Astronomy and Ancient Greek Cult

An application of archaeoastronomy to Greek religious architecture, cosmologies and landscapes.

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Abstract

This thesis examines the relationship between ancient Greek religion, cult practice, sanctuary buildings and astronomy. Its geographical range extends across the modern territory of Greece; chronologically it covers the thirteenth to second centuries BC, from a period before the development of self-standing religious architecture to the most important phases of temple construction.

Data was collected from 125 structures, giving priority to sacred structures but also considering 'secular' buildings (hypostyle halls and stoas; for stoas, the extent of the interior illuminated by the sun at different times of year is calculated, to show the significance of orientation in conjunction with function). The hypothesis that there is an astronomical orientation in Greek religious structures is tested, and the data sample divided by geographic location, date of construction, and deity (distinguishing chthonic and ouranic cults). Case studies (Apollo at Delphi, Artemis Orthia at Sparta and Messene, the Erechtheion at Athens, Demeter and Kore at Eleusis, and a number of Thesmophoria) are presented in order to examine the sample in detail, taking into account mythology, cult, rites and the local total perceived environment (land, sky and horizon). The analysis shows that religious structures were, in at least some prominent cases, oriented towards stars and constellations, not the solar range as has often been claimed. Celestial bodies were significantly integrated with the cyclical ceremonies associated with a temple, the rites performed, and the deity's attributes. This complex association of the night sky and landscape influenced the design, planning and orientation of religious buildings.

This study advances understanding of the role of landscapes in Greek religious practice, establishes the importance of astronomy and cosmology in ancient Greek religion, and demonstrates how this religious system was expressed at the local level in myths and the performance of cult rites.

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Abbreviations

ABSA	*Annual of the British School at Athens*
AJA	*American Journal of Archaeology*
BCH	*Bulletin de correspondance hellénique*
CQ	*Classical Quarterly*
CUP	Cambridge University Press
JHS	*Journal of Hellenic Studies*
n.s.	new series
OUP	Oxford University Press

Glossary

Greek Terms

Adyton: An enclosed room which formed the innermost sanctuary of a temple, located to the rear of the cella.

***Agora*:** Public open space which included religious, public and administrative buildings as well as markets, and was linked to the government of the city. It was the location where citizens would assemble and the heart of the city's political and economical life.

Bouleuterion (pl. *Bouleuteria*): Council-house, the meeting-place of the *boule* (council) of a *polis*.

Catasterism: The placing of an individual in the night sky in the form of a constellation.

Cella (pl. cellas): The inner and main section of a temple, where the cult statue would often be placed. The cella was adjacent to the adyton.

Cosmogony (cosmogonical): The theories and beliefs about the way that the cosmos came to be and was created. The study of the origins and genesis of the universe. A topic within cosmology.

Cosmology (cosmological): The philosophical and/or scientific study of the universe and its structure and operation at present.

Chthonic: Deities that inhabited the domain of the underworld and the dead. Heroes were always chthonic, with the exception of Herakles whose cult could be either chthonic or ouranic.

Deme (dêmos): A local administrative unit of Athens. The *polis* of Athens, comprising the region of Attica, was made up of many demes.

***Gymnasion* (pl. *gymnasia*):** A building that was a combined sports-ground and education centre in ancient Greece.

***Megaron* (pl. *megara*):** Minoan-Mycenaean royal-sacral building also described as a great hall. A rectangular or apsidal-ended structure with a hearth usually entered through a shallow porch at one end.

Ouranic: Deities with attributes associated with the world of the living. The terms usually denotes Olympic deities and those thought to live above the earth.

***Palaistra* (pl. *palaistrai*):** A space devoted to training of wrestlers and the performance of wrestling competitions. They were in many cases located within Gymnasia.

Pediment: An architectural term for a triangular recess filled with sculpture found at the external of both short sides of a temple underneath the gabled roof.

***Perioikoi*:** Inhabitants of the free but dependent city-states (*poleis*) in Spartan territory, mainly in Laconia but also some in Messenia, who were controlled by Sparta.

***Polis* (pl. *poleis*):** Greek city-state.

Pyre: Sacrificial or funerary fire. If part of sacrificial rites the pyre was a significant part of the cult rites performed.

Stoa (pl. stoas): A multi-purpose colonnaded building, single or double-storeyed. Served as seats for magistrates, dining-rooms and housed shops. In sanctuaries stoas would have provided shade from the sun, or protection from the rain.

Stylobate: The top step of a temple, which functions as the base on which the columns rest.

***Temenos* (pl. t*emêne*):** An enclosed sacred precinct which could contain several structures (altars, statues, temples, administrative buildings, treasuries, stoas etc.), but need to contain more than an altar of some form.

Theogony (theogonical): An account or study of the genesis, origin and genealogy of the gods.

***Xoanon* (pl. x*oana*):** The most ancient image of a deity carved on wood, which would be kept inside the cella of a temple. Greeks believed that the earliest images of the gods were carved on wood and therefore a *xoanon*, when present in a temple, denoted a very old cult. The difference between *xoana* and statues is that the former were always made of wood and were believed to be statuaries with the ability to have the spirits of gods or heroes dwelling within them (Paus. 2.2.6; 10.19.2; 3.22.12). *Xoana* could be aniconic, i.e. not literal a sculptural depiction of the deity.

Astronomical terms

Acronychal rising, *see* Apparent acronychal rising

Altitude: The vertical angle between the observer and the different features of the horizon (Ruggles, 1999: ix).

Atmospheric extinction: The reduction in the brightness of a celestial body when it passes through the atmosphere. Extinction is more pronounced for celestial bodies at low altitude.

Atmospheric refraction: The small apparent change in altitude of a celestial object caused by its light passing through the Earth's atmosphere. Refraction makes the body appear to be at higher altitude that it actually is and it is greater at low altitude.

Azimuth: The bearing from the observer measured clockwise round from true north, so that due east corresponds to an azimuth of 90°, south to 180°, west to 270° and north to 0° and 360°.

Apparent acronychal rising: The last visible rising of a star at the eastern horizon shortly after sunset. On the following evening, the star will have risen while there is still too much daylight for it to be seen.

Apparent cosmical setting: The first visible setting of a star approximately an hour before sunrise. On the previous morning, the star did not quite reach the western horizon before sunlight made it invisible.

Clinometer: Surveying instrument for measuring a slope or angles of elevation of objects.

Declination: The celestial equivalent of geographical latitude. Indicates which celestial bodies rise and set in a particular point of the horizon, and would have risen or set there at any given era in the past (Ruggles, 1999: 18).

Heliacal rising: The first visible, though brief, appearance of a star on the eastern horizon shortly before sunrise after the period of weeks when it has been invisible behind or near the sun. On the following morning, the star will be visible for longer before being drowned out by the light, since the sun has moved further east.

Heliacal setting: The last visible setting of a star shortly after sunset before it becomes invisible as the sun moves eastwards across the sky.

Magnetic bearing: The bearing from the observer measured clockwise round from magnetic north.

Chapter 1
Introduction

The argument that Greek thought progressed from a pre-rational or pre-logical stage to philosophical and cosmological theories within the course of a few centuries implies a linear course of development. Such a model seems simplistic and misleading, since it views Greek mythology as no more than the initial stage of Greek philosophical cosmology (Lloyd, 1966; 1975: 198–200). This thesis will show that developments in cosmology were more complex than is commonly asserted, by studying cosmological and cosmogonical thought and its manifestation in worship and cult.

This thesis, by examining the role of astronomical observations and cosmogonical beliefs in the realm of Greek religious practices, festivals, cult and mythology, aims to contribute to our understanding of the relationships between people, structures and the landscape. Astronomy, archaeology and literary evidence are brought together in this innovative approach, which through systematic examination demonstrates the complex and enmeshed relationship between religious structures, cult practice and astronomical observations.

One of the main ideas explored in this thesis is the possibility that Greek religious architecture was associated with the observation of astronomical bodies. If astronomy played an integral role in the timing of religious cults (through timekeeping for festivals), then could it also be part of religious ritual? One of this study's objectives is also to attempt to explore in their connection the possible astronomical content of Greek myths. Greek myths are in all cases related to religion. The religious character of divine interventions is consistent with the idea expressed by modern scholars of a connection between the positioning of structures and their surrounding landscape — more so for religious structures (e.g. Scully, 1979). This tendency, which until now has been a matter of speculation only, deserves more serious consideration.

Despite our sketchy knowledge of several areas of Greek thought, some features are clear at the outset. Through cosmogonical and theogonical ideas expressed in the earliest available writings, dating to the eighth century BC, it seems there was no general agreement as to how the cosmos came to be. For example Xenophanes's theory (6th century BC) – that the cosmos is eternal (ἀγένητος), everlasting (ἀΐδιος) and incorruptible (ἄφθαρτος) (Diels, 1956a: 124.26) – was rejected by the fifth-century atomists Leucippus and Demokritos (atomists believed in the existence of countless co-existing worlds). Their theory was disputed in turn in the fourth century both by Plato (who stated that the universe is one and created) and Aristotle (the universe is one and eternal) (Aristotle, *Physics*, II.196a 24ff; *De Caelo*, I.8–12). The beliefs of Plato and by Aristotle were in disagreement with those of Epikouros (late 4th century BC) and later Epikoureans (who argued the existence of countless eternal worlds, not created) (Epikouros, *Letter to Herodotus*, 45, 76f; *Letter to Pythocles*, 88ff).

Regardless of the differences in the cosmological beliefs of the Greeks it is apparent that within these ideas of cosmogenesis stars emerge as a pivotal theme in the formation of Greek philosophical and cosmological thought. In Anaximander's cosmology, the stars were 'cycles of fire' (τὰ δὲ ἄστρα γίνεσθαι κύκλον πυρός), (Diels, 1956a, 84.9) and Anaximenes believed that they were made of fire (πυρίνην μὲν τὴν φύσιν τῶν ἄστρων) (Diels, 1956a, 93.24) and resembled 'petals of fire as if painted' (τὰ ἄστρα [...] δὲ πέταλα εἶναι πύρινα ὥσπερ ζωγραφήματα) (Diels, 1956a: 93.26–27). Parmenides and Herakleitos believed that the stars were made up of 'compressed wool of fire' (πιλήματα πυρὸς τὰ ἄστρα) (Diels, 1956a: 146.25); Archelaos describes the stars as 'hot masses of metal' (μύδρους ἔφησεν εἶναι τοὺς ἀστέρας, διαπύρους δέ) (Diels, 1956b: 47.23); Xenophanes believed that the sun is made up of small sparks which come together every day (τὸν δὲ ἥλιον ἐκ μικρῶν πυριδίων ἀθροιζομένων γίνεσθαι καθ' ἑκάστην ἡμέραν) (Diels, 1956a: 122.34–35). Examining the cosmological beliefs of the Greeks reveals the vital role of astronomy and of the observations of astral bodies in the formation of Greek ideas about the existence and order of the cosmos and religion.

The Pre-scientific versus the Scientific

Greek astronomy has been divided into ‘pre-scientific’ and ‘scientific’ since antiquity and is still distinguished in the same way by modern scholars (e.g. Aaboe, 1974: 22; Aveni and Ammerman, 2001: 84; Dicks, 1970: 33–38). It has been divided according to its purpose since at least as early as the fifth century BC, when the observations of Homer and Hesiod were considered to be an inferior type of astronomy. At the risk of generalising a situation that may not have been representative of the rest of Greece, it seems that the Classical and Hellenistic Greek philosophers did not value highly the contribution of Homeric and Hesiodic astronomy, nor did they view it as the precursor of the scientific astronomy of the later periods. The Platonic Socrates argues that the purpose of astronomy is the pursuit of ‘truth’ and not its unscientific and common use by ‘farmers, sailors and generals’ (*Republic*, 7.527d–e). Therefore, the aforementioned cosmological theories and the astronomical observations of the Classical and Hellenistic periods have been distinguished from Homeric and Hesiodic astronomy in antiquity and in modern times.

It is possible that the division between the unsophisticated use of astronomy and scientific astronomy as a tool that assists in the unravelling of cosmic knowledge, as described by Plato, could emanate from the concept that stars were divine and living, a notion found in the *Epinomis*, according to which stars can distinguish the good and bad among people and have the ability to report to the gods everything that happens on earth (985a-8) (also Nilsson, 1940: 1–8). The cosmological role of stars and the beliefs of their divinity are also found in the *Timaeus* (40b), where it is also mentioned that the stars have been given a soul by the creator (the soul of a just man after his death) (41d–e, 42b). For the Stoics (influenced by Herakleitos), ‘men were changed into gods (καὶ ἀνθρώπους εἰς θεούς φησι μεταβαλεῖν) and stars were gods’ (Chrysippus, *Stoicorum Veterum Fragmenta*, 810–11, 813–15, 1076–7). These texts strongly suggest that thoughts of stars and religious beliefs were implicitly related in the minds of the ancient Greeks.

Astronomy and Religion

Divine presence and epiphany (divine intervention), sought in ancient Greece in natural surroundings, was a belief that perhaps related to the divinity of the skies. The presence of a god seems to have been secured through divine epiphany within Greece since Minoan times. There is evidence for epiphany in Minoan iconography, with figures shown as descending from above (Burkert, 1997: 27; Hägg, 1986), and there is a vast number of references to divine intervention throughout ancient Greek literature. As with the personification of stars, the sun (Helios), the moon (a deified figure called Selene) and landscape, it seems that meteorological phenomena were sometimes thought to have some divine essence. In many cases, they were taken as a divine sign, a message from the gods. Watching the sky for signs of divine intervention is very common in Greek mythology and religion, even in plays (e.g. the arrival of Zeus at Thebes in the form of lightning; Eur. *Bacch*. 6–10), or the custom of the Pythais pilgrimage according to which the Pythaistai group spent three days and nights in each of three months in anticipation of lightning as a divine sign for the Athenian procession to depart for Delphi (Dillon, 1997: 24). Such an intervention could occur with or without the presence of a religious structure. In this thesis divine intervention is approached with regard to its potential relationship with astronomical observation and the timing of the religious festivals.

Astronomy and Architecture

Orienting structures in relation to celestial objects and meteorological phenomena seems to have been a familiar concept in Greek thought. Such practices certainly existed in Classical Greece: this is apparent in various literary sources which speak of the optimal orientation of structures, streets and *agoras*. An example is found in the works of Aristophanes who describes Meton – known to us mostly for his astronomical pursuits – as a cosmic city planner, geometrician and surveyor, who applies celestial principles to the layout of cities:

> PEISTHETAIROS: […] And what are these?
> METON: They're rods for Air-surveying. I'll just explain. The Air's in outline, like one vast extinguisher; so then, observe. Applying here my flexible rod, and fixing my compass there —you understand?
> PEISTHETAIROS: I don't.
> METON: With the straight rod I measure out, that so the circle may be squared; and in the centre a market-place; and streets be leading to it straight to the very centre; just as from a star, though circular, straight rays flash out in all directions.

PEISTHETAIROS: Why, the man's a Thales!

Aristoph. *The Birds*, 999–1009 (Loeb translation).

Even though the excerpt belongs to a theatrical play, the reference to Meton must contain some truth in order to have made sense to Aristophanes's audience. Such examples lead me to think that it is possible that the (re-)organisation of social space within a city was linked to the organization of and beliefs about physical space in Greek cosmological ideas. To our knowledge, these concepts seem to appear with Anaximander (*c*.610–*c*.546 BC), who first introduces the concepts of geometry in the city and the universe (Vernant, 1983: 180–181, 186), but it is likely that the roots of this concept had occurred at a slightly earlier date. In any case, the development of Greek religious architecture began in the 'Dark Ages' (between 900 and 700 BC), but did not become widespread until the seventh–sixth centuries BC, dating close to the time of Anaximander. By the time of Cleisthenes of Athens and his numerologically based political reforms at the end of the sixth century BC, it is argued that cities reflect what happens in the heavens so that the microcosm of the city participates in the macrocosm of the universe (Shipley, 2005; Vernant, 1983: 224).

Our knowledge of Greek ritual is pieced together from references in the written sources, theatrical plays and the narration of tales — myths. The fears, anxieties and hopes expressed in myths, the results of relationships between humans and gods, give us an idea about the ways and terms according to which such relationships would have been maintained. The division between myth (the telling of a story 'with suspended reference structures by some basically human action pattern'; Burkert, 1979: 57) and ritual (the 'stereotyped action redirected for demonstration'; Burkert, 1979: 57) is apparent. Myth can exist without ritual and *vice versa*. In this thesis, in the case studies that are analysed in Chapter 6, both myth and ritual, are interlinked.

Timekeeping in Greece

One component of this study addresses the question of the possible role of astronomical observations in religious festivals and cults. A second component reinvestigates the significance of the orientation of religious structures. The Greek calendar – developed in the second half of the sixth century (Beyer, 1990: 4) – seems to have resulted from the need to hold religious festivals at the same time every year.

The existence of a religious (luni-solar) calendar in fifth-century Athens (Hannah, 2005: 42, 47), separate from the solar political calendar (Hannah, 2005: 44), reflects the evident necessity for accurate time-keeping in religion, in order to hold religious festivals at the correct time every year. The earliest use of calendars in Greece remains uncertain. The earliest references to timekeeping come from the Homeric writings, which are the first to mention the use of the moon in counting months (*Odyssey*, 14.162, 19.307) and the observation of stellar phenomena for keeping track of time (e.g. *Iliad*, 22.26–31). The earliest reference to observing the movement of the sun is found in Hesiod, who refers to the solstices (*Works and Days*, 479–80; 564–7, 663–5). Robert Hannah has demonstrated the existence of a third type of calendar, the 'seasonal' (2005: 46), which seems to have been used for more practical reasons such as sailing or agricultural practices, or even in making references to Panhellenic matters (for example, historical events, or medical conditions that the changing seasons could bring, found in the Hippocratic writings; (Lloyd, 1978: 148ff)); a calendar which therefore would have been possible to be cross-referenced throughout Greece. Such a time-measuring method was stellar/solar and therefore more accurate than the political Athenian calendar – as Thucydides observed (Thucydides 5.20.1–2) – making it more appropriate for timing religious celebrations. The problems of the lunar calendars have been discussed in length in the past by ancient authors (Aristophanes, *Clouds*, 615–26; Thucydides 4.118.12–119.1, 5.19) and modern (Hannah, 2005: 47–50; Ruggles, 1999: 60–63), as has the incompatibility of the calendars of the different Greek city-states (Hannah, 2005: 48); they do not need further discussion here.

Stellar observations must have been ideal for measuring time for religious celebrations, because they provide an accurate indicator of the time of year, and also due to the fact that they can be seen from any location (given no obstruction). The heliacal rising of a star will always be observable at the same point in the sky and horizon. The position of sunrise or sunset on the horizon, though, is particular to location. In this respect, some celestial observations are universal, but this alone does not make them significant. In addition, although these observations occur at the same time across vast areas, the observers, in order to recognise them, must have associated them with local reference points. Consequently, a 'universal' astronomical observation has also a very local character.

Observations of astronomical cycles must have been interwoven with observations of other cycles such as agricultural, cosmological, meteorological and religious. Not only is the wider context of astronomical observations considered in the course of this thesis, but in addition new methods are explored in which such concerns might be manifested. In particular, since the majority of religious festivals were held on an annual basis and since time was measured in ancient Greece through the observation of celestial phenomena, I shall examine whether Greek temples or other elements in the sanctuaries may have been oriented towards those celestial events which, when observed, would signify that it was time for the festival to be held.

Study area and Chapter outlines

The thesis covers in terms of geography most of modern-day Greece (apart from Crete and the Ionian islands). It stretches from as far north as Macedonia, to as far south as the southern Peloponnese and to the islands of the eastern Aegean in the east. This area was chosen on the basis that this was the place where Greek cosmological thought emerged and developed, the locality of the initiation, development and prosperity of Greek religious architecture and the nucleus from which Greek culture spread to the west, east and south. The study area also includes the sites on which all previous Greek archaeoastronomical research was focused, making it easier to assess the problems encountered by previous research.

Chapter 2 comprises a detailed review and discussion of early and more recent approaches that aimed to interpret the orientation patterns of Greek temples. Aside from the general comments on previous scholarship, the chapter reviews a number of specific case studies in which earlier methodology was applied and highlights specific methodological and interpretational problems. To move forward, I attempt a new approach with a new methodology considerably different from that applied by previous researchers, which takes into account important evidence ignored in earlier studies, such as literary sources and material culture.

Extensive use of literary sources is made in this study, but not all types of texts are considered equally reliable. The problems faced when using Greek textual evidence, as well as the criteria that group and define such sources in terms of their reliability, are outlined in Chapter 3.

In light of the problems outlined in Chapter 2, and in order to successfully and fully answer the research questions, this thesis replaces previous assumptions by employing a new and interdisciplinary methodology. This combines archaeoastronomy, archaeological evidence, historical sources and mythology. The methodology is outlined in Chapter 4. The chapter gives a detailed account of the selection criteria for the sites chosen for survey, the site sampling, measuring and recording methods, and the procedure followed in data analysis.

In attempting to examine the orientation patterns of Greek religious structures and certain types of public structure, this thesis employs two levels of data analysis. The first, presented in Chapter 5, examines the orientations in terms of chronological period, geographical location, the deity to which the religious structure was dedicated, and the function of secular structures. The results of the general analysis of the entire sample presented in Chapter 5 demonstrate that in order to understand better the dynamics of the examined relationships, we need to focus on detailed case studies (Chapter 6).

Chapter 6 is a contextual study of the role of ethnic and religious identity of the communities which created those structures. The main task of the chapter is to contextualise the orientations with the assistance of the archaeological and historical evidence, and to draw conclusions that are meaningful for the society in which the structures were created. I also study specific orientations in conjunction with the observation of astronomical events, and examine the role of the landscape in these specific cases. It seems clear that the landscape was interwoven in Greek thinking to such an extent that, in several cases, it was given human attributes, an issue which is discussed further in Chapter 7.

Chapter 7 brings together the results and ideas developed in this thesis and argues in favour of the importance of astronomy in Greek religion, an aspect which has largely been ignored by modern studies. This section takes a more theoretical approach, discussing perceptions of landscape and its role in Greek identity, religion and mythology.

Chapter 2
Literature review

Introduction

The aim of this chapter is to examine critically previous scholarship on the role of astronomical observations in Greek religion and to identify problems in previous methodologies that can be addressed and hopefully resolved. Previous research addressing this issue has focused strictly on the orientation of Greek temples and their connection to astronomical observations. It will be demonstrated in this chapter that this research – carried out by several scholars over the last two centuries – has largely overlooked the role of religious festivals, cult, and even historical evidence related to the archaeoastronomical arguments and has thus become entirely separated from research related to the development of Greek astronomical thought.

In addition to literary documents, the role of astronomy in architecture has been examined. Scholarship on Greece has mostly focused on religious architecture from Minoan times to the Classical and Hellenistic temples in Greece. As the works dealing with Minoan structures are not directly relevant to this study, only a very brief and general assessment of the approach is offered here. The general conclusion of Minoan archaeoastronomical research by Blomberg and Henriksson is that Greek astronomy was borrowed from the Minoans after the island was taken over by the Mycenaeans and was carried to mainland Greece (Blomberg and Henriksson, 2000: 118). In support of this position the authors argue that a) systematic astronomical observations (the heliacal rising and setting, the acronychal rising and the cosmical setting of Arcturus) were carried out in East Crete at the peak sanctuaries of Traostalos and Petsophas and were used in time-keeping (Henriksson and Blomberg 1997; Blomberg and Henriksson 2000: 115); b) that the phase of the moon was observed on the vernal equinox from the palace of Knossos in central Crete (Blomberg and Henriksson 2000: 110–113); c) that the sun was observed at the equinoxes on Petsophas and Knossos (Blomberg and Henriksson 2000: 115); and d) that at the E. Cretan palace of Zakros, the corridor of the House of Tablets was oriented towards sunrise on the equinox (Blomberg and Henriksson, 2000: 113–115). In addition, they argue for the Minoan origin of Aratus's *Phaenomena* (Blomberg and Henriksson, 1999). The distinct lack of supporting archaeological and textual evidence for these arguments makes it impossible to confirm such conclusions. In addition, in order to observe the illumination of the sun in the corridor in Knossos through the reconstructed entrance, the exact original height of the entrance is of vital importance. This height of the doorway cannot be determined with precision, and even a small difference in the height of the entrance would affect the time and extent of the effect of illumination observed by the authors. Equally, in the case of the palace in Zakros, the observation of the lunar standstill is dependent on the exact height of the wall on the eastern side of the court, which is impossible to determine accurately. The authors' conclusion that the wall would have been *c.*1.5 m high appears to have been solely based on the consideration that if it was any taller the observation of the moonrise would have not been visible (Blomberg and Henriksson, 2000: 113). Such an assumption creates a circular argument: the conclusion assumes the role of the moon in the construction of the structure, when evidence for such a practice is far from conclusive. The case studies of the Minoan palaces and peak sanctuaries presented by Blomberg and Henriksson describe very different types of observations: a sun–shadow effect (Knossos), lunar observations (Zakros) and stellar observations (Petsophas, Traostalos). They represent an insufficient amount of data to support reliable conclusions on Minoan time-keeping and in any case form only a small part of the available material (over twenty peak sanctuaries and at least two more palaces).

Blomberg and Henriksson argue that the oval crown that some figurines from Petsophas bear on their heads represents the moon, and that depending on the angle from which one looks at the figurines, it is possible to see a different lunar phase (Blomberg and Henriksson, 1996: 35) (Figure 2.1). This idea is used also in order to argue for the Minoans using the nineteen-year lunar node cycle, but support is

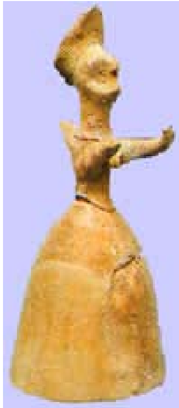

Figure 2.1: Figurine from Petsophas (after http://www.goddessalive.co.uk/issue7/crete.html).

presented for this argument. In order to support the idea the authors claim that such observations take 'hundreds of years of astronomical observations' and consequently, the use of the cycle 'in the eighth century BC means that its origins probably lay in the Bronze Age'. As plausible as this interpretation sounds, it is loaded with many assumptions: such a conclusion presupposes that Mycenaeans did not conduct their own observations (Blomberg and Henriksson, 1999: 39), which seems unlikely given their excellent sailing skills. Finally, the argument on the Minoan origin of Aratus's *Phaenomena* cannot be supported by the historical or archaeological evidence. The myths of the catasterism of the bears and the crown of Ariadne, which are used as examples of the Minoan origin of the *Phaenomena* (Henriksson and Blomberg, 1999: 307), do indeed refer to locations in Crete, but the earliest references we have for the myth of the bears date to the Hellenistic period, from Aratos himself (Aratos, *Phaen*. 30, 36, 94; also Apollodorus, 3, 100–101; later Paus. 8, 3, 6; Hyginus, 130, 177). The earliest reference to the Minoan origin of Ariadne is found in Homer (*Od*. 11.321). Blomberg and Henriksson claim that there existed a Minoan version of the *Phaenomena* in verse (in order to assist the memorisation of the knowledge), which was later translated into Mycenaean and then into Greek (Blomberg and Henriksson, 1999: 72). The mistakes found in the *Phaenomena*, however, which could be taken as indication that the poem was composed several centuries before Aratus, are not systematic and do not all point to the same date of observation. There is no evidence in support of this argument. According to our present knowledge, the data reflected in the *Phaenomena* drew on existing work by the astronomer Eudoxos (Kidd, 1997). They were later reworked in verse by Aratus. For the authors' argument to be considered as a likely interpretation, it is imperative to justify Eudoxos's intervention and Aratus's reasons to copy Eudoxos's work.

As far as Minoan palaces are concerned, Shaw's approach (1977) is much more contextual and objective. Shaw raises some interesting points on the function and orientation of the palaces, but does at the same time acknowledge the lack of evidence that could facilitate any general conclusions: 'not enough is known about the Minoans [.....] we do not know their calendric system, cannot estimate their interest in celestial phenomena, nor are we in a position to describe the equipment that they might have used to make the observations' (Shaw, 1977: 58).

Nissen

Since 1869, when Nissen published his first account on the orientation of Greek temples, the field has been influenced by his ideas. His model has been quoted by several researchers from Dinsmoor to Beyer (Dinsmoor, 1938: 97, 98, 99; Beyer, 1990). This and the following section systematically critique earlier approaches to Greek temples and their orientation, as represented by the researchers who initiated Greek archaeoastronomy: Nissen and Penrose. Such a critique is long overdue, as the research carried out by the two scholars has been the foundation stone of more recent research.

The idea that has been dominating the field of Greek archaeoastronomy to this day is that the vast majority of Greek temples face east with only a few exceptions (Dinsmoor, 1938: 115; Nissen, 1869: 162, 174, 175; 1906: 125; Penrose, 1893a: 380; 1893b: 808; Scully, 1979: 44, 151). In addition, the focus of Nissen's and Penrose's theory was that Greek temples were aligned to sunrise on the day of the god's major festival (Dinsmoor, 1938: 122, 133; Nissen, 1873: 527–28; Penrose, 1893b: 380). These two arguments form the basis of Nissen and Penrose's models. Archaeological evidence can prove the first idea to be no longer sustainable (see chapter 5) so no further discussion is offered here. The second – that of the solar alignment – can be easily dismissed through historical and archaeoastronomical evidence.

Nissen's original argument was formed by the notion that the sun was the oldest symbol, its worship was the earliest and its importance remained until the point when states started manipulating the calendars. It was at that point that the practice of orienting the temples towards the sun was relaxed (Nissen, 1873: 523; 1906: 259). In his view about the function of Greek temples, Nissen agrees with Lockyer's suggestion that they were operating as 'giant telescopes' (Lockyer, 1891: 11) suggesting that the temple doors would open once a year to allow the sun, or starlight to enter (Nissen, 1906: 122). The existence of windows and roof openings, which were common architectural features in Greek religious architecture, could make dramatic changes in the illumination of the structures. Such features invalidate the concept of deliberate temple alignments to receive the first rays of the rising sun on the festival day that would illuminate the interior of the temple and the cult statue. The openings would have allowed the light to enter the entire cella without directing it only to its centre, as would have occurred if the structure had only one central opening. The archaeoastronomical models which argue in favour of the illumination of the cult statue by the first rays of the sun do not take into consideration the presence of such openings. Starlight is not strong enough to visibly illuminate an enclosed space. Nissen distinguishes between stellar orientations – which he argues to have a priestly character – and solar ones with a state character, although sometimes they are linked with each other (Nissen, 1906: 162). Nissen does not, however, justify and explain such an idea through the presentation of supporting evidence with regard to why such a division should be made.

Nissen seeks verification for most aspects of his model in Egyptian and Semitic influences in Greece, which would have introduced the Greeks to religious astronomy (e.g. 1873: 521; 1906: 114, 249, 253–257); these cultures are known to have been familiar with the use of astronomical observations for religious purposes. The connection that Nissen presupposes, however, inhibits him from examining the development of Greek religion and thought in depth, exploring its development and influences. Had he done so, his approach would have been more contextualised within Greek culture, rather than assigning every development in Greek religion and religious architecture to foreign contacts and influences.

Nissen – unlike Penrose – acknowledges that extreme precision in the measurements does not result in the greater accuracy of his interpretations, as the Greeks could not have been more precise than the magnetic compass. As it is hard for the naked eye to see extreme details, he finds a deviation of one degree an acceptable margin of error — arguing that such a deviation would not be noticed with the naked eye (1873: 534). Nissen creates three groups of temple orientations: those with the long axis oriented within the solar range, those with the short axis oriented within the solar range (although the main entrance of those would have been facing north or south), and those where neither axis falls within the solar range (Nissen, 1869: 189). It seems thus that Nissen's primary concern is to associate as many temples as possible with a solar orientation. Such an aim seems on the one hand to overemphasise the importance of the sun. It overrides any other selection criteria and determines the orientation of a structure according to which axis falls within the solar range, regardless of whether the structure was actually facing towards that direction or not. On the other hand, once the solar orientation is determined, there will be two dates with which the orientation could be associated.

Nissen never gives any general reasons why astronomical orientations would have been important. He classifies orientations as solar, lunar, or stellar but does not seem to identify any factors that would have determined any of these three associations. In some cases for example, he adopts stellar and solar associations for the same structure, like at the temple of Zeus Basileus in Lebadeia, which he concludes is oriented towards Regulus in the constellation of Leo, but during the month that the sun was in Leo (Nissen, 1887: 55). This combines stellar and solar associations but Nissen does not state why some temples only have solar or stellar orientations while others have both. Such conclusions contradict his initial claim that the orientation of the Greek temples divides them into two groups: those associated with stars and those with the sun (Nissen, 1906: 123). It appears that Nissen's ideas are driven by using the orientation of a structure as a starting-point and then trying to find a stellar body that fits or a day on which the sun will be rising on the axis of the temple. Attempting to find explanations for orientation following such a methodology can be risky indeed. It is easy enough to fit at least one star against any orientation. What is challenging task is to actually explain and contextualise the star in terms of the specific cult. Nissen did not take this second step. His argument results in assigning random stellar, or solar associations to temple orientations.

Through the application of his model, Nissen uses the orientations in order to establish the timing of festivals for which there is no surviving historical or archaeological evidence. For example, at the Heraion in Samos, he deduces from the temple axis that the festival would have been held in April or September (1887: 45). Aside from the fact that the sole evidence he used for such a deduction is the temple alignment itself, the great accuracy with which Nissen converts the ancient Greek calendar to Gregorian dates, in most cases to the exact day (e.g. Nissen, 1885: 364) is undoubtedly flawed. The conclusion that the festival day was determined by orienting a structure to one specific sunrise in the year leaves unexplained the very common shift in orientation between consecutive temple phases. Aligning temples to sunrise would result in consecutive temples having practically the same orientation, which in the majority of the cases is not true for Greece. The fact that it is common in Greece for the orientation of consecutive temples to shift was detected by Penrose, who claimed that it was related to the stellar associations that the temples had in addition to the solar ones, but Nissen only discusses the reasons behind the much greater shifts (around 60°–90°) that are observed in some sites. Without examining the development of any cult, Nissen dismisses these greater changes in orientation as the result of foreign contacts and influences and the introduction of new customs (Nissen, 1885: 364). No archaeological or literary evidence is offered in support of this claim. The change in orientation is generally from west to east, or, as Nissen puts it, from facing the Aegean Sea to facing the sun (1906: 249). Had such an influence occurred, we would expect the influences not to have been limited to the shift in orientation, but to have resulted in innovations in other aspects of the cult and worship. Nissen, however, does not discuss any such evidence.

The island of Delos forms a significant part in Nissen's argument, but he overlooks archaeological evidence that strongly opposes his idea. Athenian influence on the island started during the time of Peisistratos around 540 BC and was marked by the Athenians' temple of Apollo, built in the late fifth century BC. The Poros temple – which Nissen regarded as the oldest – was built in the first half of the sixth century BC, prior to the Athenian influence on the island (Nissen, 1906: 249). The oldest temple is in fact temple Γ (Figure 2.2), which dates to the Geometric period (ninth–eighth centuries BC). This faces north, and has an architecturally peculiar entrance, occupying the entire length of the north wall (Bruneau and Ducat, 1965: 80). Nissen makes no comment on the peculiarity of the House (*Oikos*) of the Naxians, perhaps the second oldest Apollo structure in Delos, built in the seventh century, long before the Athenian influence on the island. The construction of the *Oikos* shows three different phases, each with a different entrance orientation, the earliest of which was in the middle of the north wall (Bruneau and Ducat, 1965: 79), following the same orientation as temple Γ (Figure 2.2). The present structure of the *Oikos* is the last of the three phases, completed in *c.*550 BC, with its main entrance towards the east, thus facing the Geometric temple of Apollo. It has a second entrance to the west and the Naxian colossus – a statue representing Apollo– was placed outside, adjacent to the north wall, also facing the East (Figure 2.2). It is suspected that this was the temple of Apollo that followed the Geometric structure, which was converted to an *Oikos* (part of the sanctuary, but not a place of worship) in the fifth century (Vrissimtzis, 2003: 16–18).

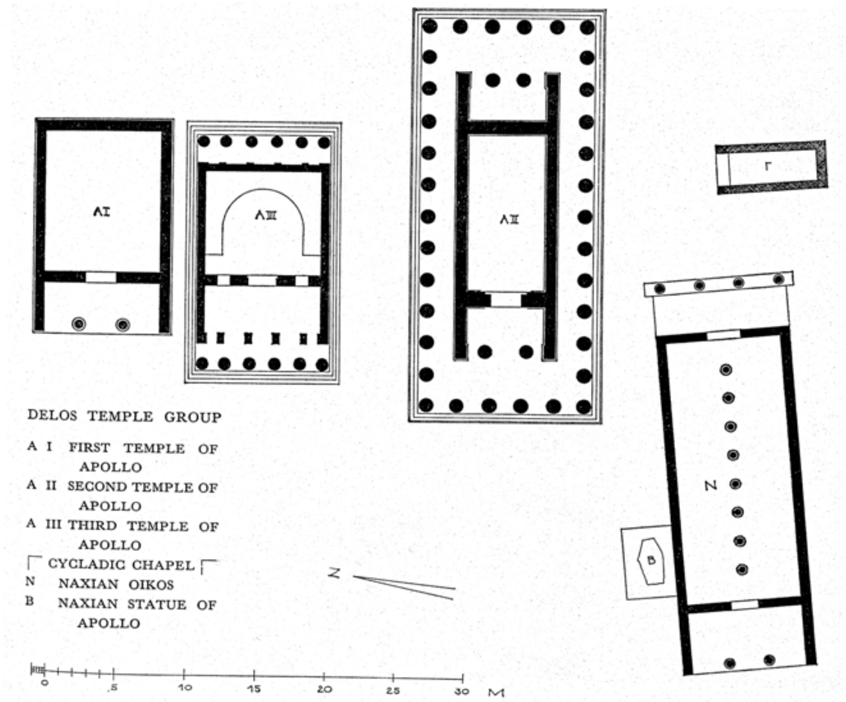

Figure 2.2: Plan of the *temenos* of Apollo in Delos (after Berve and Gruben, 1963).

Nissen uses a second example from Delos: the temples of Artemis. The first Artemis temple dating to the Mycenaean period was oriented towards the south. In the archaic period (seventh century BC) onwards, it faced towards the east as it did until the Hellenistic period (Bruneau and Ducat, 1965: 100–1) (Figure 2.3). The orientations of the Apollo temples, then, rotated from north to NE to west, while the Artemis temples, which are also the oldest group of structures on the island, shifted from south to east. These two groups of structures used by Nissen in support of his foreign influence model did not follow the same pattern of orientation change as he presents (Nissen, 1906: 249). In the case of the Apollo temples he disregards the initial northward orientation, and in the case of the temples of Artemis he claims that the first Artemis temple faced east and then was shifted 60° towards the south as the result of Egyptian influence (1906: 249, 254). Nissen only uses the Delos temples in support of the idea of foreign influence in the temple orientations (1906: 249) but, as has just been demonstrated, this idea contradicts the archaeological evidence.

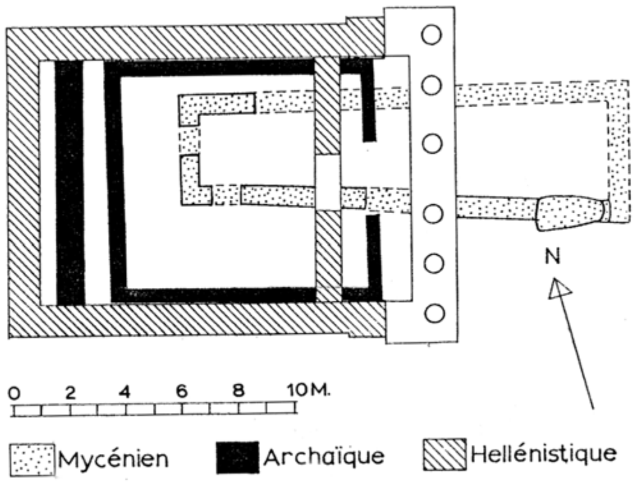

Figure 2.3: Plan of the temples of Artemis in Delos (after Bruneau and Ducat, 1965).

Nissen's idea of foreign influence recurs in the case of Greek time-keeping. He argues that the native Greek time-keeping methods dictated the use of the movement of the sun, which was also the reason why early Greek temples predominantly faced within the solar range (Nissen, 1906: 257). A first objection to this claim is that many early Greek temples did not face within the solar range (e.g. the Erechtheion in Athens, Pelopion in Olympia, temple of Athena Pronaia in Delphi, temple of Hera in Tiryns, Megara A and B and temple of Apollo in Thermon, temple of Dionysos in Naxos etc.). The use of stellar observations for measuring time, he argues further, was a foreign concept for the Greeks, which derived from contacts with the Near East and Egypt. Nissen does not specify the period that he is discussing and it is therefore difficult to understand during which period he thought that such influences had taken place, but he could hardly have thought that this had occurred before the ninth and eight centuries, as the remains of post-Bronze Age religious structures before that time are sparse. Such an argument then, neglects the writings of Homer and Hesiod, both of whom use stellar observations, and more importantly, he overlooks the documented foreign contacts within Greek space with oriental cultures that were present since the Late Helladic period. This distinction between foreign and native religious traditions leads Nissen to the conclusion that the orientations of the temples can help in distinguishing between native and 'immigrated' deities. Hera and Demeter are, as a result, native goddesses, as their temples only face the sunrise (Nissen, 1906: 255). In this conclusion about the two goddesses, he disregarded the temple of Hera in Delos (az. 172°) with declination –45° (see p. 58 for definition of declination), Hera's Geometric temple in Tiryns (az. 180°) with declination –51°, built on the remains of a Mycenaean *megaron* following its orientation, and Demeter's temple in Naxos (az. 213°) with declination –43°. Zeus's temples are argued to be facing the east, with only one exception of an earlier temple. In view of this conclusion I would like to draw attention to the temple of Zeus Hypsistos in Dion (az. 147°) with declination –41° which is not early at all, but probably built in the Classical period (the temple is not yet published). Finally, Athena is argued to have all her temples facing east but there is no mention of Athena Pronaia's temple in Delphi (az. 177°) with declination –45°. Consequently, the orientations of Zeus' temples do not range over 30° as argued by Nissen (1906: 259), but instead over 70°, and the Athena temples do not range over 34° (1906: 259) but 95°.

One last idea that Nissen puts forward is that the determination of festival dates implies that during the course of the Greek year there were cycles of festival and rest seasons. The festive season, according to Nissen, began in March (with the commencement of the sailing season), and lasted until May. From 10 May until around 10 August there was a summer break from celebrations. With the end of this period and towards the end of August, the new cycle of celebrations commenced, lasting until sailing ceased at the beginning of October. The spring and autumn cycles are for Nissen the periods when the major festivals were held in Greece (1906: 258). Such an argument is erroneous. The Panathenaia in Athens for example, were held in July–August, during Nissen's summer break; the Thesmophoria were celebrated in October–November; and the Lesser Mysteries fell in February–March, within Nissen's winter break period. All these three were major festivals.

Despite the shortcomings of Nissen's model, his approach is by far the most contextual that has been attempted hitherto in any archaeoastronomical study for Greece. Even though some of his ideas are not valid, he attempts to use the historical sources in order to support his conclusions. An example of this is seen in his book *Das Templum* (1869: 169–175), where he lists all the available sources on orientation when praying – even though most sources are Roman with a few Classical exceptions – acknowledging that the Greeks left no references on the principles of temple orientation (1885: 328).

Penrose

Penrose's model, which is similar to that of Nissen's, deduces dates for the cults and for the construction of the structures that pre-date by several centuries the archaeological finds. He dates the vast majority of the temples he surveyed, to a period he calls 'pre-Homeric'. He accounts for the lack of archaeological evidence to support these dates by arguing that the earlier date corresponds to temples built previously on the exact spot, with the same orientation, the remains of which did not survive (1892: 395; 1893a: 383). His aim is to verify the validity of his theory by using the overlap between the festival date and the timing of the astronomical observation. The dates he gives for the temples, though (Table 2.1), pre-date even the earliest dates of the festivals, in most cases by almost a millennium.

Penrose's aim is to continue and extend previous research initiated by Lockyer and Nissen on Egyptian temples by adding more precision than the magnetic readings used by the previous researchers. The magnetic error seems to Penrose too great when attempting to establish the precise date of construction of a temple, as he argues that a shift of one degree could lead to very different conclusions. It is contradictory that Penrose attempts to be as accurate as possible with his measurements (to the nearest minute of arc), but allows himself to correct his values for the orientation of structures he revisited and re- measured. Repeated theodolite readings should not deviate by more than a few minutes of arc, whereas in several cases Penrose corrects his earlier measurements by more than half a degree.

Such an example is the temple of Apollo in Delphi. In his 1897 paper, the orientation was measured at 227° 53′, whereas in 1901 the same temple was measured at 45′ less (227° 8′). Another example, the temple of Zeus Olympios in Athens, was changed from the initial 257° 35′ to 258° 44′, with the horizon altitude corrected from 0° 35′ to 1° 55′ (Penrose, 1899: 371). In his attempt to accurately define the exact time at which festivals were held, Penrose (like Nissen earlier) converts the Greek dates to very specific dates of the Gregorian calendar. For example, he states that the Eleusinian Mysteries were held on 16 September, the Niketeria festival on 4 September (2 Boedromion, which in fact can fall anytime between mid-September and mid-October (Vrettos, 1999: 502)), the Theseia 8–9 October (1892: 396) (held on 8 Pyanepsion which can fall between mid-October and mid-November: Vrettos, 1999: 364, 734), etc. As Stecchini points out, measuring with greater accuracy than is valid for the circumstances leads one to assume discrepancies that are not present (Strecchini, chapter 5: 10).

Temple	Penrose's dates	Archaeological Dates
Hecatompedon, Athens Acropolis	1150 BC	between 570–540
Temple of Athena, Sounion	1125 BC	Small: begin. of mid 6th Large: mid. of 5th
Heraion, Olympia	1300 BC	Around 600
Heraion, Argos	1760 BC	Old: 1st half of 7th New: after 420
Temple of Olympian Zeus, Athens	1135 BC	AD 131–132
Temple of Zeus, Olympia	760 BC	472–470
Temple of Zeus in Aegina	670 BC	570 (2nd temple) after 510 (3rd temple)
Temple of Zeus, Nemea	700–670 BC	Old: 73-410 New: 330-270 330 or after
Temple of Nemesis, Rhamnous	780 BC	Begin. of 5th

Table 2.1: Some examples of the dates Penrose obtained from applying his solar alignment method and how they compare to the archaeological evidence.

Penrose seeks both solar and stellar orientations. Most temples (those within the solstitial limits) are associated with both a star and the sun. The 'solstitial temples', he argues, have two astronomical associations: they are aligned to a star, which indicates the year of construction of the temple, and also to the sun on a particular day of the year, which is the day of construction and of the major festival celebration (1893a: 380). Penrose uses no supporting evidence for this claim, nor does he provide a context that could connect the chosen star to the temple or cult. It seems that this argument is created in an arbitrary manner. Nor does he not explain or justify his conclusion that the stellar and solar observations had to be observed from the temple's *adyton* (innermost and most sacred area). He only makes the following statement: 'Rising or setting must be just so far in advance of sunrise as to enable the star to be seen from the adytum of the temple' (1892: 396).

The length of this thesis does not allow me to analyse in detail every argument that Penrose made in his lengthy list of publications. His conclusions about the temple of Apollo in Delphi are analysed here, as an example of some assumptions that his model was based upon. He argues that archaeologically there is evidence of another temple (earlier than the surviving one) on the same site, but with a different orientation. Archaeologically, in fact, there is no evidence for the presence of a temple around 1180 BC, the date Penrose deduces for the construction of the earliest temple. He further attempts to define the orientation of the older temple. However, as there are no surviving remains of that structure he concludes that the temple would have been built parallel to the masonry wall, which is oriented 4° away from the present temple of Apollo (1900: 613; 1901: 389). In fact, there is no archaeological evidence that an earlier temple shared the same orientation as the masonry wall. Penrose initially associates *β* Lupi with the orientation of the temple (1896: 383, 385). However, the lack of historical evidence and the faintness of the star result in him revisiting this claim. In 1900 he changes the stellar association to *ε* Canis Majoris (1900: 1, 86). With this alteration, he also alters the temple orientation from the initial 227° 53′ to 227° 8′ (1900: 612) without any reference to the reasons behind the orientation change, or the association of the constellation with Apollo. We can infer from Pausanias (10.5.9–10) that the earliest temple would date to around the ninth century. Even if founded by the Mycenaeans it would have had to have been constructed by around 1100 BC at the earliest. Not only is an association between either β Lupi or ε Canis Majoris and Delphic astronomy unfounded, but there is also no evidence that these stars were known to the Greeks in the first millennium BC. Penrose himself seems dissatisfied with his argument for the temple of Apollo in Delphi. He concludes that '… no satisfactory explanation could be made for Apollo's temple without the sun' (1897: 51), on the grounds that the temple is oriented towards such a high horizon that the sun could not have shown through the temple to illuminate the cult statue.

The combination of stellar and solar observations of the Greek temples is argued by Penrose to have been functional. He supposes the highest moment of the religious festivals to have been the moment of the day when the sun, aligned to the temple's axis, would have illuminated the cult statue, which would have been located in the adyton. He connects the astronomical observations to the cult by arguing that the heliacal rising of the star aligned to the temple axis operated as the warning sign that the time was approaching when the rising sun would illuminate the statue. According to Penrose, the one hour by which the star would have risen before the sun would have provided the priests with the necessary warning in order to commence the preparations for the festival (1896: 383; 1893b: 808). This claim seems unlikely. A much longer warning would have been needed both for the priests to prepare for the festivals (sacrificial animals, offerings, personal adornment and preparation), as well as for the pilgrims to be notified of the commencement of the festival; more so for Panhellenic festivals. It seems unlikely that the festivities would have begun with the sighting of the star or sun, especially given the nocturnal nature of most Greek festivals, which entailed night-long preparations and celebrations and ended at dawn. From Penrose's statement that worship in Greece 'was carried on almost exclusively at sunrise' (1893a: 380), it seems that he overlooks this nocturnal character of many Greek festivals. Penrose argues that the sole function of the side entrances in temples was to illuminate the cult statue. If his argument on the importance of the statue illumination were valid, and the observation was indeed so significant that the architecture of the temple would have been compromised by an additional side opening to facilitate the event, it still has to be explained why a much simpler rule could not be followed: i.e. to orient the temple towards the rising sun. In this way, the sun would enter and illuminate the statue from the main entrance rather than the side. Penrose does not discuss why the main temple axis should face 90° away from the all-important rising sun.

At Eleusis, Penrose claims that Sirius rose at midnight on 14 September. He states that the rays of the rising star would have been 'reflected from some combination of jewels' (1892: 396) inside the temple (1893a: 383). The Herodotus excerpt (2.44), which Penrose uses for this argument, is misinterpreted. Nowhere does Herodotus mention the reflection of anything being captured on jewels. He simply describes two shafts, one of gold and one of emerald.

> 'And because I desired to get some certain knowledge of these matters from whom I best could, I sailed also to Tyre in Phoenicia, when I learned that there was a holy temple of Heracles there. And I found it was richly adorned with many offerings, and therein were also two pillars, the one of refined gold and the other of emerald, which shineth by night with a great light' (λάμποντος τὰς νύκτας μεγάλως) (translation after Powell, 1949: 130).

The pillars could have been shining at night as a result of torches being lit inside the Telesterion. The date of the Eleusis temple calculated by Penrose to be 2100 BC (1893b: 824) seems wholly unrealistic. The factor that led him to infer this date was that in this year Sirius would have risen close to midnight, which is a modern concept. It is likely that even Penrose was not convinced by such an early date and perhaps this is the reason why he decides to take into account the orientation of the northern jamb of the door, which gave him a somewhat later date (1400 BC) (1893b: 824).

Penrose and Nissen consider only stars of first or second magnitude as possibilities for determining the orientation of the temple axis. Such a criterion seems unjustified. There is no reason why the Greeks should only choose bright stars – if indeed they did align their temples to stars. Small but eye-catching asterisms like the Pleiades had been used as markers of time since Homer.

There is no justification for the idea that the stellar and solar alignment of temples was relaxed towards the end of the sixth century BC, at which time Penrose says that the later temples 'appear to have been built without any reference' to the stars as time-keeping methods (1892: 396). He uses this explanation to justify the great shift in orientation in the surviving remains of the Theseion, Nike Apteros and Erechtheion. This study does not examine precession with regard to the change in orientation between subsequent temples, because the date at which precession was noticed by the Greeks is uncertain and because the shift can be too small to be noticed with naked eye. Precession is not used in support of the arguments put forward in this thesis, or as evidence for the astronomical significance of the orientations. Although Penrose acknowledges that the first evidence we have of the knowledge of precession comes from Hipparchus (190–120 BC) – almost a millennium after the majority of the dates that he ascribes to the temples and cults (1893b: 807) – he nevertheless considers precession to be the only explanation for the change in orientation between subsequent temple phases (1893a: 380).

Dinsmoor

The most referenced and influential publication on Greek archaeoastronomy is the paper published by Dinsmoor in 1938. The publication does not include new data but it was conducted in the post-Penrose period, when archaeologists had already become cautious about the speculative nature of existing archaeoastronomical research and the methods of dating structures according to their orientation. Dinsmoor reuses Nissen's and Penrose's data but re-examines them from a slightly different perspective. He examines the orientations to find lunar and solar associations, and assumes that it would be possible to determine the date of a temple if one used archaeology or other possible dating methods to determine the orientation of a temple to within a particular 19-year lunar node cycle. Then, using its orientation, we could determine the exact year in which the temple was built by fitting the orientation to the position of the sun at sunrise on the specific festival day. This approach continued the previously argued significance of sunrise in the orientation of Greek temples — an argument which had not been supported by other evidence. Like Penrose, Dinsmoor does not attempt to contextualise his astronomical conclusions and to a large extent his arguments are very similar to those of Penrose. As a result, this article will be discussed here in brief, since the previous criticisms apply also in his case. Dinsmoor commences his treatment of the orientation of Greek temples with the statement that 'the Greek calendar was always a lunar one' (1938: 118) and as such, stellar and solar observations 'could have never been employed by peoples observing lunar calendars' (1938: 95). Perhaps Dinsmoor employed this argument in order to criticise research carried out by previous scholars who attempted to associate the orientations of the temples with stellar and/or solar events. Nevertheless, such a statement is incorrect. It is established that the Greek calendar was luni-solar, not lunar. In addition, in making this claim, Dinsmoor overlooks ancient astronomical writings and artefacts (i.e. *parapegmata*) which refer to stellar and solar observations as a means of time-keeping and he argues that: 'No ancient people possessed such a calendar as would bring any designated moment in the same relationship to sun or stars in recurring years' (1938: 105). Dinsmoor concludes that the change of orientation between consecutive temples resulted from the irregularities in the Greek lunar calendar (1938: 118), a claim that is far from grounded. He attempts to explain the orientation criteria of only those temple orientations that fall within the solar range. The 19% of his data that do not fall within this category are completely disregarded throughout his approach. It appears then that his approach is loaded with the assumption that only solar orientations are of significance but nowhere is such an assumption discussed or explained.

Scully

Approaches which examine the orientation of Greek temples from the perspective of the landscape have been published in recent years. The best known is that of Vincent Scully (1979). Perspectives like Scully's which attempt to explain the orientation of temples as the result of landscape features to which the temples were oriented fail to convince, as the observations they describe are subjective and the features and shapes that one sees in the landscape (e.g. female figures, heads of animals, etc) can be quite inconspicuous. Scully's approach argues that there are two criteria that determined temple orientations: 'a) the sacred character of the landscape and b) the tension between special terrestrial and celestial points of focus that may or may not have existed' (Scully, 1979: 44). Those temples that are not oriented to the east are explained as the result of the landscape which dictated a different positioning, in order to achieve a topographical conformation of the site as a whole.

The landscape could indeed have been a determining factor in the positioning of the temple, but the way in which Scully interprets the landscape seems very subjective. He claims that all the Bronze Age and Mycenaean religious structures were oriented towards mountain horns which were the symbols of chthonic deities (Scully, 1979: 25–40), but offers no explanation of such a symbolism apart from that mountain peaks (referred to also as mountain horns or cones) symbolise the great Goddess. For subsequent periods he seeks features in the landscape that could be symbols of the deity whose temple he examines – bearing in mind that all deities supposedly derived from the one Mycenaean great goddess – but in doing so he limits his horizon descriptions in seeing only horns and cones, which were for him the symbols of chthonic deities and could therefore serve to confirm the continuity in religious beliefs from the Bronze Age. Scully's approach fails to take off, mostly because of the way that he limits himself in looking at landscape features and also because some of his parallelisms of the distant horizon are simply not convincing. For example he describes the landscape of the temple of Apollo in Mt Ptoön: 'in order to arrive below Ptoon's cleft, which yawns abandoned and painful' (Scully, 1979: 106). Or the horizon of the temple of Zeus in Nemea: 'The mountain which, from Acrocorinth, resembles a crouching lion' (Scully, 1979: 140). Issues concerning landscape phenomenology are discussed in Chapter 7 (Discussion), where more examples are offered and a longer discussion is given on the problems of such visualisations.

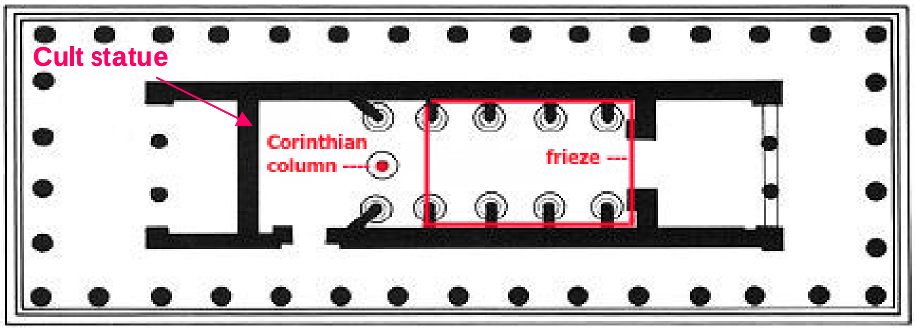

Figure 2.4: Plan of the temple of Apollo in Bassae (after http://www.beazley.ox.ac.uk/cgprograms/Site/Script/TempleApolloBassaeSite.html).

Scully's account of the orientation of the temple of Apollo in Bassae is an example of the author's attempt to explain "non-conformative" orientations as the result of landscape features. He argues that the northward orientation of the temple resulted from the location chosen for the temple and from the landscape, and would have been ideal to make Apollo's presence as a saviour felt in the wild (Scully, 1979: 27–28). This interpretation of the eastern side entrance is somewhat unconvincing. He sees the Corinthian column, placed in the middle of the lateral area of the temple (Figure 2.4), as the god's tree symbol and therefore as replacing the cult statue which in Greek temples would normally have stood at this spot. He places the cult statue against the SW corner of the temple, facing the side entrance. With such an arrangement, he argues, the image of the god would have looked out to Mt Lykaion, where the sanctuary of Zeus was located and which was not visible from any other location in the temple (Scully, 1979: 127–128). Perhaps it is true that the sanctuary of Zeus on the peak of Mt Lykaion was not visible from anywhere else in the temple of Apollo, but it remains unclear why such a connection would have been of significance in the first place. If this arrangement was indeed made in order for the cult statue to be facing Mt Lykaion, we would expect the connection to have been a very strong one, but none of the historical sources makes any mention of a connection between the two cults or sanctuaries, nor about the positioning of the cult statue of Apollo in the temple.

Liritzis, Vassiliou

The most recent systematic approach to Greek temple orientations is that of Liritzis and Vassiliou, but this still conforms broadly to Penrose's model and approach. While recognizing the need for more contextualized approaches (Liritzis and Vassiliou 2002: 72; 2003: 96), Liritzis and Vassiliou adopt the methodology and approach used by scholars over a century and a half ago. The authors agree with Penrose and Dinsmoor on the predominance of eastward orientation in Greek temples and treat any other orientations as 'a few exceptions' (2002: 71). This thesis will demonstrate in Chapter 5 that such a conclusion is flawed.

Liritzis and Vassiliou seem to commence their approach from the belief that the existence of astronomical associations in Greek temples is confirmed. This becomes evident from the format of the majority of their publications, which offer tables showing solar and stellar associations and alignments for the examined temples, based on the orientation of the structures. The selection criteria for the chosen celestial bodies are not discussed in any of their publications. It appears that selection is based solely with regard to the structural alignment, following Penrose's and Nissen's models.

The presence of astronomical connections to the orientation of religious structures in other cultures such the Maya and prehistoric Britain does not verify that this was also the case in Greece, as the authors claim (2002: 70, 71). In several cases the authors make conclusive statements on the function and association of the structures with celestial bodies without presenting supporting evidence. During the study of the temple of Apollo Epikourios in Bassae for instance, before discussing any background information on the temple, the function of the eastern door is stated to have been 'to admit the sunrise at right angles to the axis' (Liritzis and Vassiliou, 2006: 14). This idea was first put forward by Penrose (1896: 383). Starting the examination of a structure with such a statement before examining other avenues or possibilities indicates an approach that predetermines the astronomical significance of the orientations. In the case study of Eleusis the scholars claim that Antares and Orion were the celestial bodies that determined the orientation of the Mycenaean *megaron* in Eleusis. The etymology of the red giant Antares (*anti* + *Ares*) does indeed mean 'rival of /against Mars', but this reference is with regard to its red colour, which is like that of Mars (Ares in Greek), and not – as Liritzis and Vassiliou claim – in relation to the warlike attributes of the star being like those of Mars (god of war) and Orion. According to the authors, the justification for such a conclusion is the 'war atmosphere during late Mycenaean times, invasions, migrations, colonizations etc' (Liritzis and Vassiliou, 2002: 77). The Telesterion in Eleusis is argued to have an orientation determined by the sun, towards sunrise on the shortest day of the year (22 December). This, they argue, is associated with the promise of life after death of the Eleusinian Mysteries, and therefore less darkness (Liritzis and Vassiliou, 2002: 76). Such claims cannot be supported by the archaeological or indeed the historical record. With this assertion the importance of the Eleusinian Mysteries is suddenly shifted to the significance of the sun in the cult and in the ideas that the Mysteries encompassed. Nowhere in the sources do we find such a connection between the sun and the Mysteries. In fact, quite the opposite seems to have been the case. All the elements that made up the institution of the Mysteries were emphasizing darkness, death and the underworld, from the myth of the abduction of Kore and the agreement that she would spend one third of the year in the underworld, to the chthonic character of Demeter as a goddess, the performance of the cult during the night, the re-enactment of the return of Kore from the underworld and the presence of the temple of Plouton in the sanctuary. The cult and tradition of the Mysteries had an undisputed chthonic character which is in contrast to the solar connections argued by Liritzis and Vassiliou.

A third example is the case of the temple of Athena Lindia in Rhodes. Liritzis and Vassiliou claim that the temple was connected to the constellation of Centaur (Cheiron) who in Greek mythology taught medicine to Asklepios, thereby giving healing attributes to Athena Lindia. The authors support the idea of the healing properties of Athena Lindia using the great amount of votive offerings found in the sanctuary (2003: 97). The archaeological and historical evidence, however, shows no indication of such attributes. Votive offerings are found throughout Greek sanctuaries. Those offerings that are connected to healing requests – such as those found at the sanctuary of Asklepios in Kos – are distinctive from other types of offerings. At the sanctuary of Athena in Lindos, no offerings that would be dedicated for healing requests were found: the predominant offerings in the sanctuary are female figurines, perhaps reflecting Athena's relationship with women as the protector of the household. Depictions of women holding a child are frequent, as are seated boys and male figurines reclining and holding a drinking vessel, probably connected to the sacrificial banqueting which took place in the rooms of the Propylaea. Exotic animals like lions as well as birds and cats, objects of Egyptian, Near Eastern and Cypriot origin are also attested in significant quantities and finally, objects representing cult implements: lamps and torches used in processions, baskets, wine jars and drinking cups which are related to the feasting. In addition to the archaeological evidence, no literary sources mention healing properties for this sanctuary. No such mention is made by Pindar in his *Olympian Ode* 7 when he talks about the sanctuary (7.35–49), nor do the later accounts talking about Athena's epiphany in the sanctuary at the time when the Persians were invading Greece in 490 BC (Grant, 1953).

Finally, the ideas presented in the case study of the temple of Apollo Thermios seem to be dependent on attributes of Apollo from cults not related to the specific cult of Apollo in Thermon. The claim that Apollo Thermios was connected with fire worship is nowhere attested in the archaeological and historical records. The idea is presented as an established view, but the authors do not provide the epigraphical evidence that they call upon in support of this (Liritzis and Vassiliou, 2006: 15). The epithet is not connected to fire as they argue, but instead derives from the word for hot-springs, θέρμαι *(thermai)*. The aurorae argued to have been the determining factor in the temple's orientation do not seem to be a predictable and regularly repetitive event to the extent that they could have inspired the construction of three consecutive structures over three centuries, especially at such low latitudes as that of Greece. The temple that is examined by Liritzis and Vassiliou in this case study is in fact the third consecutive structure. The authors overlook the two earlier structures (Megara A and B), the date and function of which remain unresolved, and construct their argument based on the geomagnetic pole as it would have been at the time of construction of the most recent temple. As a result, they overlook the fact that the previous two structures had already determined that orientation and may have not been connected to the worship of Apollo. In addition, it is also overlooked that although the temple axis is indeed N–S, the entrance is to the south and not the north, where the aurorae would have been observed.

Hoskin and Papathanasiou

Papathanasiou and Hoskin have published one article on temple orientations (Papathanasiou and Hoskin, 1994). Three structures are examined in the paper, but only one was measured (the Kardaki temple in Corfu). The temple of Artemis is completely ruined and it was not possible to measure its orientation. The authors assume that the orientation would have been the same as that of the altar, built in front of the temple, and therefore measured the altar instead. Such an assumption does not hold. There are numerous temples that have a different orientation from that of their altar. Examples are the altar in the sanctuary of Poseidon and Amphitrite in Tenos (Figure 2.5), the altar of Chios in front of the temple of Apollo in Delphi (Figure 2.6), as well as the altar of Zeus in Olympia (Figure 2.7) and the altar at the sanctuary of Artemis Orthia in Sparta (Figure 2.8). In some cases, the orientation of the altars is not merely a few degrees different from that of the temple. At the sanctuary of Asklepios in Kos, only one altar was constructed which seems to have served the three temples that were built around it. Consequently, the altar was oriented at 90° to the Great temple of Asklepios and approximately at 200° to the Corinthian temple (Figure 2.9).

Apart from the orientation of the temple the altitude of the skyline of the eastern horizon is also estimated, as the horizon was not visible. In the second temple, there is not one actual measurement.

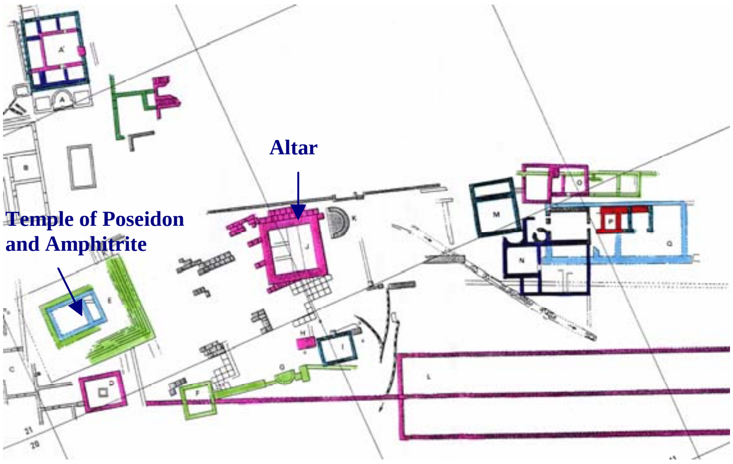

Figure 2.5: Plan of the Sanctuary of Poseidon and Amphitrite in Tenos (after Étienne and Braun, 1986).

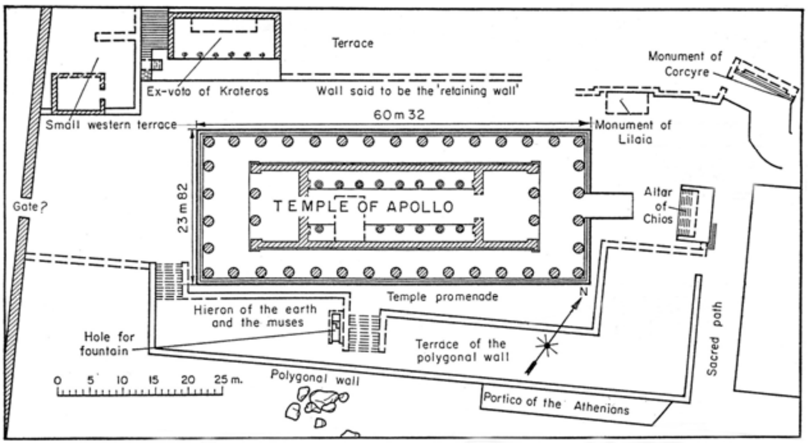

Figure 2.6: Temple of Apollo in Delphi and altar of Chios (after Flaceliere, 1965).

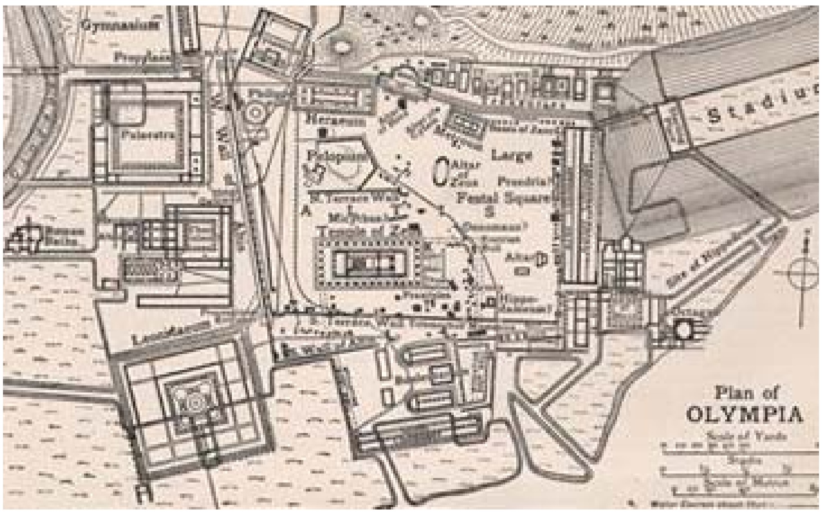

Figure 2.7: Temple and altar of Zeus in Olympia (after Boetticher, 1886).

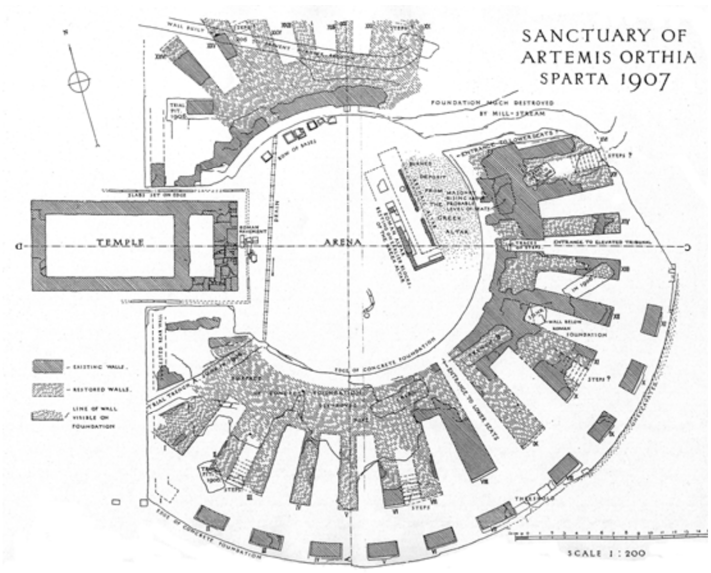

Figure 2.8: The sanctuary of Artemis Orthia in Sparta.

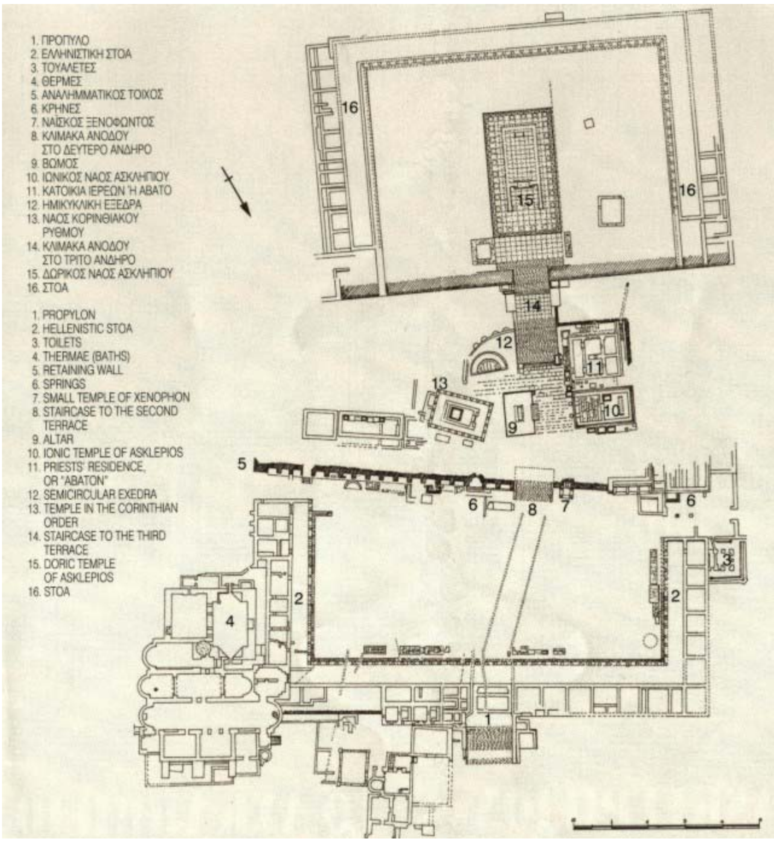

Figure 2.9: Ground plan of the Asklepieion in Kos (after http://www.schueller-net.de/Kos/Asklepieion/asklepieion5.jpg).

The third structure is the altar of Apollo Korkyraios. No remains of a temple exist near the altar, so it cannot be associated with a specific temple. The authors assume that the altar faced east, as the only visible precinct walls are 'to the north, west and south' and because 'the altar is on high ground that slopes down towards the sea in the easterly direction' (1994: 114). There is no supporting evidence (archaeological or even historical) for such a conclusion. In addition, further difficulties arise with regard to the horizon of the altar. The site is located in woods and thus high vegetation blocks the horizon. The authors estimate the altitude on the grounds that it 'should be very similar to that of the nearby temple'. It is surprising that with such an evident lack of data the authors conclude that the three structures were oriented to the equinoxes.

Conclusion

Previous research on the orientation of Greek temples offers little context and theoretical approach. As a result of Penrose's and Nissen's work, researchers do not engage in discussions on the significance of a potential astronomical orientation of the religious structures. Recent studies, in the main, presuppose the astronomical associations of Greek religious structures without offering a justification for such an assumption. Their main aim is to determine not whether any celestial body, but which celestial body was related to the orientation of the structures. Examples are found as early as Nissen's work: in his analysis of the temple of Zeus in Olympia he seems uncertain which association to attribute to the temple. In his first attempt to establish an astronomical relationship, he states that the temple is at least oriented to the September full moon (1887: 38). A few years later, he decides it is oriented upon sunrise 17–18 days before the equinox (1906: 200), also making a connection between the temple axis and α Aquilae (1887: 39; 1906: 201). In neither case does he attempt to contextualise his approach or to seek evidence for such associations in the cult rites performed in front of the temple.

The study of Greek temples, so far, is deprived of associations and links with archaeology and the literary sources. These are aspects that my research aims to focus upon.

Chapter 3
The written record

Introduction

Chapter three is a brief discussion about the history of the oral and written record in ancient Greece. This thesis relies heavily on the wealth of written information about cosmology, astronomy, myth, and cult rites, which must be situated within a considered review of the audience that would have been familiar with astronomical observations, theogonical beliefs and catasterism myths. The reliability of the sources used also demands some discussion. In general this chapter considers whom these texts were written for and for what purpose. The major and ongoing debates on the importance of literacy in ancient Greece, the effects of literacy on its society, and the psychological and cultural implications of literacy are not discussed here.

Considering levels of knowledge and accessibility of texts in ancient Greece is not a straightforward exercise. As I will show, the terms ‘orality’ and ‘literacy’ are more complicated than is initially apparent in discussions of ancient myth and astronomical knowledge. For example, I will show that a great deal of astronomical knowledge was not privileged to those who could read. Many researchers have concluded that the boundary between an oral and a literate tradition is unclear, especially in the Greek Dark Ages. If the Homeric epics were indeed performed by poets with the assistance of compositional units, conveniently called ‘formulae’ by scholars, we must consider a tradition of communication that was neither completely literate nor solely oral. The process of a society turning from predominantly oral to predominantly literate can stretch over several centuries (if the latter stage is ever reached). The first lyric verses that were written down during the author’s lifetime were composed by Archilochus of Paros in the mid-seventh century. The first written literary texts for which we are certain of the date at which they were written down are Hesiod's *Works and Days* and *Theogony* (written in verse), and the sixth-century cosmogony of Pherecydes of Syros (written in prose) (Harris, 1989: 50). The cosmogonic and cosmological themes are prominent in all of the above documents.

During these periods the terms 'literate' and 'illiterate' are not sufficient to characterise these societies and we need to adopt a more flexible terminology. In dealing with this issue, this thesis adopts the three components of orality as defined by the anthropologist Ruth Finnegan (1977: 16–24): oral communication, oral composition and oral transmission, each with a different relation to writing. In general terms, it would be adequate for the purposes of this study to adopt Harris's definition of a literate person as someone who can understand, read and write a short simple statement (Harris, 1989).

Contrary to the earlier rationalist and functionalist anthropological theories of Goody and others (e.g. Goody, 1975), arguing for a major qualitative difference between orality and literacy, researchers are in agreement today that all ancient Greek literature was primarily transmitted orally, through narration (e.g. performance of tragedies) or singing. The argument of the predominance of silent reading in antiquity (Thomas, 1992: 3, 103) has been deconstructed by Gavrilov (1997) and Burnyeat (1997). This idea is also present in Aristophanes, who makes Dionysus say that he sat down to read Euripides' *Andromeda* to himself (Aristophanes, *Frogs*, 52). Even for the highly literate, like Plato – who considered writing to be inadequate and unreliable – Socrates – whose philosophical debates were conducted orally with nothing in written form – or Herodotus – who is said to have given public readings to large audiences (Lucian, *Herodotus and Aëtion*, 1–2) – ideas and literature were usually transmitted orally, even in those cases where they existed in written form.

The time of the transition from orality to literacy

The adaptation of the Phoenician alphabet in Greece during the first half of the eighth century – probably well before 750 (Harris, 1989: 45; Thomas, 1992: 12) – cannot be indicative of the widespread use of writing from such an early date. Writing started to be used for public purposes in the middle of the seventh century but was used only sporadically until the fifth century (Thomas, 1992: 12). Very little is known about Greek literacy and illiteracy until the end of the sixth century (Harris, 1989: 65).

Around the eighth century BC, the first oral traditions appear to have been committed to writing (Thomas, 1992: 32, 53), at a time when Greek city-states made little or no use of writing, let alone the ability to compose poems such as the *Iliad* and the *Odyssey* in written form. Researchers agree that these poems were the result of oral composition, performance and transmission for several centuries (Havelock, 1982: 44; Thomas, 1992: 12). It is believed that the introduction of the alphabet around 800–750 BC was still in its infancy and thus writing was not used in most of everyday life across Greece (Havelock, 1982: 82, 102). In the works of Homer and Hesiod there is no indication that writing played a significant role in everyday life. There is only one reference to the art of writing in the *Iliad*, describing the Argive prince Proetus having written a letter in a 'folded tablet' (6.168). *Works and Days* could be viewed as having a didactic aim and being targeted at a large audience but even so, we cannot presuppose a large readership, or that the ordinary Greek farmer made use of writing, although it is possible that some farmers may have been literate. This is however, more likely to have been out of necessity (Harris, 1989: 49, 67) and could in most cases have been limited to the ability to keep accounts (Aristophanes, *Clouds*, 18–24).

Havelock's argument that archaic Greece was a craft-only literate society, with the 'craft of writing' being ascribed to potters and traders, or even to a distinct class of scribes (Havelock, 1982: 187–9, 200–1, 233), is, I believe, untenable. The early existence of public inscriptions, graffiti and the use of writing on pottery as decoration testify that writing was not confined to a specific group (e.g. scribes, aristocrats) (Harris, 1989: 48). Writing began to be used in inscriptions, religion, the passing of laws, and by poets who are thought to have written down their poems, which were, however, still performed orally (Harris, 1989: 93; Thomas, 1992: 13). During the beginning of the sixth century, Attic drama arose (Havelock, 1982: 263) along with the first sun-based calendars, followed by the development of stone *parapegmata* in the late fifth century (Hannah, 2001: 139, 143). From the beginning of the fifth century, it seems that writing became more widespread, mostly in the domain of literature, where written published literature was now quite common. In other parts of life, though, the use of writing was still uncommon. The example of Pericles, who is said to have been the first man to speak from a written text (Turner, 1977: 18) shows that orality was still predominant, even in the political sphere. Evidence suggests that by the fifth century BC schools were quite common across Greece, even in small towns like Astypalaea and Mycalessus (Harris, 1989: 16–17; Morgan, 1999: 47). Spartan literacy was attained mostly only in a basic form, as far as was necessary (Plut. *Lyc*. 16.6; *Mor*. 237a; Cartledge, 1978: 32). The spread of literacy by the fifth century BC can be testified by the public display of *parapegmata*, which were constructed and displayed for public use (Pritchett and van der Waerden, 1961: 40). In fifth-century Athens reading books was an unusual activity. By the end of the fourth century, Athens adopted widely the use of written documents and manuals and the oral gives way to the written word, even though oral transmission seems to continue alongside the written texts (Morgan, 1999: 58; Thomas, 1992: 14, 102, 122). The first evidence for the merchandisation of literature comes from Xenophon who refers to a shipwreck carrying '*biblia*' (books, or more likely papyrus scrolls) (*Anabasis*, 7.5.14). Owning books, however, must have been extremely rare in the fifth century, judging from Euripides being thought very eccentric for owning a 'library' (Thomas, 1992: 8).

The written record: the reliability of the sources

A variety of sources have been collated together in this study to establish astronomical knowledge, practices and cosmological beliefs in Greece. The wealth and diverse background, purpose and function of the sources results in certain authors being regarded by scholars as more reliable than others, and the same is true for public inscriptions. More emphasis is given here on the reliability of writers than of inscriptions, as it is mostly the aid of literary evidence that is sought in this thesis.

Homer and Hesiod

The Homeric poems, although the oldest source available, are in their surviving form the end-product of what seems to have been a long oral, or semi-oral tradition, rather than the product of one poet. They are likely to have been written down for the first time sometime around the late eighth century BC or later (Havelock, 1982: 225); Thomas, 1992: 29–34). This means that the Homeric poems as we know them are an end-product of several centuries and only one version of the many that would have been performed. In addition, – as a result of time's reshaping effect in all oral traditions – during the course of time many sections of the poems would have been recast, and passages added or omitted. Perhaps more important than the modification caused by later addition or omission of the content in oral tradition, is the irretrievability of anything that has been lost, or omitted. Hence, it is by no means arguable that the information gleaned by the poems dates to the time of their initial composition. It would be sensible to avoid reaching a conclusion about Homer's orality or literacy, as this debate is still ongoing, but Thomas's conclusion that 'a fluid relationship between written text and oral performance seems increasingly possible' (Thomas, 1992: 126) appears justifiable.

Hesiod's contribution to literature differed from Homer's in that it has a more clearly didactic character. The works of Hesiod are believed to have been committed to writing close to the time of their composition (West, 1963). The fact that *Works and Days* was written down around the late 8th century BC does not entail that the astronomical observations described by Hesiod were first introduced into Greece at the same time. It may rather signify the time at which much earlier knowledge was committed to writing. Since Hesiodic astronomy was viewed by Plato (*Epinomis*, 990a–b; see below) as basic and insignificant, we can deduce that this knowledge was widely available. Also, since Hesiod refers to farming practices, this knowledge would have been possessed by farmers to such an extent that pastoral astronomy was not associated with a high level of education. If this was the case, such observations would have been apparent and known to all social classes and there would have been no particular need for a centralised state authority that would have the responsibility to inform pilgrims of the time of festivals held in different cities.

A first step in attempting to evaluate the written sources is to examine what the ancients themselves thought of the literary sources. Herakleitos (*Fragment*, 57) states his and his contemporaries' views about Hesiod:

> 'Hesiod is teacher of most though; him they conceive to know most things, who did not recognise day and night; for they are one.'
>
> (Translation after Havelock, 1966).

In another passage, Herakleitos seems to be less tolerant of Homer's work: '.... what Homer deserves is to be flung out of the assemblies and beaten up....' (translation after Havelock, 1966). Xenophanes remarked: 'Since from the beginning all men have been instructed from Homer that...' (*Fragment*, B10) and 'Homer and Hesiod say that the gods do all things which men would consider disgraceful: adultery, stealing and mutual deception' (*Fragment*, B11, B12). During the archaic period then, Homer and Hesiod were viewed as figures who had offered guidance and instruction to the Greeks, but the views, stories and arguments they offered were open to criticism, and in the case of Herakleitos, heavy criticism. The Hesiodic poems *Works and Days* and *Theogony* were believed to have been didactic, the former also having contributed to practical knowledge (Havelock, 1982: 124).

Less than a century later, Homer and Hesiod's contribution to Greek theological thought is viewed by Herodotus as established:

> 'for I suppose Hesiod and Homer flourished not more than four hundred years earlier than I; and these are the ones who taught the Greeks the descent of the gods, and gave the gods their names, and determined their spheres and functions, and described their outward forms.'
>
> Her. II.53.2-3 (translation Godley, 1920).

This view seems to have persisted until the end of the fifth century BC when a character in Aristophanes says:

> 'Just consider how useful the noble race of poets has been from the start. Orpheus taught us rites and to abstain from killing, Musaeus taught the cures of diseases and oracles, and Hesiod the working of the land, the seasons for crops and ploughing. And where did the divine Homer get honour and renown if not from instructing well in the tactics, virtues and weaponry of men?'
>
> Aristoph. *Frogs*, 1030–1036 (Loeb translation adapted).

Plato shows little respect for Hesiod's contribution in astronomy and for his knowledge:

> 'he who is truly an astronomer must be wisest, not he who is an astronomer in the sense understood by Hesiod and all the rest of such writers, the man who concerns himself with settings and risings; but the man who investigates the seven out of the eight orbits, each travelling over its own circle in such a manner as could not ever be easily observed by any ordinary nature, that did not partake of a marvellous nature.'
>
> Plato, *Epinomis*, 990a–b (Loeb translation adapted).

The Homeric poems were still thought of as didactic during the classical period. Even Plato, who criticises Homer and Hesiod heavily, remarks upon the didactic ability of the poets' tales (*Rep*. 10.606e) adding the element of fiction. In the course of the *Republic*, Plato begins by classifying the tales told by Homer and Hesiod as fictional:

> 'we begin by telling children tales, which are mostly fictional, in part factual...
> In the greater [tales], I said, we shall see the [models] of minor ones....
> ... but I do not understand which you mean by the greater either. Those, I said, that Hesiod and Homer and the other poets have told us. Because they composed untrue stories which they told and continue to tell to mankind.'
>
> Plato, *Republic*, 2.376e, 2.377c–d (Loeb translation adapted).

Although in *Ion* Plato calls Homer ‘the best and most divine poet of all’ (530b), his criticism of Homer and Hesiod becomes stronger in the Republic, where he remarks that being aware of the fictional elements in Homer is simply not enough and argues that stricter means should be employed, such as the complete censorship of the poets altogether:

> ‘if Homer was really able to educate men and make them better, and possessed not the art of imitation but real knowledge, would he not have acquired many companions and would he not have been honoured and loved by them? ...
> if he had been of use to men in gaining virtue, would his contemporaries have been content to let him and Hesiod to roam about rhapsodizing, rather than attach themselves to them, instead of their gold, and forced them to dwell with them in their homes; or would they not have escorted them as pupils until they were sufficiently educated?’
>
> Plato, *Republic*, 10.600c–d (Loeb translation adapted).

Between Xenophanes and Plato, a century and a half elapsed. Views on Homer and Hesiod did not change during this time and although the poets’ didactic contribution is acknowledged, the knowledge to which they contributed was that of warfare, agriculture and religion (as stated by Aristophanes previously). The comments of Plato and Herakleitos on the quality of Homer and Hesiod’s astronomical observations indicate a division between scientific and pre-scientific astronomy as discussed in chapter 1. This separation does not detract from the accuracy of the writers’ observations. It rather confirms that the initial purpose of observing the sky was related to agricultural practices. Even so, this knowledge was not perceived by their successors as educational so much as the means that led to the survival of an earlier oral tradition through the storage of information in the form of poetry. All of the above writers classed Homer and Hesiod together in terms of the value of their work. There was a distinction in antiquity between poets and wise men, which Plato makes explicit by classifying Parmenides, Protagoras, Herakleitos and Empedokles among the wise men (οἱ σοφοί) and Epicharmos and Homer among the poets (οἱ ποιηταί) (*Theaetetus*, 152e). This distinction, which was merely dependent on the content of one’s work, testifies that the Homeric poems were mostly viewed as art. When it comes to Hesiod, however, Aristotle considers ‘didactic poets’ to be either *theologoi* (as for example Hesiod) or *physiologoi* (as for example Empedokles) (Hunter, 1995: 9). Didactic poetry, though, does not need to be exhaustive in order to be didactic. It can simply offer examples or references to events, in order to inform the reader, as opposed to the textbook which aims to offer complete knowledge of an art (Hunter, 1995: 11).

The seventh-century poem *Partheneion* by Alkman, which is used in the Artemis Orthia case study in chapter 6, is arguably ‘a song of genuinely religious and ritual significance, probably quite clear to its original audience’ (Thomas, 1992: 120). As such, the rite described – as far as we can reconstruct it – should be considered authentic.

Herodotus and Thucydides

Both Herodotus and Thucydides aimed at creating writings that would serve as the means of preserving the memory of events that had taken place. Herodotus states in the preface of his *Histories* that the reason for his composition is ‘so that the events will not be erased from men’s memory, nor the great and wonderful achievements of the Greeks and Barbarians lose their fame in time’ (Herod. *Histories* proem.). His aim was to discover the reasons behind the war between the Greeks and the Persians (1.1.5) and his method of research was personal inquiry, a sort of ethnographic study, which collected different versions and descriptions of events as he came across them. He informs us that his principle was to record ‘what was said’ (τὰ λεγόμενα) (7.152.3), whether he believed it or not. Despite Herodotus’s initial stated aim of preserving historic events, he concentrates regularly on persons and their relationships with others, focusing most of all on the founder and his family, for ‘royal genealogy ... [serves] to provide a rule of succession and to support the institution of kingship’ (Vansina, 1965: 78). Herodotus’ writing is based heavily – though not completely – on oral tradition, it included to a large extent mythological elements. From that respect, his writings were those of an oral tradition, although somewhat different from the poetry of Homer, in that Herodotus was composing a description of events that had taken place only a few years earlier.

Thucydides’s claim that he intended to produce what would have been a possession for generations to come shows not only that his work was more dependent on writing, but also that he aimed to record an account of events that would have been as reliable as possible by making a decisive distinction between myth and history and through the exclusion of mythological accounts (τὸ μυθῶδες) (1.21.1, 22.4).

Aratos

A didactic work – stated by the poet himself (42, 758–765 etc.) – but considerably later, is Aratos's *Phaenomena*. The content of the text is such that it can be easily cross-checked in terms of its reliability. Hipparchos's accusation (1.1.7) that Aratos deliberately manipulated readers by writing in a charming way (χάρις) in order to deceive people into believing that what he says is true should not be taken seriously. The astronomical inaccuracies found in the *Phaenomena* are easily corrected and are not caused by carelessness. Aratos, although not an astronomer, seems to have had a good understanding of the astronomy at the level that was required for the *Phaenomena*, and although it may initially seem that his treatise relied on Eudoxos's earlier astronomical observations, Kidd has demonstrated that in several cases Aratos seems to be correcting Eudoxos (1999: 16–17). Although some of these corrections are erroneous (Kidd, 1997: 17), the *Phaenomena* is regarded an accurate and reliable source for our purposes, used in this thesis for its timekeeping and meteorology knowledge and practices. From this respect then, the *Phaenomena* has a didactic character, being reliable in terms of astronomical knowledge (but not always of astronomical calculations).

Greek plays

A different type of written sources used in this thesis are theatrical plays. Of course the setting and figures in each play are fictional, located in an imaginary heroic past, but this served and was deemed appropriate to a religious occasion. This is not to say that theatrical works should be taken literally, but the comments on religious cults and astronomy could indeed be useful in our attempt to reconstruct the knowledge and conditions of the time that the plays were written. 'Greek drama remains fundamentally didactic in purpose' (Havelock, 1982: 264).

Inscriptions

The display of inscriptions in public places would offer a feeling of transparency in state matters and political decisions drawing a positive picture of the way in which the state was run, and to ensure justice and fairness:

> 'There are first no laws common to all, but one man is tyrant, in whose keeping and in his alone the law resides, and in that case equality is at an end. But when the laws are written down, rich and weak alike have equal justice, and it is open to the weaker to use the same language to the prosperous when he is reviled by him, and the weaker prevails over the stronger if he has justice on his side.'
>
> Euripides, *Suppliants*, 433–37 (translation Coleridge, 1938).

Greek inscriptions seem to have had other roles than to simply be read or to pass on and communicate a message, invalidating the rationalist view of the spread of writing as the medium of detecting literacy in a society (Thomas, 1992: 76). Beyond the simple content of text displayed in inscriptions, other elements such as religion, symbolism, magical manipulation (e.g. curse tablets) and propaganda affect the reliability of the written text, indicating that the end result is determined by social and political factors rather than to simply inform and educate (Thomas, 1992: 89, 106).

In this thesis, however, the inscriptions consulted most extensively are *parapegmata*. The issues on the reliability of inscriptions outlined above do not seem to apply to *parapegmata*, due to their sole function of timekeeping. Given that literacy had increased after the fifth century it seems logical to assume that the information on the *parapegmata* was aimed at the general public. We have examples of other types of inscriptions, like the Athenian tribute lists, which, although they were on public display, were not there to be read but instead were used by the state as a means of monumentalising an idea (Thomas, 1989: 50–53, 61, 67). The information recorded in the *parapegmata* assisted in timekeeping, and in the recording of the movement of only certain constellations. As a result, it is unlikely that their content or context could be manipulated. The creation and function of the *parapegmata* was not the result of knowledge acquired for the sake of knowledge. Their purpose was functional, and it is rather likely that it was driven by and served socio-political forces and needs (Hannah, 2001).

Discussion

The manipulation of texts need not only apply to inscriptions and is not always deliberate. As we saw previously, the earliest texts written in verse aim to transfer or preserve knowledge and to crystallize awareness of the past. Caution is needed with texts that describe monumental actions, commemorate ancestors, maintain the social structure, or give genealogies and argue for autochthony, in other words, traditions which serve the interests of the society preserving them. Such an example is Hekataios's *Genealogiai*, or more relevant to this study, the references to the autochthony of the Athenians and the genealogy of king Erechtheus (Aristoph. *Wasps*, 438; Eur. *Ion*, 724, 1163–4; Herod. 8.44), the cult of which is discussed in chapter 6. 'Accurate transmission is therefore a matter not of time, or of the capacity of the human memory, but of the presence or absence of institutionalized customs of recollection, of trained specialists, and of the needs and interests of governments, families and individuals' (Davies, 1984: 90). It seems, then, that the value of textual evidence depends and changes according to associations and context, which will determine its use and function. Several factors may affect the accuracy of transmission: distortions caused by the informant himself, those which result from the attempt to eliminate archaizing features, information fed by external agents into an oral tradition, and factors affecting genealogy and chronology (Davies, 1984: 90).

Evidence from Greece demonstrates the longevity of oral tradition even after the adoption of sophisticated writing. The presence of inscriptions does testify to the use of writing, but the percentage of the population that was literate remains speculative for at least the archaic and early classical periods, and even in the later classical period we find a lot of scepticism on the advantages of writing. Plato for instance, only justifies the existence of writing in those cases when it has been composed

> 'with intelligence in the mind of the learner... the living and breathing word of him who knows, of which the written word may justly be called the image'.
>
> Plato, *Phaedrus*, 276a (Loeb translation).

It seems that such a severe criticism and distrust of the written word was the result of aristocratic elitism, which opposed the propagation of knowledge that writing was offering.

The proportion of literate people from the archaic to the Hellenistic period would not greatly alter the accessibility of literary compositions. As discussed previously, poems and theatrical plays, even historical narratives (in the case of Herodotus), were performed in public rather than read. The knowledge described in those works, then, not only would have been communicated potentially to everyone, but it seems that any astronomical observations, myths and cosmological beliefs described in these works would have been familiar to most or all Greeks from the time of the initial composition of the Homeric poems and Hesiod's *Theogony*. As mentioned above (p. 38), in pre-literate Greece, astronomical observations seem to have been common in everyday activities such as navigation and agriculture. With the exception of *parapegmata*, the written sources used in the course of this thesis were not only used in their written form. From that perspective, the actual level of literacy among the Greeks is not relevant.

It is a reasonable inference, therefore, that the myths, observations and celestial bodies mentioned in the Hesiodic and Homeric works were not the authors' inventions. They had to be familiar to the Greeks prior to the composition of the poems, in order for these to have made sense to their audience and for the audience to have been able to relate to them. It is possible, however, that not all the myths and observations would have been familiar to every person in the audience. Although of apparently didactic purpose, the Hesiodic poems, I believe, did not have the sole purpose of educating. The myths of the *Theogony*, for example, were accepted in their majority by the Greeks in Hesiod's time and were well-known. A purpose of writing them down can be found in the opening lines of Hesiod's poems. In his opening of the *Theogony* he claims that he acquired what he is about to narrate from the Muses themselves and therefore what he will say is true:

> 'And one day they taught Hesiod glorious song while he was shepherding his lambs under holy Helicon, and this word first the goddesses said to me the Muses of Olympus, daughters of Zeus...'
>
> *Theogony*, 21–25 (translation Evelyn-White, 1914).

His attempt to defend the truthfulness of his narrations indicates that he aimed for his poem to be read (or narrated) by others subsequently. His ambition for posterity is even more evident in the opening lines of the *Works and Days*:

> 'Muses of Pieria who give glory through song, come hither, tell of Zeus your father and chant his praise. Through him mortal men are famed or unfamed,

> sung or unsung alike, as great Zeus wills. For easily he makes strong, and easily he brings the strong man low; easily he humbles the proud and raises the obscure, and easily he straightens the crooked and blasts the proud, Zeus who thunders aloft and has his dwelling most high. Attend thou with eye and ear, and make judgements straight with righteousness.'
>
> *Works and Days*, 1–10 (translation Evelyn-White, 1914).

This aim does not alter the reliability of the information that the poem carries, but leaves us in no doubt that the fact that authors hoped their work would be remembered and transferred can be a confirmation that the knowledge carried by these poems would have been common to all social classes and ages. It is for this reason that when a literary source is used in the following chapters, no distinction or discussion is made on how accessible and widespread the communicated knowledge would have been.

Chapter 4
Methodology

In chapter 2 I demonstrated the methodological shortcomings and the lack of theoretical rigour that have characterized previous research on the orientation of Greek cult structures. The re-examination of previous scholarship assisted me greatly in my attempt to form a sound and improved methodology that could be also used in future research. The strands pulled together in this study are: archaeological evidence, historical and literary sources, and archaeoastronomical data collection and analysis.

Theoretical framework and specific objectives

Ruggles (1999: 154) and Renfrew (1984) have argued that one of the main motivations behind celestial building alignments was the attempt to harmonise a structure with the cosmos (which includes both the landscape and the sky). The relationship between monuments and the landscape in which they are located is examined in all the structures that have been measured. The frequency and consistency of such relationships is observed.

Settlements that developed organically are important to the present research, as they allow us to study patterns of continuity and, more importantly, to observe changes in the orientation of successive buildings. This raises questions about the reasons for either maintaining or modifying the orientation. Several of the sites examined have demonstrated long-term continuity of occupation. Interpretations concerning the introduction, expansion and decline of the influence of astronomy in architecture are dependent on such sites, especially those at which continuous occupation lasts for several centuries. In those cases where it is possible to detect the development of the site from its early occupation until its full growth, by plotting the sequence of structures followed from its appearance through to its final destruction, it is possible to detect variations in building orientation. There are cases where we have as many as four reconstructions of the same building until final abandonment. Such examples are the temple of Hera in Samos, the temple of Athena in Sounion and the Telesterion in Eleusis. In the preliminary study I carried out of the sites included in this thesis, I observed that only in a few cases is the orientation of the structure maintained in subsequent structures. This observation merits further investigation and it is possible that astronomical considerations motivated this change in orientation.

The earliest account we have from Greece of the observation of the stars is Hesiod's *Works and Days*. This source indicates the tight connection between mythology, cosmology and astronomy, and influences from the Near East and Egypt. Almost all the night sky was depicted in Greek mythology and vice versa; the myths were mapped onto the heavens. This is easily demonstrated, for example, in the catasterism myths of Ursa Major and Ursa Minor, Orion, Perseus and Andromeda, the Centaur Cheiron who was the constellation of Sagittarius, Aquarius who was Ganymedes, etc. The naming of constellations after mythological creatures, heroes, or gods in itself, demonstrates a close relationship between religion and astronomy. As will be discussed in more detail in Chapter 6, many of the star or constellation myths were related to cults.

Geographical limits and selection criteria of sites

The geographical area covers the Greek mainland and the following Aegean islands: Aigina, Delos, Kos, Naxos, Poros, Rhodes, Samos, Santorini and Tenos (Piraeus, Thasos, Lemnos and Samothrace were also included in the initial list, but these sites could not be surveyed because of lack of time and have not been considered further). Three main factors determined the boundaries of the selection: firstly, the centre of archaic and classical Greek civilisation was located primarily in the Greek mainland, and consequently this is where many of the most important archaic and classical cities of the

Greek world were located. These sites, together with the most active and important sites located in the islands (also included in the study), make this sample reasonably representative of the Greek world. Secondly, the sites chosen included organically grown settlements, the importance of which (for this research) was mentioned in the previous pages. Such settlements can demonstrate developments and changes through time in the orientations of successive buildings in the same location, and so could indicate the continuity of practices. Changes through time in the settlements can often be identified, as important buildings were very often destroyed and rebuilt. Changes in astronomical and religious practices through time are easier to identify through the study of the literary sources and in some cases the archaeological record.

Thirdly, in order to achieve the aims of this research, we need a sample that covers a representative time-span. The sites included in this study are among the most important and representative from the periods during which they were constructed. The sites examined start with the Mycenaean (16th century BC to *c*.1200 BC) and extend to the Hellenistic age (*c*.323 BC until around the 1st century BC). The reason for choosing to have a representative sample from these periods is that the main religious ideas and beliefs of the ancient Greeks were probably established by the 9th and 8th centuries and were broadly maintained until the Roman period. Of course, these ideas and beliefs did not remain unchanged during the centuries. A number of new deities and new secondary attributes of the existing gods were introduced, and others fell out of practice throughout this time and until the end of the Hellenistic period. It is therefore evident that a sample representative of the time from the early formation of the religious and mythological beliefs through the 'golden age' of the Greek civilisation and beyond is appropriate in order to draw convincing conclusions. In the selection procedure of the religious structures to be surveyed, no particular deities have been targeted or overlooked intentionally. All religious structures (including those of foreign deities) are given equal attention.

Sites situated on coasts (e.g. Perachora), in plains (e.g. Messene, Athens) and on hilltops or mountains (e.g. Menelaion in Sparta) are included. The sample not only contains sites of various sizes but also sites with access to a number of different resources: some have limited local trade routes; others were cosmopolitan trade centres, subject to a variety of cultural influences and in contact with settlements with religious or political importance; and there are poor and under-developed ones.

The selection procedure was also governed by the availability of published and excavated data. Further selection criteria, presented below, were employed in order to compile a representative sample of the Greek world. It was decided to include a wide range of site sizes that were, however, easy to access. As a result of this, the sample includes sites as large as the city of Athens, small non-urban sanctuaries (e.g. Sanctuary of Zeus in Nemea), or isolated temples in the landscape (e.g. the temple of Apollo Epikourios in Bassae). Within that sample I have selected a variety of structures used for different functions such as gathering and worship, as well as buildings that carried distinctive architectural features (e.g. *tholoi*). Tombs have not been examined in this study, in order to maintain a manageable size of data, since a vast number of tombs have been recovered. Tombs alone could compose a separate group for archaeoastronomical study (for example Hoskin, 2001). We know that astronomy was important in the formation of Greek calendars and therefore in the establishment of the religious festivals. For these reasons the relationship between astronomy and architectural orientations was primarily sought in religious structures, although I have included a small number of secular structures found in sanctuaries.

Several researchers have argued that the decision where to locate Greek temples was of great importance (for example Scully, 1979; Wycherley, 1976, 1992; de Polignac, 1995). Sanctuaries can be separated roughly into three types: urban, built in an urban location in the territory of a city (usually on the acropolis or in the agora, for example the sanctuary of Apollo in Corinth); suburban, built on the boundaries of the settlement (located on the edge of a town, like the sanctuary of Athena in Delphi, or the sanctuary of Apollo in Thebes (Ismenion)); and extra-urban, which includes structures constructed in open space several kilometres away such as the sanctuary of Demeter in Naxos, all located away from urban space (de Polignac, 1995: 21–23). I have included sanctuaries of all of the above types in my sample.

Wherever possible, cities that were planned before they were laid out have been included in the sample (such as Rhodes). Such new cities were usually planned from scratch according to town planning concepts and principles (Dinsmoor, 1975; Owens, 1991). In these cases we can note the preferred locations of certain buildings as opposed to the unsystematic expansion of an existing settlement (as at Athens), and it is easy to detect the principles behind the location of certain buildings or the orientation and direction of streets. This study includes the vast majority of religious sites that could be measured within the study area. No selection criteria were applied to privilege the survey of one site over another. I carried out three-week long fieldtrips, during which I thoroughly surveyed the entire area I was visiting each time according to the methodology defined in this chapter.

Structures

The structures included in the dataset are those found in Greek sanctuaries. Temples were usually integrated into sacred precincts called τεμένη (*temêne*). Sanctuaries did not simply enclose the temple of a principal deity, but could also include smaller temples dedicated to the deities connected with the location as well as altars, administrative buildings, treasuries, accommodation quarters, workshops, and buildings dedicated to mythical heroes. The presence or absence of such buildings depends on the religious significance, function and size of the sanctuary. These are temples or other structures of religious function, buildings that were used for administrative purposes like *bouleuteria* or council houses, and structures used for gathering such as stoas and *gymnasia*. In every sanctuary I attempted to measure all of the above if present, but only those that were constructed during the chronological periods covered in this study. I omitted any structures that were constructed in the Roman period, or later. Structures that were also excluded from the dataset were those constructed for athletic purposes, such as *palaistrai*, hippodromes, arenas and stadiums.

Field methodology

Having obtained the necessary information about the sites that needed to be visited, a field methodology was constructed for data collection in the field. Before a site was visited, the available information was reviewed and a list was created of the buildings to be measured. Once a site visit began, the initial list was subject to change, either due to obstacles (for example, very bad preservation of a structure that made it impossible to be measured, or the foundations of the structure being covered after the excavation), or due to further buildings being added. The reasons for the latter were (a) inadequate publication of the site which did not include a complete list of the excavated structures, and (b) further excavation being carried out that unearthed more structures since the most recent publication.

The first part of the fieldwork was the measurement of the magnetic bearing of the structures using a compass-clinometer. The magnetic bearing is the bearing from the observer measured clockwise round from magnetic north, so that due east corresponds to a magnetic bearing of 90°, south to 180°, west to 270° and north to 0° and 360°. The buildings measured were mainly rectangular structures, apart from a few cases where we were dealing with round structures. The measurement of the magnetic bearing gives the orientation of the structure. This was measured along each of the long walls of the rectangular structures (Figure 4.1), and from either end of the wall, giving four measurements. In those cases where only half of the structure survived, the long and the short walls were measured from either end (Figure 4.2). This number of measurements was needed in order to be able to determine the correct magnetic bearing in those cases where two measurements were different. Additional orientation measurements were taken in cases where the structures had side doors or openings. When dealing with a temple with side doors, it was possible to identify the main entrance, based on the excavation reports and the site plans (Figure 4.3).

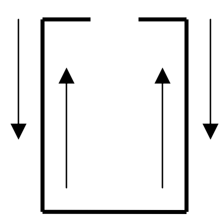

Figure 4.1: Azimuth measurements taken from rectangular structures.

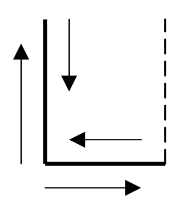

Figure 4.2: Azimuth measurements from badly preserved structures.

On several occasions there were certain non-secular buildings with up to six entrances (e.g. Eleusis and the Thersilion at Megalopolis) (Figure 4.4). For some of those, there seem to have been two main entrances, and, as is shown using the example of the Telesterion at Eleusis (Figure 4.4), there are two entrances on each side of the structure, all symmetrical with one another, and of the same size. The measurement of the orientation of *tholos* structures was taken along the structure's axis of symmetry.

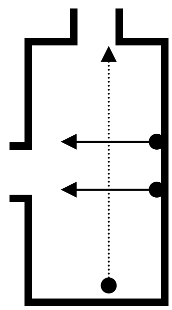

Figure 4.3: Measurements taken in structures with side entrances. Dotted arrow indicates the main orientation of the structure. The arrows that are perpendicular to the side entrance show the direction of the measurements taken for the altitude and the magnetic bearing of the side entrance.

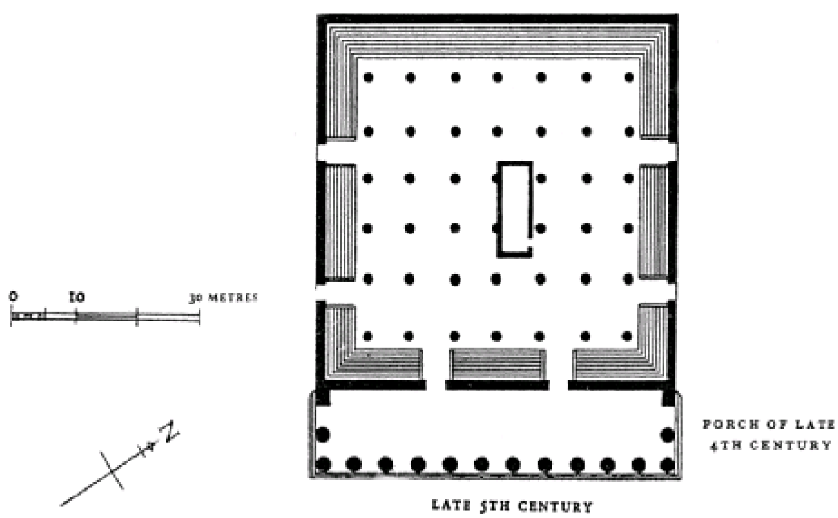

Figure 4.4: Plan of the Telesterion in Eleusis (after Lawrence, 1973).

In rectangular structures two horizons are considered relevant, those in front of either of the short walls, as the entrance would be placed on one of these walls. For those structures where the position of the entrance was known, only the horizon faced by the structure was considered. In several cases, however, the preservation of the structures was so poor that the direction of the entrance has not been established. In those cases, two horizon measurements were taken, one in each direction. This measurement was taken using a clinometer. The word 'altitude' is used throughout this project to describe the vertical angle between the observer and the different features of the horizon (Ruggles, 1999: ix). Due to the rugged and mountainous landscape of Greece, in all the sites visited, horizon profiles were measured by sketching the horizon features (Figure 4.5), within approximately 20° either side of the orientation. The altitude and magnetic bearing of the horizon points were measured for the horizon profiles, so as to convert to declination (discussed below), and refraction was taken into account when reducing these measurements. A detailed photographic archive was created, including, apart from the actual structures, the horizon visible from the openings and the surrounding landscape. Additional photographs were taken of the structures in relation to the features of the landscape and to the rest of the sanctuary complex.

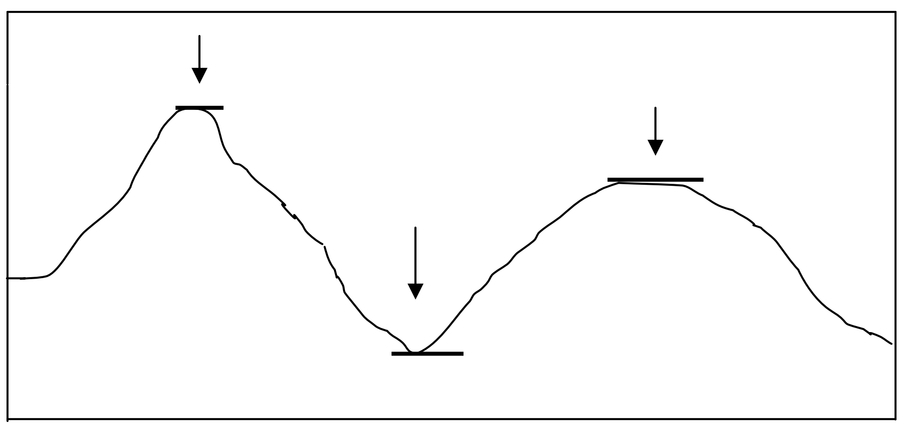

Figure 4.5: Altitudes taken when measuring horizon profiles. The arrows indicate the points measured when creating a horizon profile.

There was only one case where more than two magnetic bearing measurements were taken, the altar of Zeus Lykaios in Arcadia. The site of the altar is above the sanctuary where the arena and other buildings were constructed. There is no temple at the site and the main religious structure is the altar, which is positioned on the highest peak of Mt Lykaion. In this case I measured and photographed the entire horizon profile (360°) surrounding the altar.

GPS measurements and reliable topographic maps were used in order to determine the exact location of the sites. The maps used are those created by the Geographical Service of the Greek Army at a scale of 1:50,000. In addition, at least one GPS reading was taken on site of each measured structure. The location given by a GPS is considered accurate (to within *c*.10 m) only when the GPS has located five or more satellites. In the majority of the sites the number of located satellites was either five or six.

Errors and variations

A compass, duly corrected for magnetic declination, will only determine the direction of true north to an accuracy of around 1°. Taking into account the highest level of astronomical precision that the ancient Greeks would have been capable of measuring with their instruments, this level of accuracy was considered enough for this study. The Greeks did not have magnetic compasses. Improved *dioptra* were made after Hipparchos (190–120 BC). For his observations (and the composition of the first comprehensive star catalogue) Hipparchos used the armillary sphere (Lloyd, 1984: 344–345) which would not be more precise than the error of the compass.

Local magnetic anomalies were tested in two ways. Minor anomalies were tested by the several measurements taken along each of the long walls of the rectangular structures, and from either end of the wall. Great magnetic anomalies that could have affected a large geographical area and would have not been detectable with the compass were examined by looking at the geology of each site before visiting it.

The sites were surveyed during the years 2003–2005. Each measurement was taken by two individuals with one or two instruments in order to avoid random and gross error. When surveying with a magnetic compass, it is necessary to apply a correction for the difference between magnetic and true north (called ‘magnetic declination’). This correction varies from place to place and with time, and local magnetic anomalies can cause further errors. As a result, random errors of at least 0.25° to 0.5° are inevitable (Farrar, 1987), but local anomalies may cause considerably larger systematic errors. However, the magnetic bearings obtained with a magnetic compass are potentially the most accurate of those that can be obtained from compact and manoeuvrable devices. In order to avoid the larger systematic errors, reference points were identified and measured at every site that was visited. The reference points chosen needed to be identifiable on the 1:50,000 maps mentioned previously, so that the accuracy of the compass measurements could be reliably checked. Before taking the measurements, the compass and the clinometer were tested for possible instrument errors. For the compass this was achieved by measuring the orientation of a feature with two different instruments. The clinometer was calibrated at the beginning of each fieldtrip by measuring the altitude of a flat horizon (sea level), with the observer being located near elevation 0 m. At such a position, an instrument with no systematic error should give an altitude of the horizon (sea level) of 0°. In addition, the dates of each field trip were noted, as the magnetic declination could have altered significantly during the period of time when the research was carried out.

Analysis of data from excavation reports

This section details the methodology used to analyse the published literature on excavated sites used in this study. The aim of collecting information from excavation reports in the form of a gazetteer is twofold: to collect plans of sites as aids for future data collection visits, and to gather information about the function, occupation, cult and date of the sites in an efficient format.

The main aim of the gazetteer was to collect information on the sites in addition to the site plans. Such information includes the presence of older structures or foundations; the dates of the structures; any curious architectural features (e.g. side doors or openings, roof openings); other important religious practices connected with the religious structures (especially for those temples that were also functioning as oracles); myths connected to the structures; passages deriving from ancient Greek literature that comment on the function, construction or practices connected with the examined structures; important landscape features visible, or any unclear points that could be resolved upon the visit to the site. The gazetteer has condensed a large body of information in such a way that is easy to access, and covers all the available information relevant to the research. By processing this information it was possible to obtain preliminary results that could be compared to the collected dataset.

I attempted to collect as much information as possible from sites that had already been adequately published (with a preference for those sites that had been extensively published). This included site plans, used for obtaining an approximate idea of the general orientation of the structures at each site. In most cases the precise orientations of the buildings could not be determined from the published literature, as there was a large discrepancy between the north point on the various published plans. As a result, more than one site plan was collected for each site and from as many different publications as possible. In those cases there were two steps in the process of arriving at the most reliable estimate of the orientation of the structures.

(a) By studying the plans of other sites, certain authors were distinguished as more accurate than others. This conclusion was based on agreement between their orientations and those of others. The orientations obtained from certain sources were always a few degrees off compared to others and those authors were classed as 'unreliable'.

(b) In cases where the only plans available were those of 'unreliable' authors, the orientations acquired were marked as 'not accurate'. In the rest of the cases, the 'unreliable' orientations were omitted. When, even after omitting the 'unreliable' measurements, the remaining ones did not agree, averages were taken and were marked as such, indicating allowance for greater error than normal. Taking measurements from the site plans was considered as the necessary first step towards the data collection because of the vast number of sites available. The aim was to obtain as many rough estimates of orientations from as many sites as possible. This exercise assesses the reliability of published material and is a useful insight for future studies which may have to rely solely on published material. Because of the unreliability of this material, it was not possible to examine it in any other way.

A serious drawback of the data obtained from the published literature is that horizon and landscape features could not be taken into account. This aspect is rarely observed and discussed in publications. The horizon is of vital importance for this study, as it would have been the determining factor in the observation of astronomical events, such as the rising and setting of stars, constellations, the sun and moon.

Data reduction

In order to investigate the possible existence of astronomical orientations, it was necessary to process the data by converting the (true) azimuths and altitudes of horizon points into (astronomical) declinations (Ruggles, 1999: 18).

The computer programs used for the reduction of the surveyed data have been designed for measurements taken with a theodolite, but can also be used for reducing measurements taken with a compass-clinometer and for map-based calibrations as well as site survey data. There were two programs available for the calculation of the declination, a command-driven DOS program called GETDEC and an Excel spreadsheet, both created by C. Ruggles. The DOS program is more accurate since, for example, it makes corrections for atmospheric refraction and extinction, but the spreadsheet was also useful for initial data reduction and detecting any gross discrepancies. The term ‘declination’ when discussing the orientation of a structure needs to be explained. Declination is the angular distance between a celestial object and the celestial equator, whether to the N or the S. As a result, a structure cannot have a declination. This term is employed in its loose sense throughout this thesis in order to denote the exact part of the celestial sphere towards which the structure is pointing. A structure’s declination is calculated by GETDEC, by taking into account the structure’s longitude, latitude and azimuth and the altitude of the part of the horizon which is aligned with the structure. Throughout this thesis, declination is preferred to the azimuth of a structure. This is because by using declination we instantly account for extinction, latitude and the altitude of the local horizon, and because it is easier to compare the orientation of a structure to the position of a specific celestial object, or a position in the horizon.

The declinations of horizon points indicate which celestial bodies rise and set there, and would have risen or set there at any given era in the past (Ruggles, 1999: 18). Furthermore, by combining digital or digitised photographs of a section of horizon with measurements of the altitudes and azimuths of points along that horizon, we can calculate the declination of any point on the profile, and hence reconstruct the celestial bodies visible on the horizon, allowing us to make inferences about connections between astronomical bodies and the orientation of the structures.

The last piece of software used was a computer program, called 'Starry Night Pro' (http://www.starrynight.com/), designed to generate visualisations of the sky and the movement of stars. This software is able to provide reconstructions going back several millennia, offering the opportunity to view the constellations as they would have been visible to people in ancient Greece. This greatly assisted the attempts to gauge what might have been important at the time and to place oneself as far as possible in the landscape context of the time. The horizon altitude was entered in the sky reconstruction of Starry Night Pro in order to obtain a simulation of the horizon for each site. This is essential when attempting to establish the time at which a celestial body would be visible in the local horizon.

The written record

The connection between astronomical knowledge or observations and religion has been elaborated above. The literature of ancient Greece is of value in examining the use of astronomy in religious practices, customs or traditions, in myths, legends, or cults. The majority of our understanding of Greek beliefs and practices derives from written sources. It would not be feasible to conduct a complete study of the astronomical and cosmological philosophy and religious practices of the ancient Greeks without the material that can be retrieved from written sources which talk about myths, theogonies, religious festivals and celebrations. In addition to the above, ancient Greek literature includes many historical accounts of events such as wars, political developments, and descriptions of structures, or cities.

A number of historical sources have been consulted for this research in an attempt to tie together the archaeological data into the written record. As outlined in more detail in chapter 3, the works cover a large chronological frame and diverse backgrounds. They include accounts of incidents of political importance (for example Aristotle's *Politics*), descriptions/narrative accounts (e.g. Pausanias's *Periegesis*), narration of wars and attempts to record historical developments (e.g. Herodotos), texts of religious content (for instance the Homeric *Hymns*), and texts that aim to impart practical knowledge (such as Hesiod's *Works and Days*). Sources that handle astronomy and cosmology purely as a science were also examined (e.g. Anaximander, Parmenides, Anaxagoras). The above types of documents were composed for different purposes, and their significance for this study lies in exactly this: because of the variety of aims the authors had, each work has a different focus and purpose and was targeted to a different audience. This diversity is ideal for our study, as all the different types of texts introduce us to different aspects of life and issues that concerned the ancient Greeks. It is therefore possible to obtain a more complete view of the society that covers issues such as politics, religion, architecture, town planning, and everyday pastoral practices.

Through the study of such texts we can aim at a better understanding of the key features of the way in which astronomy was adopted, both as a science and in its role in the development of myths. Ancient literature enables us to explore the level of understanding of astronomy and its importance to different social classes. As a result, we can investigate whether astronomical knowledge (such as that used in agricultural practices) was understood by the people who practised it or was the result of a diffusion of practices. The study of ancient texts can also yield important information about rituals, myths, legends and cults.

Conclusion

This chapter has attempted to illustrate the principles, investigations and methods behind the field methodology that was followed for this research. I have demonstrated the selection criteria for the sites examined and the chronological span of the sample of sites examined. It has been my aim to incorporate in this study a wide range of structures. However, it will become evident that the largest body of information derives from the orientations of religious buildings. Apart from the tight links between religion and astronomy in Greek society, the reason for such a selection was the impact of religious architecture in Greek cosmological thought and the landscape. The former becomes apparent through the study of the written record. Moreover, the abundance of religious structures scattered across the Greek landscape can hardly be overlooked. The harmonious incorporation of structures into the natural landscape played a significant role. This principle was followed even more strictly with the introduction of town planning, and it is therefore only natural to question the principles behind the selection of sites and orientations, and examine whether the careful positioning of the structures was connected to astronomical beliefs.

It is important to stress once again the significance of the written record in this study. Without constraining our interpretations with the help of written documents, our research would degenerate into a game of numbers that could be manipulated in a great many different ways without ever placing the evidence into context. The depiction of celestial bodies in art and the development of myths and rituals possibly aiming to justify or reflect the movement of celestial bodies, or even explain astronomical events, are indications that astronomy was not viewed only as a science.

Chapter 5
Field data analysis

This chapter presents the visual data analysis of the measurements collected. The analysis which follows includes systematic measurements of 125 orientations converted to declinations. The aim of this generic analysis is to detect gross overall trends and patterns in the orientations that may have resulted from specific factors. This is done by using graphic visualisations to address specific questions.

General analysis

Figure 5.1 shows the general distribution of the declinations for the entire body of data collected. As mentioned in chapter 4, this sample included measurements of structures found in sanctuaries. The structures that were associated with the cult (religious structures) form the majority of the data. Structures that were not connected to the cult (secular structures) form only a minority of the sample. In this chapter, the secular structures are examined first, followed by the general analysis of the religious structures. The association of religious structures with astronomical phenomena is investigated further and in more detail in the following chapter.

The types of secular structures included in Figure 5.1 are hypostyle halls and stoas. These are public structures that functioned as meeting places and were usually encountered in sanctuaries. In addition, measurements of Mycenaean palaces are also included in the dataset. The palaces form a separate group, and will be studied further as a separate group. The particularity of the palaces lies in their function; they were complex structures with several rooms used mainly as domestic space. In the Mycenaean period, there was a lack of separate non-contiguous cult structures. Cult space was initially incorporated in the domestic space of the palaces, some of which have a designated room for worship (Cosmopoulos, 2003: 19; Whittaker, 1997: 136). In other cases archaeological evidence suggests that cult activities were carried out in the main room of the palace, the "throne room" or *megaron*. The *megaron* forms the nucleus of the palace and its orientation seems to have determined the orientation of the entire palace. The chronological period during which the Mycenaean palaces flourished is separated from the rest of the sample. This distinction is not simply evident in terms of chronology; after the end of the Mycenaean period during the so-called Dark Ages (1100–750 BC) our knowledge of the development of architecture and religion is scarce (Snodgrass, 1971: 408, 422–423). In addition, the distinctive architectural differentiation of the Mycenaean palaces from later domestic and religious structures, and the combination of both domestic and religious activities in these structures, demands that the palaces should be studied as a separate group.

The raw data of the Figures presented in this chapter are listed in the Appendix. Southern declinations in the following Figures are between –60° and –40°. Western and eastern declinations overlap in the centre of the Figures and northern ones are between +40° and +70°.

Three groups are visible in Figure 5.1:

- a large group of measurements points broadly east/west. This spans the declination range –30º to +23º, with the majority of the data falling between –15º and +15º and a particular concentration between –8º and +8º. This latter concentration, if interpreted in terms of sunrise or sunset, represents a range of dates falling roughly within one month of the equinoxes. However, there is also a surprising gap between 0º and +3º, a range which includes the sun rising at the actual equinox, however it is defined (Ruggles, 1997).
- the second, in the southern part of the sky, ranges between –55º and –34º.
- a small cluster of data is present in the northern declinations (+40º to +68º);

The Figure demonstrates the lack of data towards the declination of the sun during the equinoxes (dec. 0º to +0.5º). There is no accumulation of data towards the cardinal points: only three measurements have due south orientations.

The declinations in the eastern/western group constitute 61% of the total dataset and at first seem to corroborate the idea expressed by previous researchers of a preferential

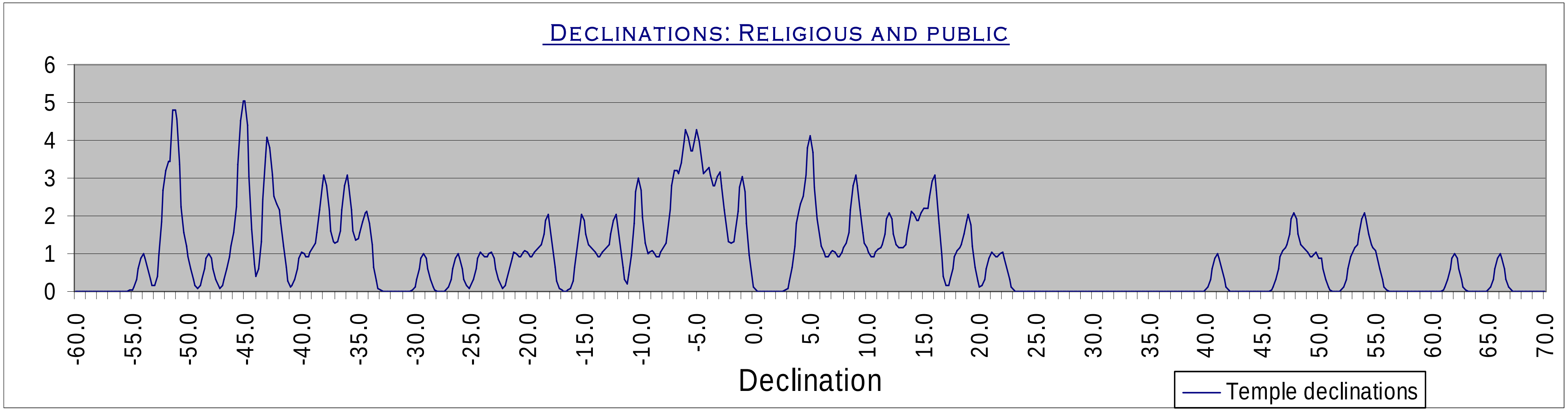

Figure 5.1: Statistical distribution of all measured structures (total number of masurements 125).

Site	Structure	Az.	Dec.
Delos	Poros temple of Apollo	265°	–4°
Delos	Apollo Temple of Athenians	263°	–5°
Delos	Great temple of Apollo	264°	–5°
Delos, Mt Kynthos	Zeus Hypsistos	286°	+12°
Delos, Mt Kynthos	Agathe Tyche	266°	–4°
Delos, Sanctuary of Foreign gods	Isis	268°	–2°
Delos, Sanctuary of Foreign gods	Serapeion A	297°	+22°
Pella	Thesmophorion (W. entrance)	267°	–1°

Table 5.1: List of the structures pointing to the west.

orientation within the solar range, the range of setting and rising points corresponding to declinations that the sun visits in its annual movement. The group has a distinct border on the northern and – although less so – on the southern end. Of the 76 declinations of this group only the 8 measurements listed in Table 5.1 point to the west. It is noteworthy that all but one of the western orientations are from structures in Delos. The Thesmophorion in Pella is a circular structure with two entrances, one towards the east and the other towards the west (the one listed in Table 5.1). It is uncertain which of the two entrances was the main one, or indeed if there was a main entrance. The range of this group also falls within the movement of the moon in its monthly movement along the horizon. However, only two measurements fall outside the solar range but within the wider lunar one. Both of these are at the southern end: one (–26°) is a stoa (at the sanctuary of Poseidon in Poros) and the second (–29°) is the temple of Apollo in Calydon.

The southern group constitutes 30% (total number of measurements 38) of the total sample and the northern one 9% (11 measurements). The main evidence from the southern declinations is of a preference for values between –42° and –45° (12 declinations) and –51° (4 declinations).

Although the public buildings form only a small component of the database, we will consider them first in the analysis that follows. However, a brief remark about the religious structures will be made here. Epigraphic and literary evidence attests that several minor games, competitions and celebrations were held at the sanctuaries.

Nevertheless, there was only one major festival in each sanctuary which would have been considered the largest and of greatest importance. This would have been held in honour of the deity to which the sanctuary and the main temple within it were dedicated. This festival would usually take the form of an annual celebration. Annual festivals are always held on the same day of a month every year and in the case of Greece it was important to ensure that the religious festivals were held on the correct day, which can be difficult to regulate in lunar calendars. The Greeks were well aware that the lunar cycle (29.5 days) does not fit into the solar cycle of 365 days, which was compensated for by intercalating an extra month approximately every three years. However, since Greek months started with the New Moon, which was determined by local observations, and different month names and different intercalation times were used in different Greek city-states, there seems to have been a lack of any Panhellenic timekeeping method. The religious festivals, which had to be held at the correct time every year, may have acted as regulators of the local calendars, which in Greece were far from fixed and subject to manipulation (Aristoph. *Clouds*, 1134; Trümpy, 1997: 1, 5). As Greek calendars were luni-solar, it seems logical to assess the overall temple orientation trends with regards to the movement of the moon and the sun along the horizon. The orientations of the temples analysed above do not seem as a whole to have been determined by the movement of the moon, or of the sun. If this was the case we would expect to have temples oriented within the solar and the lunar ranges only, or at the very least have only a few exceptions to this rule.

Orientation of secular structures

Measurements of secular structures are grouped according to the type of building. The orientations of the Mycenaean palaces fall within a range of 15º, from –51º to –36º with one exception, the Eleusinian *megaron*, which has a declination of –15º (Figure 5.2). This group includes six measurements from four sites: Eleusis, Tiryns, Thermon (x2) and Nestor's palace in Pylos (x2). The Mycenaean palaces of Thebes and Orchomenos were also visited, as well as the Athenian Acropolis where the remains of a Myceanean *megaron* are located underneath the Hekatompedon temple, but no measurements could be obtained from any of these sites. The palace of Thebes was overgrown with vegetation; the exact location and room functions of the palace in Orchomenos are still unknown as the palace is only partially excavated; and the remains of the *megaron* in the Athenian Acropolis are not exposed. The assessment of the palaces' distribution is limited, not only due to the small number of measurements – although only three or so additional measurements could have been added to the group (Iolkos, Mycenae and Thebes) – but more significantly, owing to the lack of written sources that could assist in the analysis of the structures' orientations. Given the paucity of written sources we are restricted in our knowledge about which constellations and stars were known to the Mycenaeans, and the religious practices of the time are not confidently attested. All but one of the declinations in this group fall within the second largest group of the summative Figure 5.1. This preference in orientation (towards the southern end of the sky) may have been intentional, but no further conclusions or discussion can be offered at present.

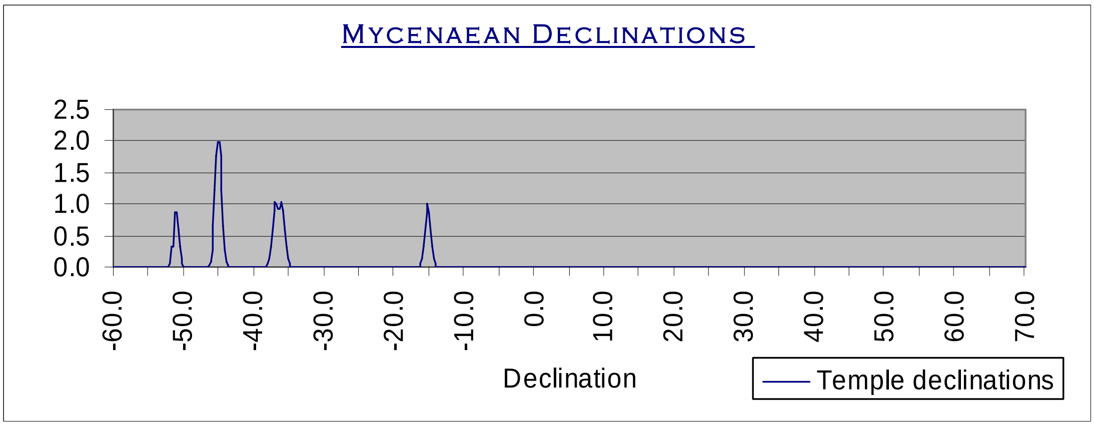

Figure 5.2: Declinations of Mycenaean structures.

The examination of the orientation of stoas includes only free-standing stoas as individual structures and not those that were part of complexes. In several cases, a surrounding colonnade was built around the major temple of the sanctuary, as was the case in the Messenian Asklepieion, the Asklepieion in Kos and around the temple of Zeus (*hiera oikia*) in Dodona. These colonnades had additional functions to the ones mentioned above. In the case of healing sanctuaries, for example, like the ones dedicated to Asklepios in Messene, Tenos and Kos, the stoas would also be used as areas in which the patients would sleep either whilst waiting to be cured or to be advised by the god in a dream. The reason why such stoas have been excluded from the sample is because the orientation of the structures would not have been determined by the optimal orientation; rather they would run around the temple, which was usually situated in the middle of the enclosure formed by the colonnade. These are called peristyle courts. It would therefore be pointless to discuss the orientation of these structures, as they face in three or even four directions (Figure 5.3).

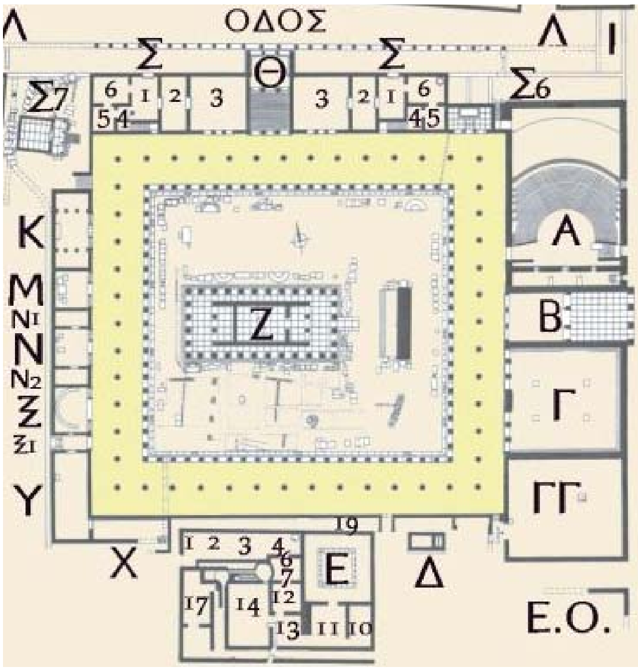

Figure 5.3: Plan of the Asklepieion in Messene. Highlighted in yellow is the peristyle court (after Themelis, 2003).

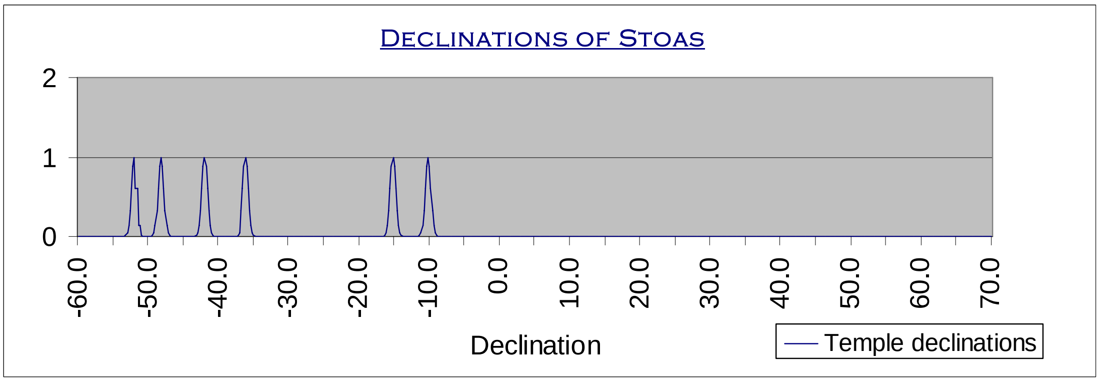

Figure 5.4: Starting from left, declinations of the stoa of Antigonos in Delos, Argive Heraion, North and South stoa, stoas of the Athenians in Delphi, stoa Basileios and stoa of Zeus in the Athenian Agora.

Figure 5.4 shows the distribution of stoas. Stoas were free-standing porticoes, which in their simplest form consisted of a long back wall with a row of columns built along the other long side; the colonnade usually faced an open space, and had a roof and end walls closing the short sides (Coulton, 1976: 1). These structures were predominantly found in agoras and sanctuaries. The architecture of stoas is unique to Greek civilization; no similar structures are found in the Near Eastern civilizations, and the stoas fell out of use in Roman times, as their civic functions were transferred to the basilica (Coulton, 1976: 1). This study includes six measurements, which forms only a small sample of the occurrence of stoas in ancient Greece. Therefore, no general conclusions can be reached with regards to these structures, but it is possible that by examining their orientation we can make inferences that could be tested when a larger body of data is collected.

The earliest occurrence of the word 'stoa' is found on the stylobate of the stoa of the Athenians in Delphi, dated to *c.*479–470 BC (Amandry, 1953: 114–115). The earliest date to which we can trace the unbroken development of the stoas is the late seventh century BC (Coulton, 1976: 18). The stoas of this study come from Argos, Athens, Delos and Delphi. The stoa declinations point between the eastern and southern part of the horizon (Table 5.2). When measuring the orientation of the stoas, the long open side with the colonnade is taken as the orientation and not the long axis of the structure, as the latter was always closed at either end. Stoas functioned as galleries for the display of artwork and dedications (e.g. the Stoa Poikile in the Athenian Agora (Paus. 1.15.1 and 1.3.1), while the laws of Solon were displayed in the Stoa Basileios in Athens on revolving wooden boards (Aristotle, *Ath. Pol.* 7.3, Andokides, 1.85). They also functioned as gathering places for people, philosophers talking to their followers (e.g. the stoa of Zeus in the Agora of Athens, where Socrates used to talk to his followers ([Plato] *Theag.* 121a, *Eryx.* 392a; Xenophon, *Oec.* 7.1)), for people who participated in state matters (e.g. Stoa Basileios in the Athenian Agora where the preliminary hearing of the case against Socrates was heard (Plato, *Theaet.* 210d; *Euthyph.* 2a), or shelters from bad weather conditions (cooling places in the summer and shelters from rain and wind in the winter) (Dinsmoor, 1975: 240; Lawrence, 1973: 255). In some cases stoas even functioned as sleeping places for visitors coming from afar (Coulton, 1976: 8–14). Their southerly orientation as displayed in Table 5.2 seems to corroborate their function as shelters from heavy weather conditions and more specifically, it shows that the southern orientation was indeed optimal for the architecture of these structures: the long, open side of the stoas was facing the winter sun during its peak hours, which would have made them warm places during that time of year. During the summer however, the sun rises higher. More specifically, the altitude of the midday sun during the warmest summer months is calculated by the following equation: $\alpha = 90° - \lambda + \delta$, where α = altitude, λ = latitude, δ = declination (positive in the summer months and negative in the winter).

The total variation in the midday solar altitude for any location on Earth (apart from the tropics) over a one year period is 47° (= 2 x 23.5°). Using the above equation we find that the midday altitude of the sun in Greece during the summer months is between 68° and 76° and in the winter months between 28° and 39°.

The general function of the stoas is well-known. However, their orientation with regards to their insulation has never been studied. I have therefore attempted to calculate the times when the rays of the sun would have illuminated the interior of each surveyed stoa. In order to calculate *d*, the depth of floor illuminated by the sun's rays at a given time, the formula

$$(h/\tan \alpha) \cos \theta$$

was employed, where h = height of the stoa to the underside of the roof,
θ = difference between azimuth of the sun and that of the stoa, and
α = altitude of the sun (see Figures 5.5 and 5.6). (Observe that in triangle BCE, $\tan \alpha = h/x$, therefore $x = h/\tan \alpha$. In triangle ABC, $\cos \theta = d/x$, therefore $d = x \cos \theta = (h/\tan \alpha) \cos \theta$).

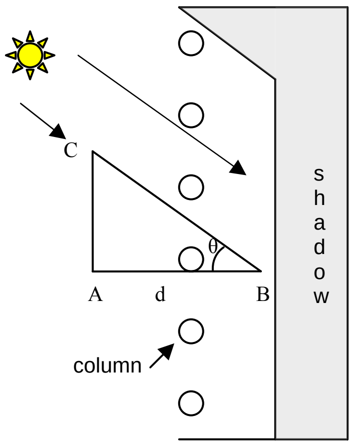

Figure 5.5: Plan of the angles used in the calculation of depth of the stoa floor illuminated by the sun, with area of shadow.

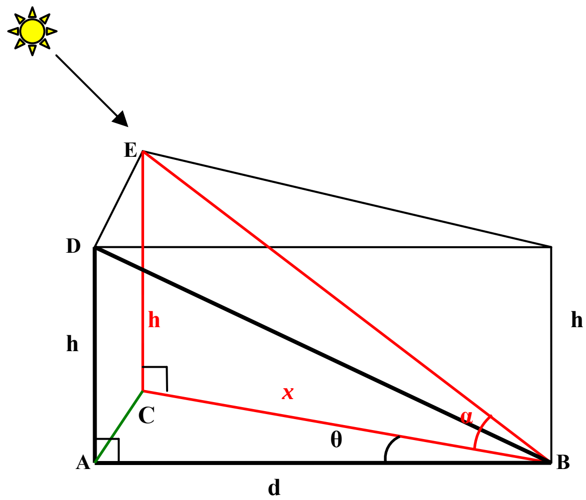

Figure 5.6: A three-dimensional plan of the variables considered for the calculation of the depth of the sun's rays in the stoas.

The depth of the stoa roof allows only a small amount of the high summer sun's rays to enter the structure, keeping the interior cool and shaded. Although during the winter months the stoas may have been somewhat draughty and cold, they would have provided shelter from wet weather, allowing large numbers of people to enter and leave without causing disturbance and the sun to penetrate further giving warmth.

Stoa	Date	Dimensions	Orientation	Approx. height
Argos Heraion, North stoa	late 7th–early 6th (Archaic)	Columns D = 0.7 m. 4 diameters high or max. 7diameters high L = 62.1 m , W = 9.2 m (Coulton: 27–28).	South az. 197°	Calculated from dimensions 4D = **2.8 m,** 5.5D = **3.8 m**
Argos Heraion, South stoa	450–440 (Classical)	Analogous to North stoa. 4.7 diameters high (columns D = 0.87 m) L = 69.09 m, W = 10.59 m (Coulton: 40, 219)	South az. 229°	Calculated from dimensions **4.0 m**
Athens Agora, stoa Basileios	6th (Archaic)	Inner columns (D = 0.42 m, c.4.7 m high or *c*.11 diameters. Outer columns D = 0.58 m, (Coulton: 34)	East az. 113°	From plan L = 18m H = **3 m** (actual L = 17.75 m, W = 7.18 m)
Athens Agora, stoa of Zeus Eleutherios	425–410 (Classical)	Columns D = 0.786 m, L = 43.56 m W = 10.73 m (Coulton: 12, 222)	East az. 106°	From drawing length = 10.33 x ht = **4.2 m** from diam. 5.5 => **4.3** m
Delos, stoa of Antigonos	246–239 (Hellenistic)	Columns D = 0.705 m, L = 119.62 m, W = 13.4 m (Coulton, 231)	South az. 186°	Estim. 5.5–5.4D => H = **3.8-4 m**
Delphi, stoa of the Athenians	478–470 (Classical)	Columns D = 0.39 m, L = 31.6 m, W = 371 m (Coulton: 14, 234)	Southeast az. 144°	Estim. 5.5–5.4D => H = **2.1–2.2 m**

Table 5.2: Information on the six stoas that make up the sample. Coulton (1973: 76–78) argues that Attic colonnades of the Classical period have a height of 5.5 lower diameters, whereas the height of the Peloponnesian/West Greek group is 4.7 lower diameters and earlier Doric proportions were 4.5–4.7 diameters. The dimensions given are of the outer columns.

During the summer months, the presence of structures that provide shade is a necessity in Greece. The orientation of the stoas as inferred from this study agrees with their function, making them pleasant places for gathering. The development of the stoas as a unique structure in the geographic location of Greece becomes thus more apparent. The orientation of the South stoa in the Argive Heraion is such that the sun would enter it in the morning through the year, but during the warmest time in the summer the rays would only reach 1.5 m across the floor, while at the same time in the winter they would reach up to 5.5 m (depth of structure 10.59 m). The Northern stoa in the Argive Heraion, however, would have been illuminated by the sun's rays in the morning during the summer but the rays would only reach as far as 1.2 m at the warmest time of the day (width of stoa 9.2 m), whilst during the winter, autumn and spring months the rays of the sun would enter the structure at sunrise and would remain until sunset. In the Athenian Agora the sun's rays would enter the Stoa Basileios and the Stoa of Zeus at sunrise throughout the year but in the summer would only reach as far as 0.50 m around noon and would have withdrawn completely by just after noon. In the winter months the rays would enter the structure at sunrise again, but this time they would reach as far as 1.5 m (depth 7.18 m) and 2.5 m (depth 10.73 m) respectively around noon and would have stayed longer in the stoa, until around 15:30 and 14:30 respectively. A very similar effect occurred in the stoa of the Athenians in Delphi, with the structure admitting the rays of the sun at sunrise but being completely in shade after 14:30 in the summer. In the winter, autumn and spring months however, the stoa would have been illuminated by the sun for the duration of the whole day until almost an hour before sunset. Finally, it seems that the stoa of Antigonos in Delos was also built with the optimal orientation according to the function of the structure. In the summer, the sunlight entered the stoa in the morning and around local noon it would have reached around 1 m deep in the structure (depth 13.4 m) before it withdrew completely around 17:30. In winter, autumn and spring, the sunlight would reach the furthest inside the structure (4 m in depth) at noon, but the rays of the sun would illuminate the structure from sunrise to the time that the sun would set.

This analysis has shown that these stoas were placed on such an orientation that they would admit the sun's rays for a long period of time during the winter months and provide long periods of shade in the summer.

The Hypostyle Hall (210–200 BC) of Delos with a southerly orientation is a quite different building (Figure 5.7). Coulton (1976: 3) classifies it under stoas not only because of the inscriptions from 210 BC calling it a stoa, but because although ‘it had a colonnaded façade, it was so deep that it had to be lit by a lantern in the roof, and its form was related as much to the Telesterion at Eleusis as to any stoa.’ The fact, though, that in an inscription recovered from Delos it is referred to as a stoa led Coulton to the conclusion that this was simply an attempt to name an unprecedented building which had a similar function to a stoa, and it seems that was used as a mercantile exchange (Lawrence, 1973: 270). The architecture of the structure is quite different from that of other stoas. Hypostyle halls were rectangular structures, in some cases with as many as two entrances on each wall (eight in total). It is for this reason that they have not been included in my sample of stoas. By looking at the architecture and function of hypostyle halls it becomes apparent that an astronomical orientation would not have been of use: they were used, for example, as gathering or meeting places of the local magistrates whenever an official meeting was required. It is believed that their interior was decorated with wooden amphitheatrical seats and a podium in the middle. Two entrances on each side of the rectangular halls, or several entrances along one wall (Figure 5.7), were an efficient solution, providing the building with the necessary light and ventilation and with easier and faster entrances and exits for large numbers of people.

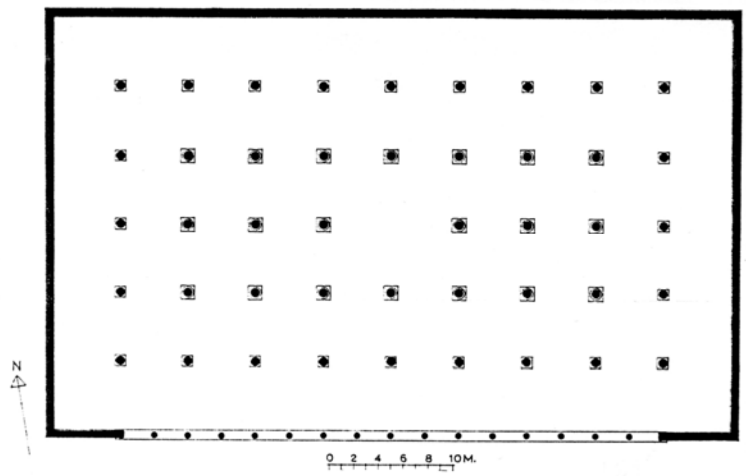

Figure 5.7: The Hypostyle Hall of Delos (after Bruneau and Ducat, 1965).

The Thersilion in Megalopolis (Figure 5.8) was another structure that was similar in architecture to the hypostyle halls, but which is classed under the Bouleuteria (council houses) group because of its function. It was the assembly-hall of the Arcadian League, a rectangular building with sixty-five columns in its interior. All the columns were constructed in a layout that created lines radiating from the centre of the structure, the projection of which would have converged off-centre towards the south end. This layout managed to reduce to a minimum the obstruction caused by the large number of columns. The seats would have probably been placed in rows and the building had a capacity of six thousand (Lawrence, 1973: 257). There is evidence that the floor had a circular slope in the manner of theatres (Robertson, 1945: 175). The speakers would stand at a point that was equidistant from the east, north and west walls but closer to the southern one.

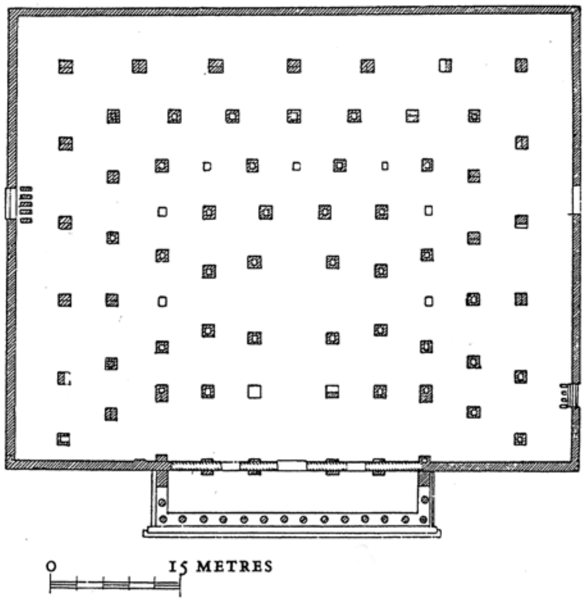

Figure 5.8: The Thersilion at Megalopolis (after Lawrence, 1973).

Four bouleuteria, from Olympia, Megalopolis, Dodona and Messene, were measured and included in the dataset, but have been omitted from the Figures and the analysis presented in this chapter, as in view of their function it can be assumed that an astronomical orientation would not have been sought mainly for two reasons: the purpose of gathering in the bouleuteria would have been for the discussion of matters of the state and an astronomical orientation would not have a role in such gatherings. Secondly, a deliberate functional orientation of the bouleuteria – like that of the stoas – is not likely owing to the size of the structures (the sun could not enter very far into the interior). The only possible orientation sought for these structures may have been connected to the local winds (see Vitruvius, 1.6.1 on designing cities for protection from winds) and it is possible that the structures were oriented so as to provide the optimal ventilation, given the large number of people gathered inside. Such a factor is a possibility judging from the several doors of the structures which would not only allow large numbers of people to enter and leave in a short time, but also would provide good ventilation during the course of the meetings. Such considerations, however, are not related to astronomical movements.

Orientations of religious structures

As the present thesis focuses on religious structures, a general Figure has been generated, which only includes non-secular orientations (Figure 5.9). The Figure shows that the general distribution of religious structures alone does not change the formation of the patterns discussed in Figure 5.1. However, the large number of measurements of religious structures enables questions to be asked that involve dividing the data into several subgroups.

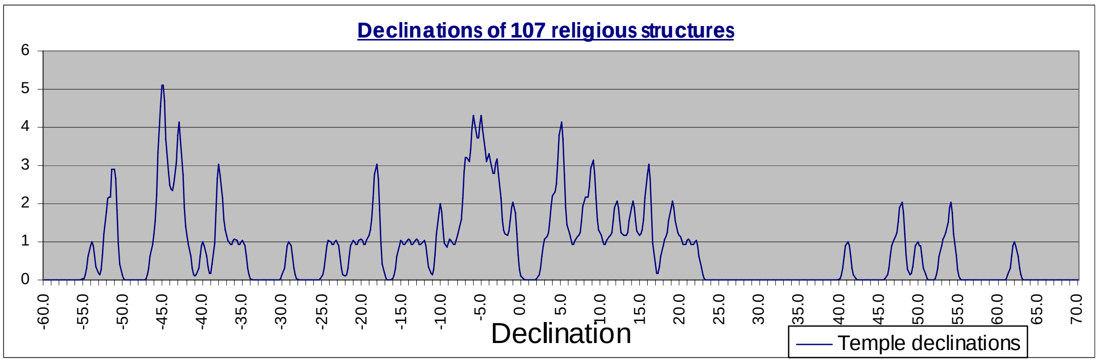

Figure 5.9: Distribution of the orientations of the religious structures included in this study.

Geographical location

I asked first whether temple orientations were related to their geographical location within Greece. In other words, did the orientation of a temple relate to specific criteria that may have been practised only in certain regions, or been affected by local traditions? Such practices did not necessarily apply across Greece. The data are split into four geographic groups: the Peloponnese and islands of the Saronic Gulf (Figure 5.10), central Greece and Attica (Figure 5.11), northern Greece (Figure 5.12) and the Aegean islands (Figure 5.13). While each of the above groups involves several cultural traditions (most evidently in the Aegean islands group, which covers the islands of the Cyclades and the Dodecanese), the number of measurements was not adequate to facilitate a division into more culturally homogeneous groups.

It is clear that the patterns that emerged in Figures 5.10 to 5.13 are broadly similar to those of Figure 5.1. We see a similar distribution of data, the same three clusters of data in all the Figures, where the eastern/western is again the largest and the southern the second largest. In central Greece and Attica (Figure 5.11) we observe a high peak in the southern group around –45°. These measurements are from only two sites (Delphi and Thermon) and from two different deities (Athena and Apollo). This is simply a case of overrepresentation, as there are three different structures from the site of Thermon and three different temples of Athena in Delphi. When examining the overall trends, then, there is no supporting evidence of regional variations in the orientation of the temples.

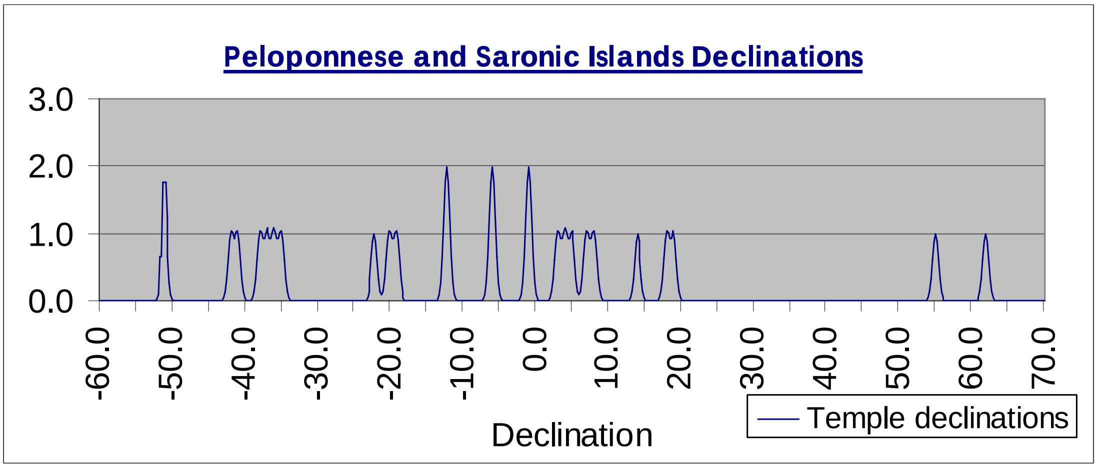

Figure 5.10: Measurements of twenty-seven structures.

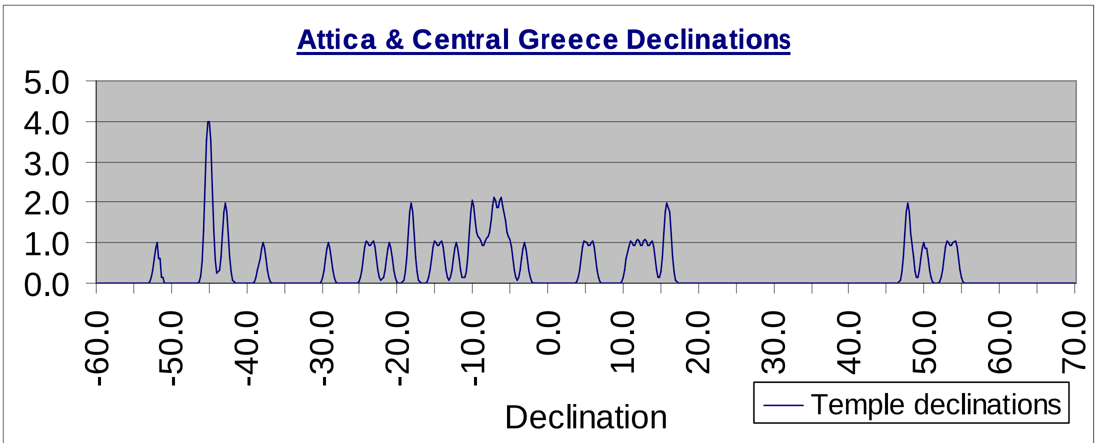

Figure 5.11: The figure includes measurements from forty structures.

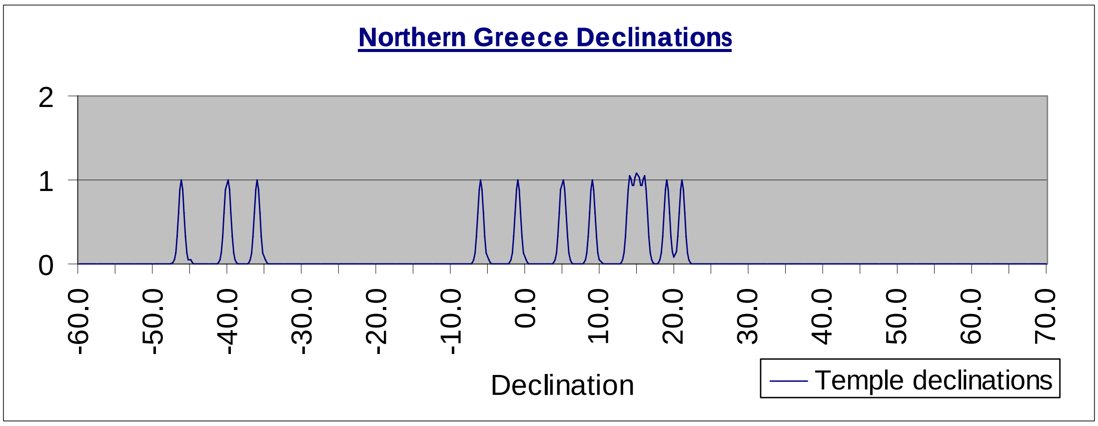

Figure 5.12: Distribution of the orientation of twelve structures.

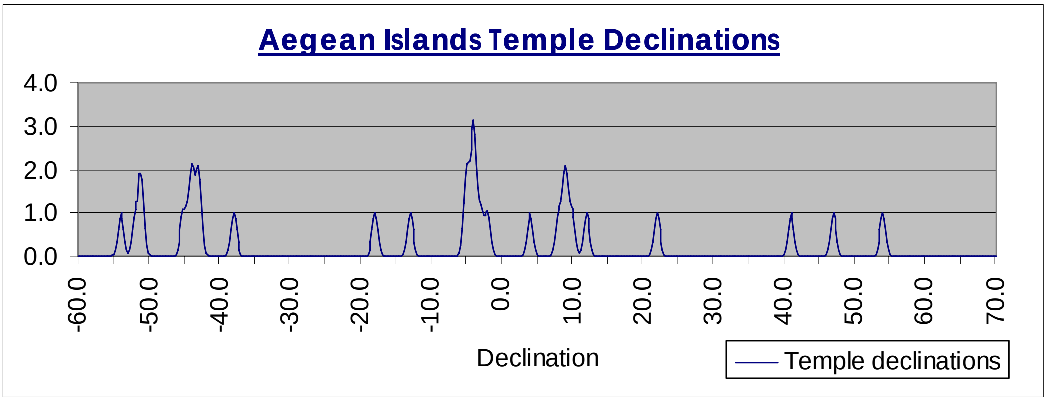

Figure 5.13: Distribution of twenty-nine orientations.

Date of construction

When studying a practice within a cultural group, it is important to specify the period in relation to the chronological phases of the temple during which the practice was performed, and in particular the date of its introduction and the time when it declined. Had there been discernable local traditions, it might have been possible to detect the rise and decline of a tradition. In Greece, religious space was a concept that developed over a long period, from early religious activities performed in open space leading to the development of temples and sanctuaries. The construction of religious structures that were detached from domestic space occurred after the Mycenaean period, during the ‘Dark Ages’. In the vast majority of religious sites we encounter continuity in the construction of religious buildings, the repeated rebuilding of old temples that had been destroyed owing to natural disasters (e.g. the temple of Apollo at Delphi, destroyed in 373 BC by an earthquake) or destruction by human action (e.g. the destruction of the temple of Poseidon in Sounion by the Persians). The new temples were built either adjacent to or on top of the old foundations, and were always dedicated to the same deity.

If temple orientations were associated with astronomical observations, then by splitting the data according to chronological periods it may be possible to determine whether the practice of orienting temples in specific directions was introduced prior to the development of temples, or subsequently. By splitting the data according to chronological periods it may be possible to distinguish the time of introduction of such a practice. A change in the orientation patterns may also be detected – in the case of deliberate temple orientations – if in later years this custom fell out of practice or became relaxed.

The declinations have been split into subgroups by chronological period as determined by archaeological finds: Mycenaean (1300–1100 BC) Figure 5.2, Geometric (900–700 BC) Figure 5.14, Archaic (700–480 BC) Figure 5.15, Classical (480–330 BC) Figure 5.16 and Hellenistic (330 BC–AD 14) Figure 5.17. The Mycenaean declinations have already been discussed on pages 67–68, where it was demonstrated that they share a similar southerly orientation. The remaining subgroups represent subsets of the data in Figures 5.14–5.17. No visible shift between the consecutive periods is observed in the distribution of the declinations.

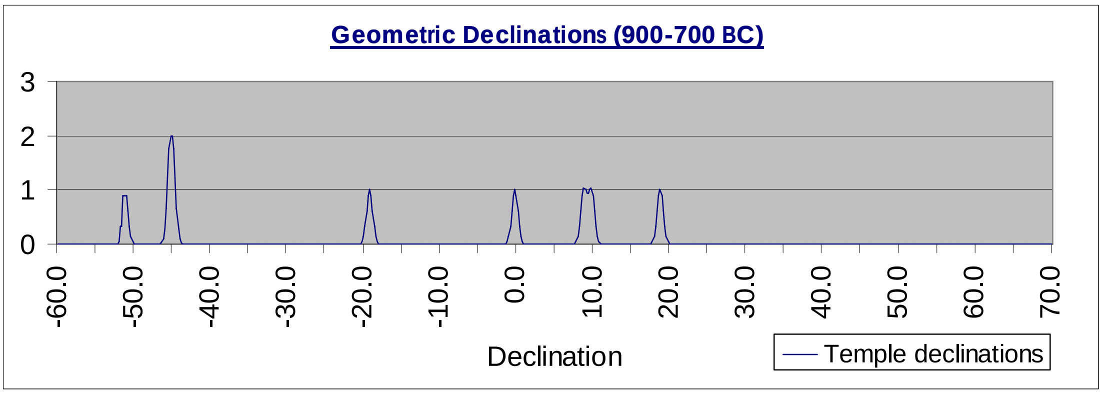

Figure 5.14: The figure shows measurements from eight structures.

On the other hand, a preliminary study of published ground plans of the sampled sites indicates a frequent shift of orientations between earlier and later structures. The division of the above chronological periods is determined through changes in technology, architectural development and elaboration in the decoration of structures, and changes in pottery and art. It becomes apparent, then, that the boundaries of these

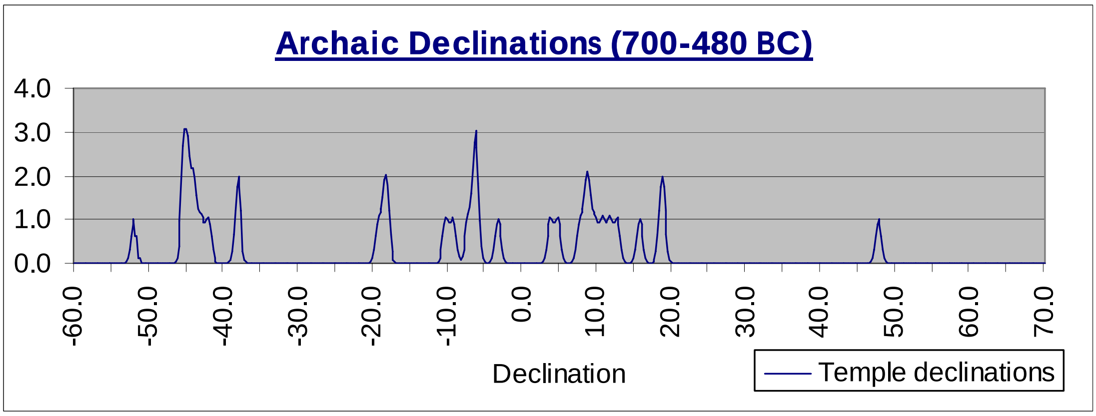

Figure 5.15: The figure includes thirty-three measurements.

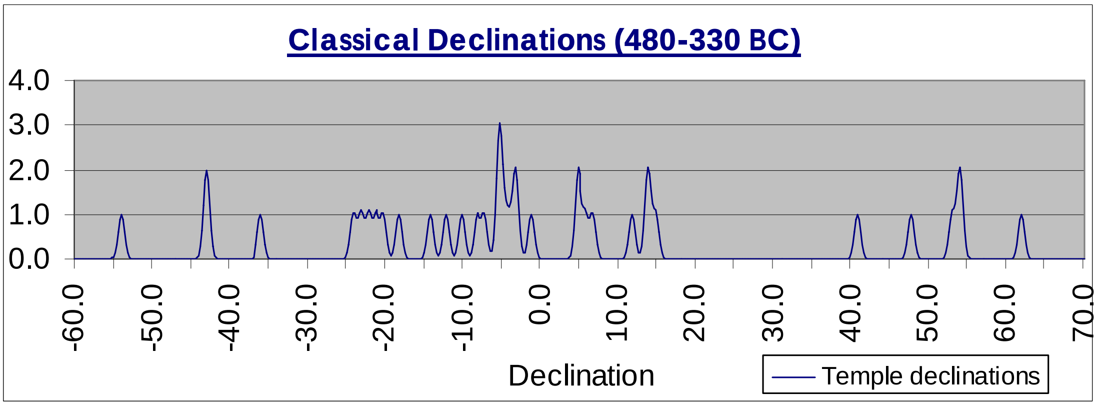

Figure 5.16: The subgroup is made up of thirty-six orientations.

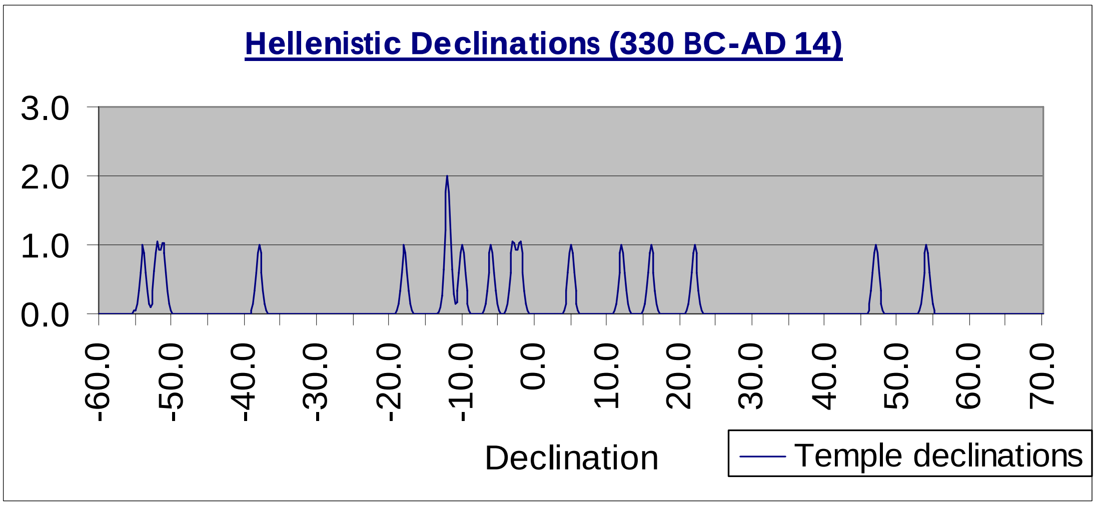

Figure 5.17: Orientations of seventeen Hellenistic temples.

periods need not apply to a study which investigates successive structures. This study includes four sites with four successive reconstructions of the same temple (e.g. the Heraion of Samos, the temples of Dionysos in Sagri, Naxos), six sites with three successive reconstructions (e.g. the temples of Apollo and of Artemis in Delos), and nineteen sites with two reconstructions (e.g. the temples of Dionysos in Athens, the temples of Poseidon in Isthmia, the temples of Demeter in Dion). The case of the four reconstructions of the Heraion in Samos, for example, involves three changes in orientation (over more than 500 years), yet these fall only within two of the above chronological periods (Geometric and Archaic). In other cases, two or more successive temples with different orientations fall in the same chronological subgroup (e.g. the two temples of Poseidon at Isthmia and the two temples of Asklepios in Kos). It proves necessary to look at sites with continuity in the construction of religious structures individually and within their religious context, regardless of modern views about the time frame of chronological periods.

Figure 5.18 shows the distribution of the temple orientations grouped according to site and successive structures. In the majority of the cases (18 out of 28) there is an observed change in orientation between successive structures. An interesting observation is that in 17 cases out of 18, the change in orientation occurs between the

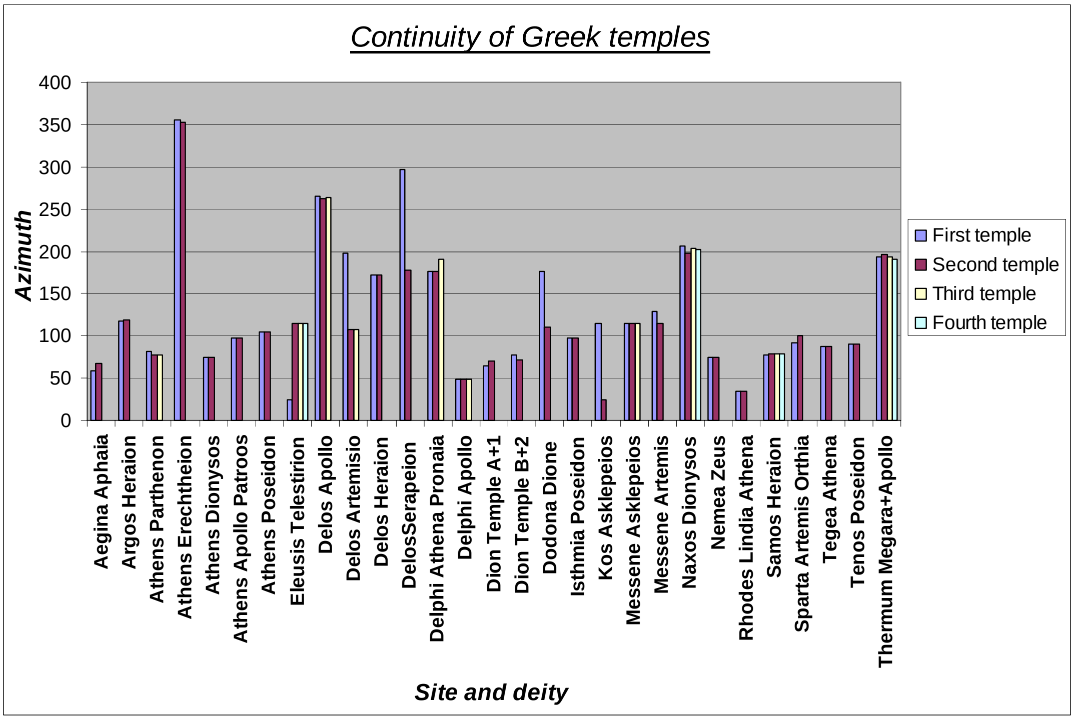

Figure 5.18: Orientation measurements from 29 cults (72 structures).

first temple and the second. Only in one case (the temple of Athena Pronaia in Delphi) do the first and second structures have the same orientation with a change occurring in the third. This may be for a number of reasons not necessarily connected to astronomy. It may be that the foundations of early Classical structures (which is usually the date of the second structures) were more durable and better preserved than the earlier archaic temples and thus there was no need to reconstruct new foundations, since the existing ones could be reused. No further patterns are detected.

Deities subgroup

It is possible that temple orientations depended upon the deity to whom they were dedicated. The worship of certain gods may have required their temples to face a particular part of the horizon. These subgroups test this idea. The collected sample does not represent all of the Greek deities, and for some of those that are represented very few measurements are available. The largest deity subgroups are Apollo (Figure 5.19), Athena (Figure 5.20), Demeter (Figure 5.21), Hera, (Figure 5.22) and Zeus (Figure 5.23). Other deities are also represented with fewer measurements: Artemis (Figure 5.24), Poseidon (Figure 5.25), Asklepios (Figure 5.26). Only five measurements in total are available for foreign gods, which are entered in one Figure (Figure 5.27). Several other deities are also present in the dataset, but for these only one or two temples were measured (e.g Leto, Tyche, Kabeiroi, Aphrodite, Hades, Themis, Dione, Herakles, the Muses, Hephaistos, etc.) and they are therefore not included in this analysis.

With the exception of Apollo and Artemis, the Figures of the deities mirror the pattern of Figure 5.1 (the three clusters of data) with respect to the amount of data that are available. In the Demeter and Athena Figures, for instance, where many

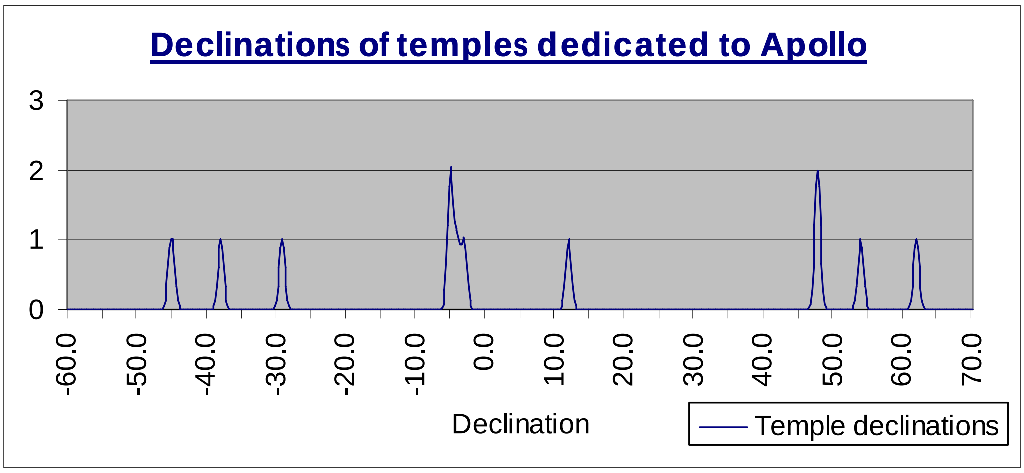

Figure 5.19: Declinations of twelve temples dedicated to Apollo.

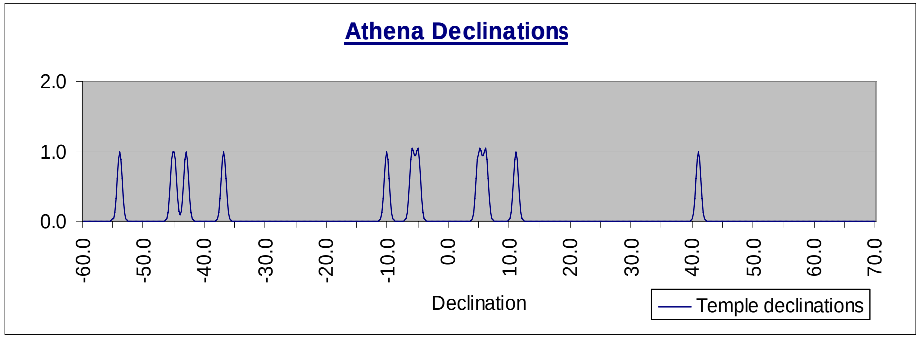

Figure 5.20: Declinations of eleven temples dedicated to Athena.

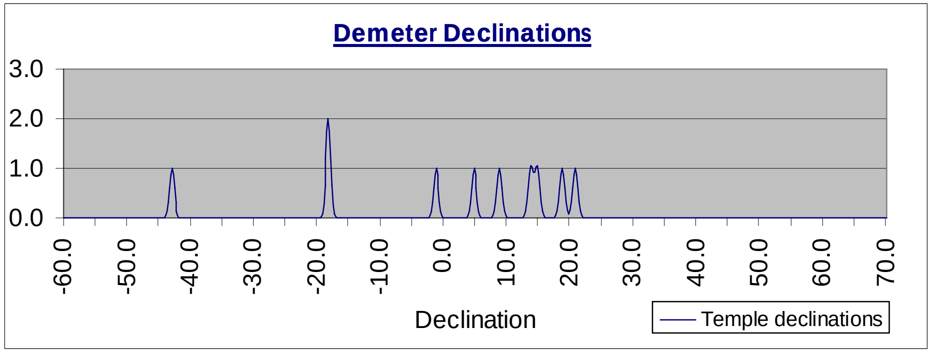

Figure 5.21: Declinations of ten temples dedicated to Demeter.

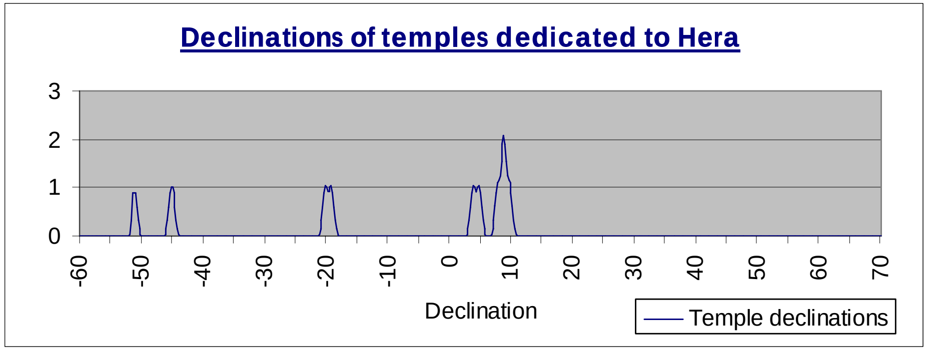

Figure 5.22: Declinations of ten temples dedicated to Hera.

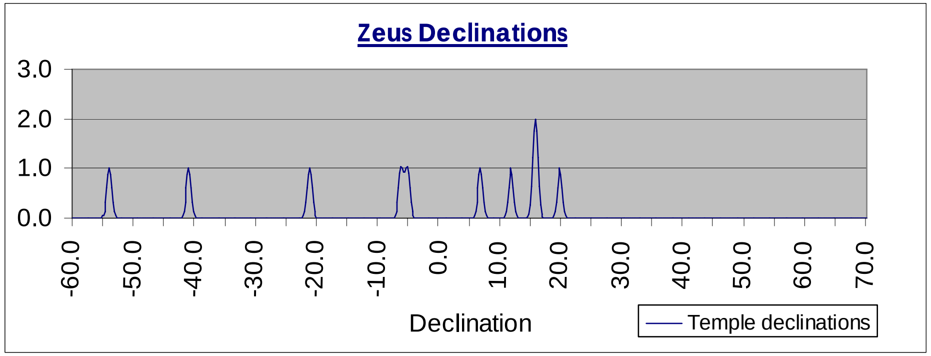

Figure 5.23: Declinations of ten temples dedicated to Zeus.

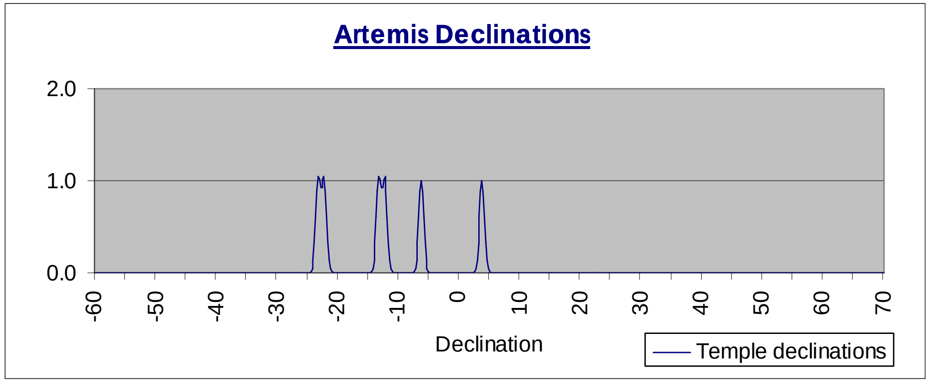

Figure 5.24: Declinations of six temples dedicated to Artemis.

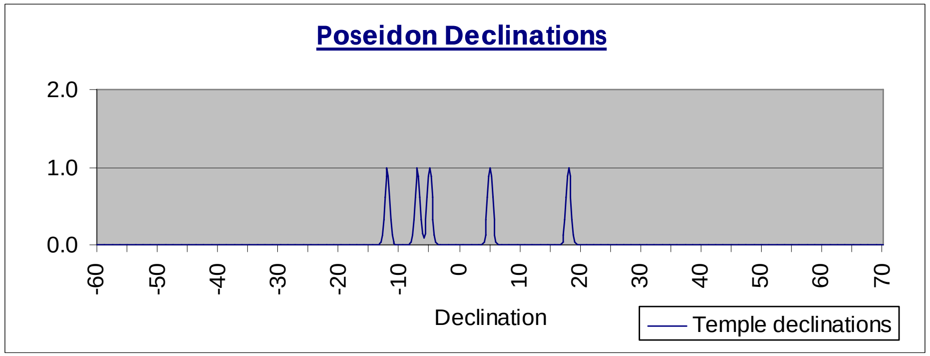

Figure 5.25: Declinations of five temples dedicated to Poseidon.

measurements are available, all the three clusters are represented. In the case of Hera only the two largest clusters emerge (the eastern/western and southern). Even in this case, though, the eastern/western is greater than the southern, as in Figure 5.1. In the smaller Figures, only the eastern/western cluster becomes visible. It is perhaps noteworthy that in the case of the Apollo temples the northern cluster is almost as large as the eastern/western.

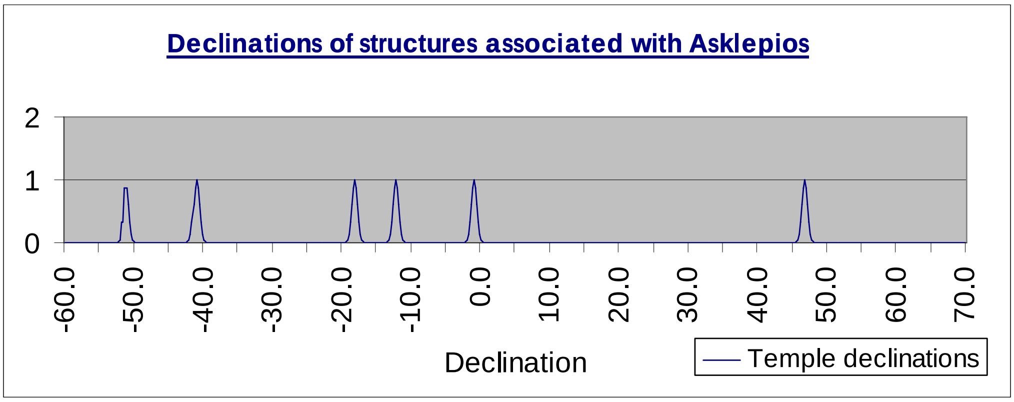

Figure 5.26: Declinations of six structures.

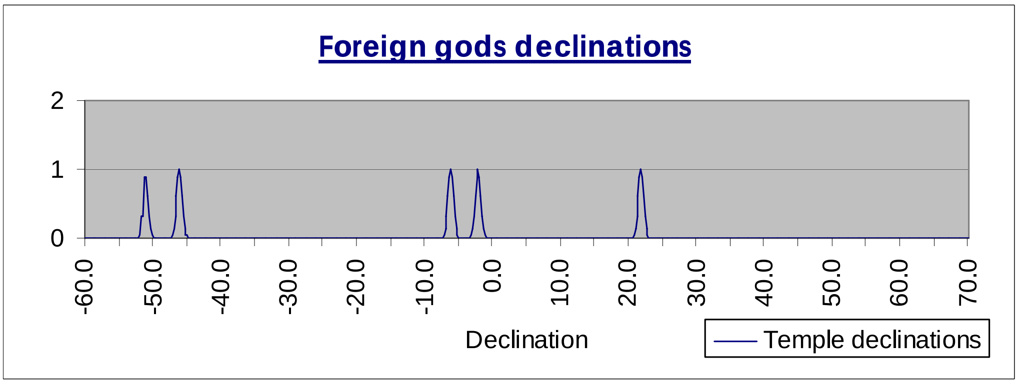

Figure 5.27: Data includes measurements from four Egyptian cults and one Phrygian deity, Attis.

Chthonic versus Ouranic

The ways of examining the temple orientations presented so far and the questions posed each time are preliminary and, to an extent, decontextualised. The questions asked are those posed as a first attempt at trying to understand the basic elements of Greek cult. Instead of integrating the orientations with the context within which they are found (e.g. cult, worship, function) they are approached with modern perceptions of what would be logical. However, such an approach was necessary in order to gain an initial and general understanding of the overall trends. The analysis presented until now is not thought to be exhaustive and complete.

This attempt at clustering the data together in order to answer specific questions results from the way that Greeks themselves grouped their divinities. Our understanding of this division emanates from written and archaeological evidence. This grouping is for us complicated, far from clear and distinct, but seems at the same time to have been quite flexible. The division of the Greek pantheon into chthonic (the gods living under the earth, for example Pluto and Hades and the heroes) and ouranic (the gods of Mt Olympos and with attributes such as those of Apollo, Athena, Aphrodite, Hera etc.) could in some cases determine the type of rites performed. Mikalson and Burkert argue that this division could also affect the time of day the rites were performed, the orientation the priest faced and the type of sacrifice offered (Mikalson, 2005: 6; Burkert, 1985: 202).

A priest orienting himself in a certain direction would have to also situate himself with regard to the altar that he would use. If, in turn, we supposed (for the sake of argument) that the orientation of the altars was important, say for instance that altars of ouranic gods had to be oriented to the east, this could consequently affect the temple orientations. In most cases the altars predate the temples and temples generally face towards the altars, even when altars are built slightly further away than the temples (as is for example the temple of Zeus in Olympia). Consequently, if the altar is situated to the east, the temple could point towards the same general direction (Mikalson, 2005: 20). Figures 5.28 and 5.29 show the distribution of orientations of temples divided into Chthonic and Ouranic groups with the aim of testing this hypothesis.

Burkert states: ‘And yet precisely those rites which are common or similar are differentiated in such a way that they are placed unmistakably on one side [chthonic] or the other [ouranic], so emphasizing a fundamental position’ (1985: 199). This is perhaps true for the rites performed once it is established in which domain a certain cult should belong, but the division of gods into one or the other sphere is far from clear and standard. Several gods, such as Asklepios, can be either chthonic or ouranic. In addition, we are uncertain about classifying as chthonic or ouranic many other deities. What seems to be a determining factor is the attribute of the god in each sanctuary, which distinguishes an ouranic Zeus (Zeus Basileus), for example, from a chthonic Zeus (Zeus Soter in Megalopolis). Even so, we can still not be certain about some cults, for example, in which sites Asklepios or Herakles were worshipped with their chthonic attributes and in which were they considered ouranic.

The analysis which follows includes only those cults which can be placed with certainty in either group. Overall, we can be certain about very few cults: (a) All hero cults were chthonic. Heroes had lived a mortal life and when consecrated at their deaths they were promoted to a quasi-divine status and lived in the underworld; thus they had to be worshipped with *choai* (libations of pouring liquids into the earth for those who lived in the underworld). (b) State cults were always ouranic. So, for example, the cults of Athena Polias, Zeus Polieus, Apollo Patroös and Zeus Agoraios are ouranic. The amount of data in this analysis is considerably smaller than the total number of available measurements; only 57 orientations being included (33 ouranic and 24 chthonic). Somewhat fewer than half of the available orientations could not be included, as many deities could move between the chthonic or ouranic domains. This demonstrates how uncertain we are about this division as well as about the local character of many of the cults by which Greek religion is constituted.

Figure 5.30 compares both ouranic and chthonic azimuths. Both groups show a preference for eastern orientations. The concentration of east orientations in the chthonic azimuths comprises just over half of the measurements of the group (15 orientations) (Figure 5.29). Of the 15 values falling in the eastern/western group of Figure 5.29, 14 face towards the east and only one to the west (one of the two entrances of the Thesmophorion in Pella). The remaining orientations show a preference for southern declinations. In the ouranic group, the vast majority of orientations face towards the east. Of the 28 measurements falling in the eastern/western group of Figure 5.28, only 4 orientations face towards the west (the three consecutive temples of Apollo in Delos and the temple of Zeus in Mt Kynthos, Delos). Just over half of the 28 measurements (15) are within 10º from due east. It is

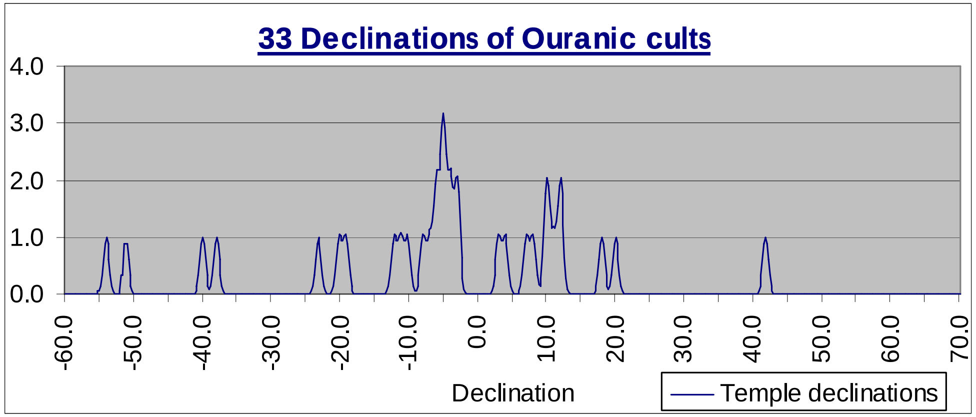

Figure 5.28: Distribution of orientations of structures related to ouranic cults.

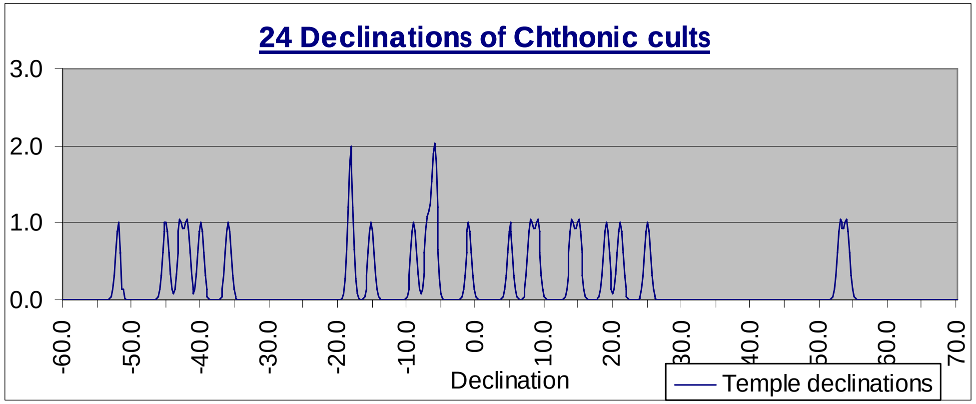

Figure 5.29: Orientations of chthonic cult temples.

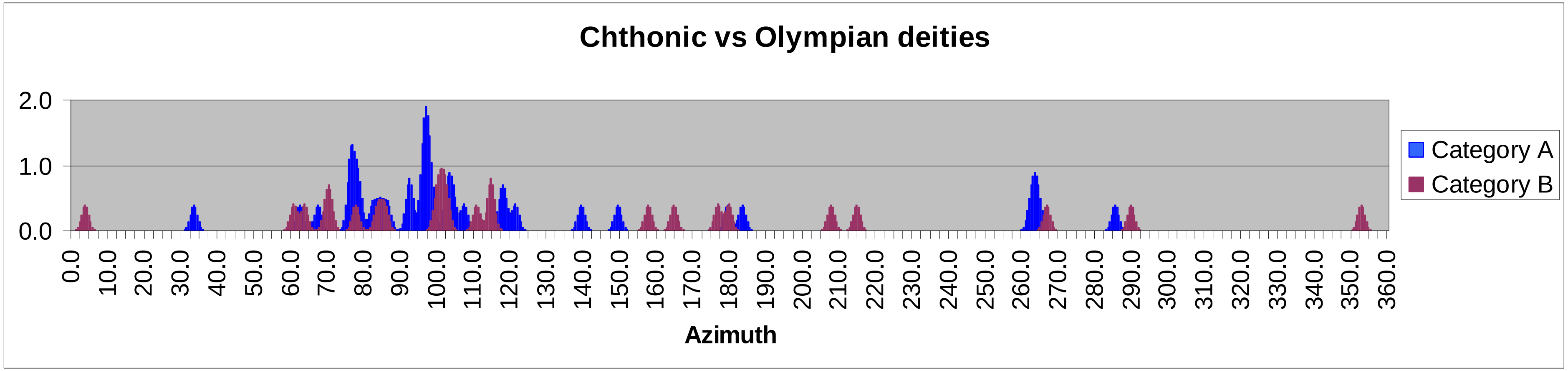

Figure 5.30: Comparison of azimuths between the chthonic and ouranic groups. Chthonic azimuths are in red. Blue azimuths belong to ouranic cults.

perhaps interesting that the southern and NW–NE sections of the horizon show a considerable lack of measurements (only 5).

This analysis demonstrates that there is no evidence to suggest a distinction in the orientation of the temples of chthonic deities towards the west. In the ouranic deities there is indeed a preference to the east, but the same preference exists also (to a lesser degree) for the chthonic temples. Most importantly, the chthonic temples do not show a preference for westerly orientations. The idea of the ouranic temples having to face east is not sufficient to explain the four western orientations, nor those facing south, outside the solar range. The temples with the most evident chthonic connotations are the Palace of Hades and Persephone at the oracle of the dead in Acheron and the Ploutoneion in Eleusis. The Palace of Hades is oriented northwards (az. 4º, dec. 50º), whereas the Ploutoneion is oriented just south of east (az. 103º, dec. –9º). Quantitative statements such as the above arguments on the orientation of the priests do not seem to apply to Greek temples.

The general data analysis leads once more to the conclusion that we need to look at individual cults and temples. The Palace of Hades, for instance, is built underground, below the oracle of the dead; it has no openings and therefore no access to a horizon. It seems that its orientation would have no significance. The case of the Ploutoneion is again unique. The temple is built in a cave, next to a chasm in the natural rock and some carved steps in the rock, from where it is thought that the priestess ascended during the re-enactment of the return of the Kore to the world of the living. The cave is narrow (Figure 5.31), and the cave walls would not have allowed the temple to be shifted to any different direction if it was to be fitted in the cave. The temple therefore has to face E. It is noteworthy that there is no altar or *eschara* (altar or pit with braziers placed upon it) at this temple (offerings were given on altars to ouranic gods, and in *escharai* to chthonic), so it is possible that no rites took place around the temple apart from the re-enactment. In both of the above cases the temple orientation seems to have been secondary.

The temples dedicated to Akslepios are the largest group among those deities who could be either in the ouranic or chthonic domain, and it is worthwhile studying them separately. Figure 5.32 shows the distribution of declinations of structures associated

Figure 5.31: Eleusis, Ploutoneion from the SE.

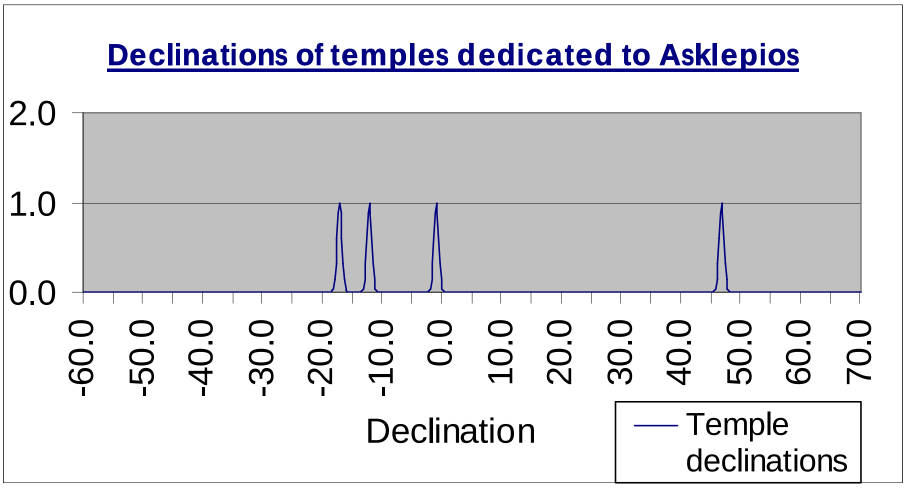

Figure 5.32: Temples explicitly dedicated to Asklepios.

with the worship of Asklepios. Three sites are represented in this Figure: Messene, Gortyn, and Kos. Declination 47º seems interestingly isolated, facing almost north. It belongs to the great temple of Asklepios in Kos. We can observe that the later and larger temple of Asklepios is orientated at an angle of almost 90º degrees to the older temple. The groundplan of the sanctuary (Figure 5.33) shows that the temple does not actually differentiate itself at all from the already existing cult places in the site; its declination was most probably determined by practical and cult factors. The size of the temple demands an extremely large platform and space, which are only available to the south of the old temple (number 14 on Figure 5.33). The construction of a temple of this size was dictated by the increasing popularity of the cult, in which case the temple had to also be imposing and to stand out from the rest of the structures in the sanctuary. This purpose is fulfilled by the platform, which is at a considerable height above the rest of the structures in the sanctuary, and provides an ideally imposing view of the new temple. Such a positioning of the temple does not compromise the importance of the focal point of the cult: the altar. Although it is at a 90º angle to the old temple and stands alone on a much higher terrace, differentiated from the other structures, the new temple does not have its own altar. Instead, it is oriented to the altar that stands in front of the old temple on the lower terrace.

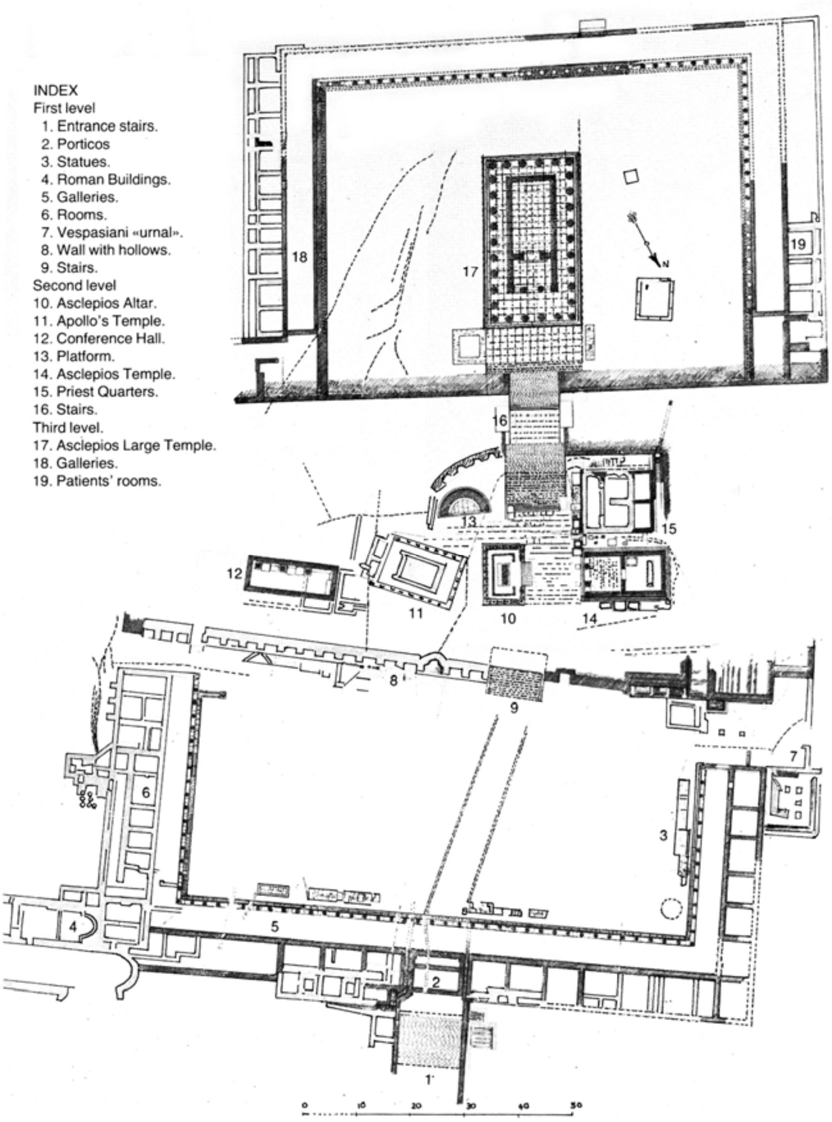

Figure 5.33: Groundplan of the Asklepieion in Kos.

A few comments are due on the two most southerly oriented structures of Figure 5.26 (dec. –51º and –40º), which are omitted in Figure 5.32. Dec. –51º is not an actual temple of Asklepios but the orientation of the Abaton/Therapeuterion in Tenos. The sanctuary in Tenos was dedicated to Poseidon, but it seems reasonable to include this declination with the structures associated to Asklepios, because at the sanctuary of

Poseidon in Tenos the god was worshipped for his healing abilities. However, the declination seems to be the most extremely oriented of the rest of the group, and given that the structure was used for the healing procedures and no cult activities were taking place there, it should not detract from the orientations of the structures that are related to Poseidon's or Asklepios's cults. Declination –40º does not belong to a temple to Asklepios. It belongs to one of the *Oikoi* in the Messenian Asklepieion and is dedicated to 'Asklepios and Paides' (house of Asklepios and his sons). Given that the cult of Asklepios in the sanctuary was housed in the great temple of the god in the centre of the sanctuary, which was constructed and used at the same time as the *Oikos*, it is unlikely that this smaller structure was used during the major festival at the sanctuary instead of the temple and great altar in front of it. Figure 5.32 was generated as a result of these observations. The two structures that were not explicitly dedicated to the cult of Asklepios, or would not be part of the focal locations during the major festivals, are omitted from this Figure.

Moon Models

It was briefly stated above that the lack of data falling outside the solar limits, but within the major lunar standstills, might have been an indication that the movement of the moon did not affect the orientation of Greek temples. I did not consider the results of Figure 5.1 to be adequate for such a conclusion and attempted to test the orientations against the movement of the moon. Dr César González García kindly entered my dataset into a moon model that he developed and generated the chart shown in Figure 5.34. This model compares the position of important phases of the moon to the orientations of the structures. The model indicates that the first waning moon after the summer solstice and the first waning moon after the spring equinox may have affected the orientation of some structures. The selection of these phases of the moon, however, is not based on literary or archaeological evidence, and I am therefore reluctant to assign such a relationship, especially since the statistically meaningful lunar results form only a small part of the total sample. There are no historical or archaeological references that support the significance of any of the above moon phases in ancient Greece. The model does not regard the peak between az. 160 and 200 as significant, although this peak includes a considerable amount of data. Finally, had the equinoxes played a role in the orientation of the temples, we would not expect to have the complete lack of data in the declinations of the sun during the equinoxes (between 0° and +3°) as it is its shown in Figure 5.1.

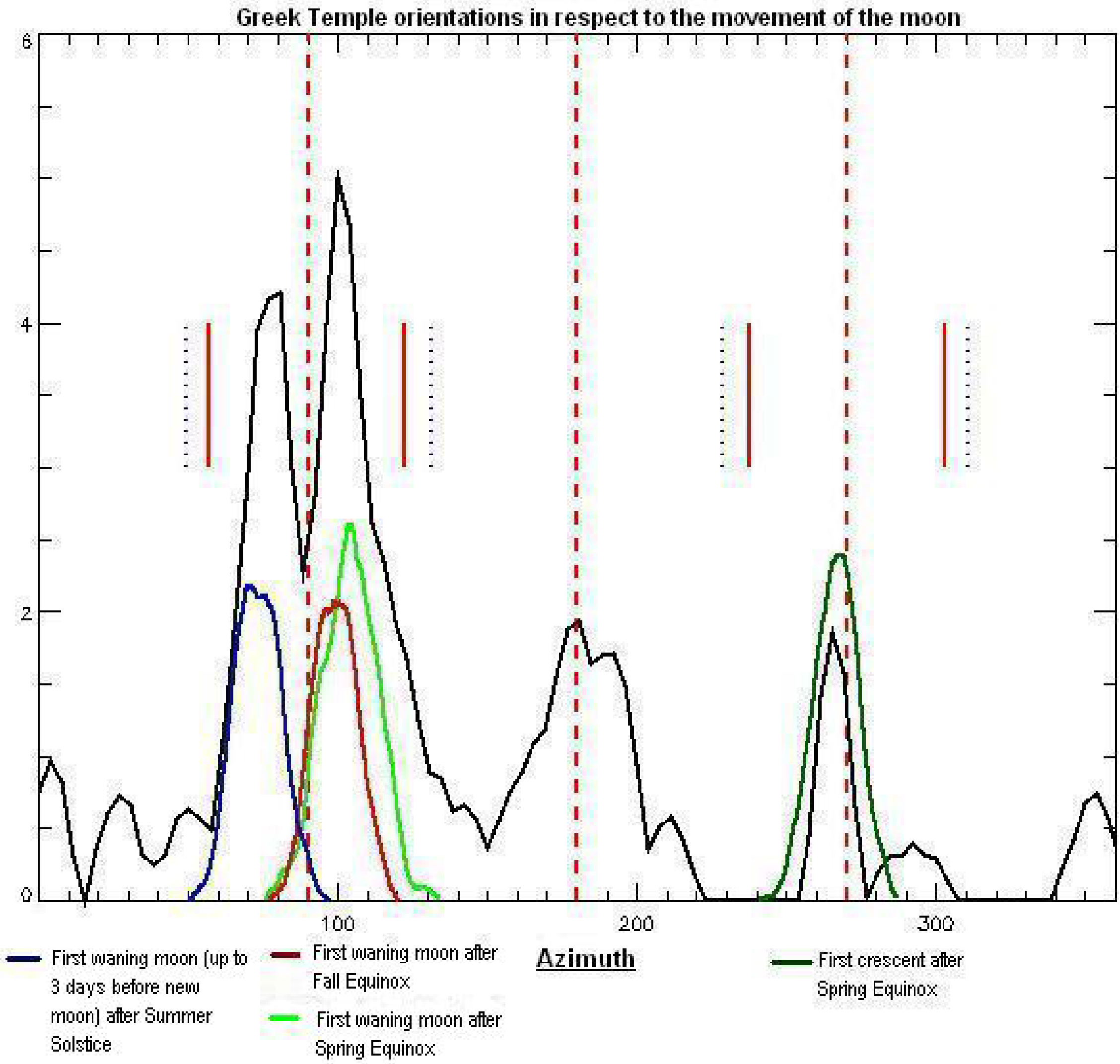

Figure 5.34: The height of the coloured lines indicates the minimum amount of data for statistically meaningful results (C.G. García). The vertical black dotted lines give the extreme positions of rising and setting of the moon (without taking into account lunar parallax and refraction), for a place located at a mean latitude of the area covered by my sample and with a flat horizon. The red solid vertical lines are the azimuths for the sunrise/sunset at the solstices (located at a mean latitude of the sample and with a flat horizon).

Discussion

There seems to be no obvious general factor that could have determined the orientation of Greek religious structures. The religious structures (Figure 5.9) are distributed mainly across eastern, western and southern orientations, while there are only 11 measurements pointing towards the north. This, and the absence of measurements between the end of the solar range and the major lunar standstill limits, may be deliberate; if so, this demonstrates that astronomical observations may have been used when orientating religious structures. If the major lunar limits were avoided, what other criteria were used in the orientation of structures?

If we suppose that temples pointed towards a part of the horizon in which a certain astronomical phenomenon was observed or predicted at the time when the annual festival was to be held, this phenomenon had to be annual and connected either to stellar or solar observations. Lunar movement equates to monthly visited positions in the horizon, with the exception of those declinations close to the major lunar limits. The data analysis has demonstrated a clear lack of data at these declinations (Figure 5.9). Only one religious structure is oriented within these declinations (see p. 66). The problems of using the moon as a marker are discussed by Ruggles (1999: 60–61) and no further discussion is necessary here.

The observation of such an event could have also served as a warning sign that the time had arrived for the religious festival to be held. The movement of the rising and setting position of the sun along the horizon is repeated annually, and the appearance of the stars and constellations undergoes a sequence of phenomena that are repeated at the same time each year: the heliacal rising and setting, the acronychal rising, and the cosmical setting of constellations and stars. However, the possibility that the temple orientations were determined by the movement of the sun along the horizon explains only the group of orientations that fall within the solar range.

61% of the dataset (76 measurements of a total 125) fall within the solar range. This percentage includes 8 measurements that point to the west (p. 66) and 2 stoas (Figure 5.4 and Table 5.2). If we subtract these 10 measurements from the total sample, we are left with 66 orientations of religious structures facing within the solar range. This number comprises only 53% of the religious structures sample. This result contradicts previous conclusions drawn by Dinsmoor that 73% of Greek temples were oriented within 60º of due east (1938: 115).

The need to study specific case studies on their own merits has been demonstrated throughout this study, caused by the individuality of cults and by specific aspects that need to be taken into account relating to landscape features. Rising and setting stars span the entire range of declinations and the following chapter aims to test the hypothesis that stellar or solar phenomena are related to the orientation of religious structures. Because there are so many stars and also because their rising and setting points shift gradually owing to precession, there is a strong risk of identifying totally spurious correlations between structure orientations and stellar bodies. Thus it is essential that appropriate criteria are employed in order to avoid random and ungrounded associations. For a convincing case, there must be a strong link between the stellar body and the cult. For this reason this study draws upon epigraphic, historical, mythological and archaeological evidence when considering possible correlations.

Chapter 6
Contextualising the archaeoastronomical research

Introduction

The following chapter is divided into five sections, each section discussing a different cult as case study. In the previous chapter, it was concluded that the shape of Greek religious rites was heavily dependent on local factors. This conclusion is confirmed and amplified in the following pages. Through the analysis of five case studies, this chapter aims to test the idea that astronomical observations were important in the organization and performance of Greek religious festivals and to investigate whether consistent observations of astronomical phenomena were associated with certain cults and religious rites.

In order to test these ideas, it was necessary to include in this chapter only well recorded cults and sanctuaries. As a result, only sites with available information from both the archaeological and the historical record were selected as case studies. The sites chosen need to have been extensively excavated, and with sufficiently detailed published excavation reports. In addition, it is essential that there exists historical information on the cult, festivals and mythology. Preference has thus been given to those cults with known foundation myths, and wherever possible, the time of year when the major festival was taking place. In addition, I include the analysis of two cults with Panhellenic character (Delphi and Eleusis) and one cult for which several temples have been surveyed in more than one site (Thesmophoria), in order to compare the results, practices and conclusions between the different locations. The case studies presented hereinafter are: the Delphic oracle of Apollo; the cult of Artemis Orthia in Sparta and Messene; the cult of Erechtheus on the Athenian

Acropolis; the Eleusinian Mysteries; and the rites of the Thesmophoria, comparing the orientations from seven temples located in Pella, Dion and Eleusis. As a result of the limited length of this thesis, no more case studies could be incorporated. The sample of case studies presented here includes some of the most important cults of ancient Greece, while including as many different deities and as wide a geographical area as possible.

The operation of the oracle of Apollo in Delphi

The imposing landscape of Delphi, dominated by the cliffs of the Phaidriades between which the sanctuary is located (Figure 6.1), inspired religious activity in the area from as early as the thirteenth century BC, when the cult of Gaia (Earth) was established (cf. Aeschylus, *Eumenides*, 6–11). The initial chthonic worship in the area is also confirmed in the myth and cult of the man-eating snake Python, terminated by Python's slaying by the divine 'Bringer of Light' (*Lykaios*) Apollo, sometime in the eighth century BC (Amandry, 1950: 209; Burkert, 1985: 147; Flacelière, 1965: 37). The archaeological finds of the temples and cult of Athena Pronaia in the lower terrace of the sanctuary confirm the argument that the cults practised in the Pronaia terrace predate the foundations of the earliest Apollo temple, and it seems that the cult of Athena was the continuation of a much earlier chthonic worship at the site, that of Gaia (Kontoleon, 1949: 46). Euripides informs us that the libation of *pelanos* (πελανός) (a thick mixture of flour, honey and oil) was compulsory for those wishing to participate in the Delphic rites (*Ion*, 226). The mixture had a clearly chthonic character (Aesch. *Persai*, 200, 523–4; Aesch. *Libation Bearers*, 92; Aesch. *Eumenides*, 264–5; Aristoph. *Ploutos*, 660–3; Eur. *Helen* 1333–4; Eur. *Hippolytos*, 145–150; Plato, *Laws*, 6.782); it was also offered at the altar of Zeus in the Erechtheion (Paus. 8.2.3), to Demeter in Eleusis (Eur. *Alcestis*, 850–4) and was poured into the fissure of Gaia in Olympia (Paus. 1.18.7; Kontoleon, 1949: 10). This chthonic offering in Delphi can be seen as the remnant of the earlier Gaia worship. Although the cult of Apollo seems to be associated with the ouranic domain, it has in fact several chthonic aspects. Before the arrival of Apollo, games were held in honour of Python (the man-eating snake that guarded the springs in the terrace below the temple of Apollo), a chthonic feature present in all the other Panhellenic sanctuaries (Olympia, Isthmia, Nemea) (Burkert, 1985: 106). The hallucinogenic vapours that ancient authors claim to have been a unique and key

Figure 6.1: View of the temple of Apollo approaching from the sanctuary of Athena Pronaia

Figure 6.2: View of the lower terrace where the sanctuary of Athena Pronaia was located.

factor in the operation of the oracle, and which seem to have some basis, were clearly released from underground (Piccardi, 2000; de Boer and Hale, 2000; de Boer et al., 2001). Also, the worship of Dionysus at the same site (where it was believed that his tomb was located) during the three winter months, when Apollo was absent from the sanctuary and the oracle was not offering consultations, testify to a clear chthonic association. These months were viewed as a period of death and mourning (Fontenrose, 1959: 379) and only the singing of the sad dithyrambs was allowed (Plutarch *Mor*. 365A, 388E, 389C; Aesch. *Eum*. 24–26). Apart from the chthonic predecessor of Apollo – a feature shared with other sites – the contemporaneous combination of chthonic and ouranic elements in the same temple is indeed rare (one more case study shows signs of concurrent ouranic and chthonic worship: the Erechtheion). This perhaps shows an attempt to marry and maintain the older Mother Earth (Gaia) and local Python worship to the later cult of the Olympian, shining (Αἰγλήτης), blond (Ξανθός), with golden hair (Χρυσοκόμης) (Decharme, 1884: 100–1; Kakridis, 1986, vol.2: 155), god of light (Φοῖβος or Λύκειος) (Hom. *Hymn to Apollo*, 120, 130–137, 146, 201, 254).

The early temple of Athena Pronaia (*c*.500 BC) in the sanctuary of Athena Pronaia, located in the lower terrace (Figure 6.2), is oriented to the south (az. 177°, alt. 7°) at declination –45°. The later temple (370–360 BC), built on the ruins of an earlier smaller temple dating to the seventh century BC (one of the earliest stone temples found in Greece), is oriented also to the south (az. 190°, alt. 8°) at declination –43° (Figure 6.3). Apollo’s last two temples (sixth and fourth century BC) had a very different orientation from the Athena temples, facing NE (az. 49°), and an unusually high horizon (alt. 27°), which resulted in a declination of +48°. In the case of the Athena temples, it was perhaps unavoidable to orient the temples to the south, as the terrace is cut in the natural rock, which rises sharply only a few centimetres from the back wall of the temple (Figure 6.4).

If the optimal temple orientations were chosen, in accordance with the landscape features, it is intriguing that this concept does not seem to have applied to the Apollo temples. The temple of Apollo might look imposing while approaching it from the sacred way (Figure 6.5), but once the visitor arrives at the terrace, it becomes apparent that the temple entrance is only a few metres away from the rocks of the Phaidriades, which rise sharply in front of it, blocking the view from the temple up to an unusually high altitude of 25°–27° (Figure 6.6). The temple of Apollo had to have the vapour releasing vault run through its *adyton*. This was already established

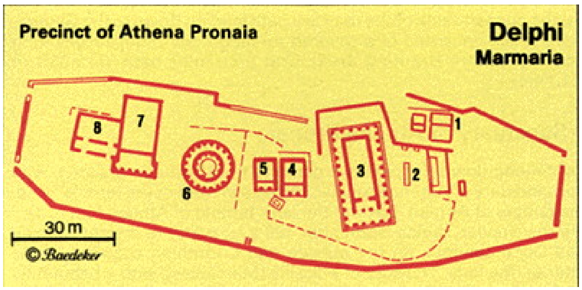

Figure 6.3: Plan of the sanctuary of Athena Pronaia:
1. archaic *temenê* and treasuries
2. altars (largest 6th century BC)
3. old temples of Athena Pronaia (c.500)
4. Doric treasury
5. Ionic treasury of the Massalians
6. Tholos
7. new temple of Athena Pronaia (c.373 BC)
8. rooms: priests' quarters
(after PlanetWare: http://www.planetware.com/maps/GR/IMG/DELMAR.htm (Consulted, 24.01.07)

Figure 6.4: View of the Phaidriades rising sharply behind the back wall of the temples of the Athena Pronaia sanctuary. View to the north.

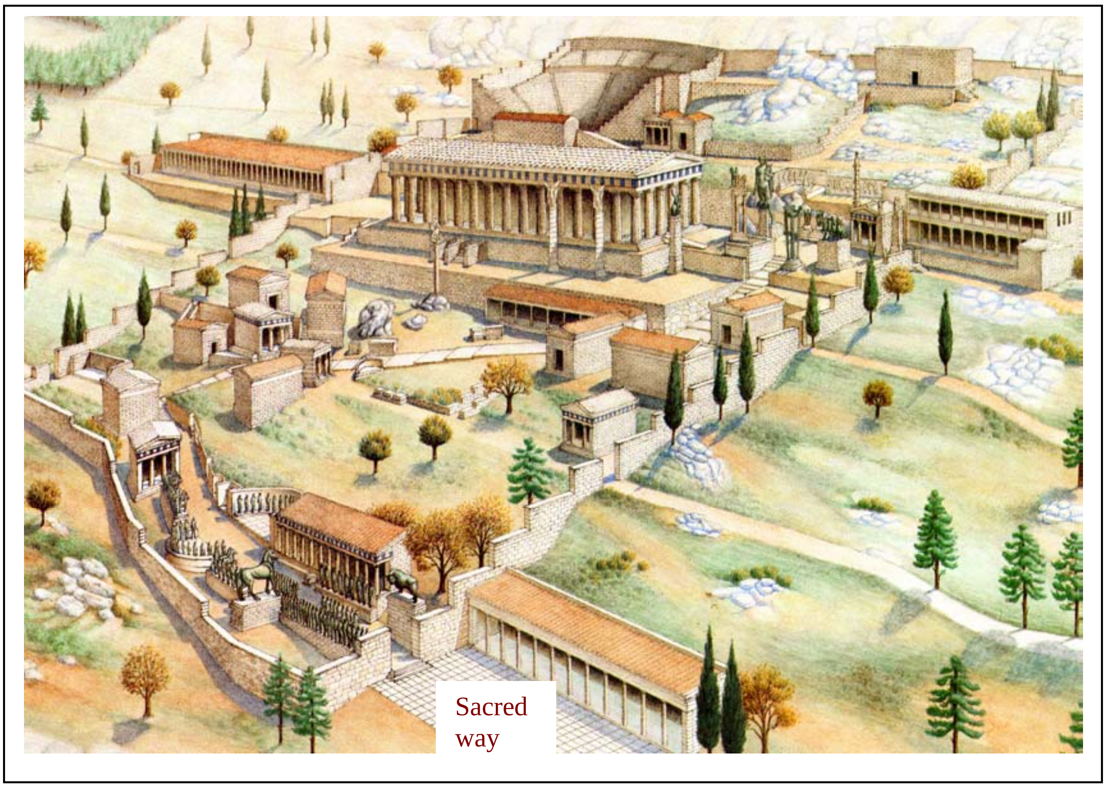

Figure 6.5: Reconstruction of the sanctuary of Apollo in Delphi.

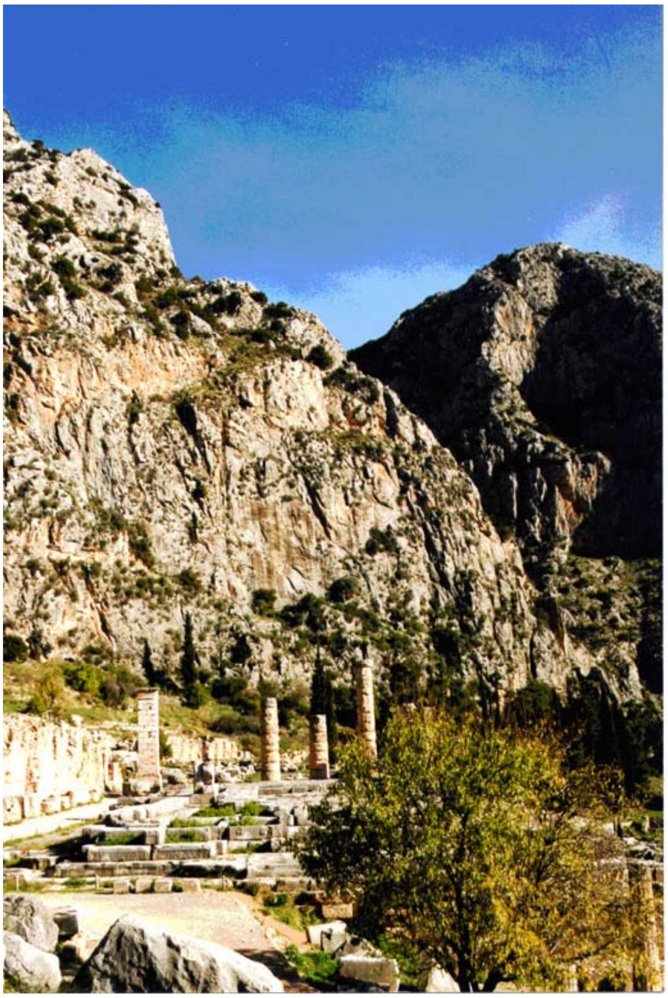

Figure 6.6: View of the horizon in front of the temple of Apollo, looking NE.

by the time of Homer (*Iliad*, 9: 405–7) and it could not be compromised. It is perhaps possible that if the positioning of the temples was to be adjusted in order to integrate them to the landscape features, this was followed only to a degree, to the point where the compromise did not affect the protected sacred cult spots (something that we will also observe in the orientation of the Erechtheion). The positioning of the temple – perhaps not aesthetically optimal as it may seem at first – is an excellent demonstration of the importance of creating structures that were in agreement with the cosmic order and integrated in the landscape. It will perhaps become apparent that the location of the temple was not simply chosen for its unique chthonic, geological features, but also for combined, unique celestial elements. The initial annual operation of the oracle only on the seventh day of Bysios, on Apollo's birthday (Flacelière, 1965: 39; Fontenrose, 1959: 383; Karouzos, 1974: 127–128; Parke, 1967: 28-29), dictated that all visitors had to be at the sanctuary on the correct day. Such a task was indeed complicated in ancient Greece as each city-state had its own calendar with different month names; and although all calendars were lunar (Trümpy, 1997: 1; Geminus, *Elementa Astronomiae*, 8; Herod. *Hist*. 2.4.1), with months commencing on the new moon (Aristoph. *Clouds*, 755–6; Mikalson, 1975: 9; Trümpy, 1997: 1), the viewing of the new moon was subject to local parameters, such as political interests (Aristoph. *Clouds*, 1134), or even bad weather conditions, which resulted in the existence of a civic and a religious calendar (McCluskey, 2000: 18). The complication became even more intense, as apart from the civic and religious discrepancies of the beginning of the month within a given city, there was no agreement on the beginning and end of a month between the different city-states (Herod. *Hist*. 6.106.3; Plut. *Arist*. 19), resulting in complications for those needing to be in Delphi for the seventh day of Bysios.

The local character of time measurement was overcome by the observation of stellar phenomena, which were visible across Greece and had the advantage of being independent of the local month names, intercalation, and beginning-of-month procedures. Such observations could therefore be used and adopted regardless of the local calendrical variation and the lunar calendar discrepancies. The benefits of this practice were noticed from a very early date and were widely used in Greece at least from the time of Hesiod:

> Πληιάδων Ἀτλαγενέων ἐπιτελλομενάων
> ἄρχεσθ’ ἀμήτου, ἀρότοιο δὲ δυσομενάων.
>
> When the Pleiades, daughters of Atlas, are rising,
> begin your harvest, and your ploughing when they are going to set.
> *Works and Days*, 383–4 (Loeb translation).
>
> Εὖτ’ ἂν δ’ Ὠρίων καὶ Σείριος ἐς μέσον ἔλθῃ
> οὐρανόν, Ἀρκτοῦρον δ’ ἐσίδῃ ῥοδοδάκτυλος Ἠώς,
> ὦ Πέρση, τότε πάντας ἀποδρέπεν οἴκαδε βότρυς
>
> But when Orion and Sirius are come into midheaven,
> and rosy-fingered Dawn sees Arcturus,
> then cut off all the grape-clusters, Perses, and bring them home
> *Works and Days*, 609–11 (Loeb translation).

It is possible that such a practice was also used in the case of Delphi. The heliacal rising of the constellation of Delphinus seems to offer a very suitable candidate for the case of Delphi. The size of Delphinus (2° across the long diagonal) is such that the entire constellation would become visible within two days at the most. The choice of this particular constellation is not random, but is connected on several levels with the particular site and cult.

In mythology, the Dolphin (Delphinus) had been connected to the site of Delphi from the same time as Apollo himself. The Homeric *Hymn to Apollo* describes how the god took the form of a dolphin and guided the Cretan sailors to Delphi (lines 399–437). The symbolism of the dolphin was important, as Homer notes that Apollo established the cult of Delphinios Apollo in Delphi (lines 493–496). This cult is also mentioned by Aeschylus (the opening of *Eumenides* is set in Delphi at the temple of Apollo: lines 7–11, 39–40 etc.). The cult of Delphinios Apollo was not unique to Delphi. Shrines of the same cult existed elsewhere and the cult was practised in Delos, Crete (Olous and Dreros), Athens and Sparta (Farnell, 1907: 146–7). A survey of these sites and a combined analysis is definitely needed in the future, in order to test the Delphic argument.

There is also an astronomical connection between the constellation and the time of operation of the oracle. The seventh day of Bysios, when the annual oracle consultation was taking place, falls around our February. The constellation of Delphinus reappears in the sky after its annual period of absence with its heliacal rising, which occurs around 25 December (Kidd, 1997: 301). However, the horizon at Delphi in front of the temple of Apollo – from where the rising of Delphinus would have been visible – is as high as 25° to 27°. This means that the heliacal rising of the constellation would have been delayed in Delphi for almost a month, occurring thus around the end of January. If January in the Delphic calendar is more or less the equivalent of the month Amalios (Table 6.1), this means that the heliacal rising of Delphinus would have occurred during Bysios, which was consequently the first month to have Delphinus in the night sky after a period of invisibility and was also the month of the annual consultation of the oracle. It is possible that the reappearance of the constellation in the night sky operated as a signifier that the next new moon would start the month of Bysios.

Gregorian	**Delphi**	**Athens**
July-August	Apellaios	Hekatombaion
August-September	Boukatios	Metageitnion
September–October	Boathoös	Boedromion
October–November	Heraios	Pyanopsion
November–December	**Daidaphoros**	Maimakterion
December–January	**Poitropios**	Posideon
January–February	**Amalios**	Gamelion
February–March	Bysios	Anthesterion
March–April	Theoxenios	Elaphebolion
April–May	Endispoitropios	Mounychion
May–June	Herakleios	Thargelion
June–July	Ilaios	Skirophorion

Table 6.1: The Delphic and Attic months compared with the Gregorian months. Months in bold indicate the period of Apollo's absence from Delphi.

This correlation might become more apparent when comparing the Delphic calendar to that of Olous, in Crete, which also had a month named Delphinios. In Olous Delphinios is the seventh month of the calendar (Trümpy, 1997: 195) as opposed to the Delphic eighth month. The site of Olous has a flat horizon, which means that the month Delphinios would be at the same time as the heliacal rising of Delphinus (around 25 December). This connection could perhaps be of some significance as it could be argued that in this case the name of the month did not simply signify the celebration of Delphinios Apollo but was, in addition, bridging religion and timekeeping. Further to this connection there seems to have also existed a strong mythological link between Apollo's residence at the site of the sanctuary and the movement of the constellation. According to the myth, Apollo resided in Delphi from Bysios to Heraios (February–October). During the remaining three winter months (Daidaphoros–Amalios, equivalent to November–January) Dionysos was taking Apollo's place in Delphi, while Apollo departed for the far north, the land of the Hyperboreans (Alkaios, 2f; Diod. 2.47.6; Cic. *ND*, 3.23.57; Claud. 28.35–34; Plut. *De*

E ap. Delph. 389c), where he resided until the following Bysios. The months during which Apollo was absent from the site are also the months of Delphinus' invisibility period. The constellation becomes visible again at the time of Apollo's return in Bysios (February) and remains visible in the night sky until the first few days of October (the time that Apollo departs). During Boukatios and Boathoös (August and most of September) the constellation would be seen moving towards the west and setting north of west progressively earlier in the night. After 20 September, Delphinus would already be quite low in the western sky when it appeared at sunset and would set shortly afterwards. Consequently, October (Heraios), the last month during which Apollo is present in Delphi, is also the last month that Delphinus is seen in the sky. After that, both Apollo and Delphinus seem to have gone to the north, until they both return long after the winter solstice, in Bysios. The division of the year into periods of Apollo's (and Delphinus's) presence and absence affected also the operation of the oracle. With the rise in demand for oracles, as the reputation of Delphi increased in later years, the rule of the annual consultation was relaxed and oracles were offered on the seventh day of every month but only during those months that Apollo was present at the site (Bysios–Heraios) (Mikalson, 2005: 105). Correspondingly, during the months that Delphinus was not visible in the sky, the oracle was not operating.

The visibility of the movement of Delphinus throughout Greece could perhaps be the signifier of the periods of consultation of the oracle for the rest of Greece. In addition to that, the delayed viewing of the heliacal rising of the constellation in Delphi due to the unusually high horizon could have offered advance travelling time for visitors to the oracle. We do not know how early Delphinus was known to the Greeks. The earliest archaeological evidence mentioning the constellation are stone *parapegmata*. The stelae were inscribed with a list of star names and phases and some included corresponding weather predictions. Next to each inscription, the *parapegmata* had a hole, in which a peg was inserted in order to mark the appropriate day (Bickerman, 1980: 58). This practice is a confirmation that stellar observations were widely used in ancient Greece. The use of *parapegmata* shows in practice that, although each Greek city-state was a coherent religious community (Sourvinou-Inwood, 1991) with its own local cults and calendrical arrangements, there was a Panhellenic system of measuring time that ran parallel to local calendars and used stellar observations. This operated perhaps as a means of keeping the local lunar calendars in season, since it was imperative for religious festivals to be held at the same time every year (Arist. *Clouds*, 615–619). *Parapegmata* are believed to have been the invention of Meton of Athens and Euktemon who were the first to publicly display stelae of this type around 432 BC (Bickerman, 1980: 57). The use of *parapegmata* was known across the ancient Greek world. They have been found as far east as Miletos and as far west as Puteoli (Hannah, 2002: 114). Although the earliest *parapegma* (that of Euktemon) dates to the mid-fifth century BC, it is believed that their invention was the result of an earlier practice. Delphinus is mentioned on the *parapegma* of Euktemon and the *parapegma* of Demokritos (460–370 BC), which say that the constellation sets acronychally on the fourth day of Aquarius (Taub, 2003: 25). Although the archaeological evidence for Delphinus dates to the fifth century, the myth which narrates the catasterism of the Dolphin (placed in the sky by Poseidon as a reward for its help with Amphitrite) is believed to date to the archaic period (700–480 BC) (Kakridis, 1986, vol.2: 117).

Conclusion

The local character of Greek calendars poses questions as to the way of knowing that the time for the annual consultation of the Delphic oracle was approaching. The demonstrated ability of the Greeks to measure time through the observation of stellar phenomena leads to the conclusion that it was the heliacal rising of Delphinus which signalled the return of Apollo to the site and the time of oracular consultation. The unique landscape and unusually high horizon around the temple of Apollo, which would have delayed the viewing of the phenomenon at the site by approximately 20 days compared to an average Greek horizon (around 5°), combined with the myth of the departure of Apollo from Delphi at the same time as the constellation's invisibility period, the mythological connection between the Dolphin and the founding of the Delphic oracle, and the use of the constellation as a season marker in *parapegmata* lead to the conclusion that the dolphin symbolism with Delphic Apollo is not exclusive to the mythological sphere.

It is indeed interesting, as Hannah (2002: 12) remarks, that a constellation as small as Delphinus was observed and recorded in the *parapegma* when it is considerably less prominent than Sagittarius, which rises at the same time (Hannah, 2002: 122). If however, the constellation played the proposed role in the operation of the Delphic oracle, its presence in the *parapegma* seems justified. The added advantage of Delphinus is that its heliacal rising occurs at the same time as its heliacal setting. Both events take place in the heart of the winter, which is the most likely period for bad weather conditions. Being able to observe both phenomena at the same time is an added advantage, since if it is not possible to observe the heliacal rising, for example, there is always the opportunity to observe the heliacal setting in the evening. The constellation, would therefore be very suitable as a calendar regulator.

The cult of Artemis Orthia

We know of six sanctuaries of Artemis Orthia in Greece, which stretched geographically from as far north as Byzantion to as far south as Sparta (Figure 6.7). Only two of these six sanctuaries have been located: those of Sparta and Messene, which are the ones comprising this case study.

Figure 6.7: Locations of the known sanctuaries of Artemis Orthia in Greece that fall within the study area.

The cult of Orthia was believed to have been of Phrygian origin, brought to Greece by Orestes (Paus. 3.16.7–9). Tauris, referred as the place of origin of the first *xoanon* of

Orthia found in Greece (Calame, 2001: 162), was also the land where Iphigeneia was taken by Artemis when she was saved by the goddess from being sacrificed. It was there that Iphigeneia was initiated as a priestess of Artemis. The epithet *orthia* derived from the position in which the *xoanon* of the goddess was found in a thicket of *Agnus castus* (a shrub with blue or white flowers commonly found in Greece), which had grown around the *xoanon* keeping it thus in an upright position (Ὀρθία) (Paus. 3.16.11; Zunino, 1997: 49). This epithet is also likely to have derived from the attribute of Artemis, who as the protector of children, she gives them the strength to stand upright (ὀρθοῖ τοὺς γεννωμένους). Other possible sources of the epithet is the belief that Artemis restored women after giving birth (ὀρθούσῃ τάς γυναῖκας καὶ εἰς σωτηρίαν ἐκ τῶν τοκετῶν ἀγούσῃ), or the mountain in Arcadia called Orthion where she was believed to have come from (quotes in schol. Plat. *Leg*. 633b (cf. Greene, 1966: 306); Bosanquet, 1905–1906: 332, 334 and n. 3; Rose, 1929: 403; Zunino, 1997: 50). Artemis Orthia was the goddess of young maidens (Page, 1951: 24), although she is most commonly identified as the goddess of hunting, the lady of the wild animals (Πότνια θηρῶν), *Potnia*, a Minoan deity, mentioned in Linear B tablets. Her cult was carried on in the Mycenaean period, maintaining her animal attributes and being the protector of nature. In the Late Helladic III period (after 1400 BC) she is depicted in a more warlike form, armed with weapons. Artemis was the virgin goddess known to have punished with death several mythical figures who disrespected her, or the purity of other women, or even punished women who did not keep their promise of remaining pure (for example, the killing of Aktaion who saw the goddess naked while she was bathing; the killing of Titios who attempted to rape Leto; the punishment of the Nymph Kallisto for sleeping with Zeus, etc.).

Rose (1929: 402) argues that Orthia was in fact a deity much older than Artemis who in later times became associated with Artemis owing to their common attributes of being protectors of nature, wild life, childbirth, animal feritility and responsible for the raising of children. Indeed, this argument seems to be valid. From the beginning of the eighth century Greek religion entered a phase of reformations and modifications of older concepts and practices (de Polignac, 1995: 25, 27) that culminated in the early sixth century. These innovations are evident at several religious sites such as Isthmia, Olympia and Delphi (Kenell, 1995: 146). It appears that during this period the need for a more centralised grouping of the existing deities was fulfilled through the move from local religious cults to the construction of a more Panhellenic pantheon. Such renovations would have resulted in the association of local deities with the Olympian gods, a group that would have been identifiable throughout Greece. The results of this development are visible across Greece, where the deities to which the sanctuaries are dedicated bear both the names of the local deity and the comparable Olympian, as in the case of Athena Alea at Tegea for example. In the same manner, Orthia seems to have been associated with Artemis. Artemis was worshipped in Greece at least as early as the eighth century BC (Hom. *Il.* 20.72, 21.472, 24.605; *Od*. 5.124, 6.108, 11.172; *Hymn to Apollo*, 197; *Hymn to Artemis*, 13ff), and the association of the two deities is thought to have taken place during the sixth century BC (Kennell, 1995: 136). Although Artemis is not a fertility goddess as such, her fertility attributes are attested in several myths such as the one of the Giants Aloades (chthonic daemons connected to vegetation), the myth with Alpheios and the cult rites deriving from this myth, as well as her connection to Selene (the Moon), since from very early Selene was connected to motherhood and fertility. Given the association of the two deities and the time at which this took place, in the remainder of the case study Artemis is referred to in connection with Orthia.

Sparta

Pausanias mentions six different cult locations of Artemis in Sparta: the temple of Artemis Dictynna within the city walls (Paus. 3.12.8); another temple near the fortifications in a spot called *Phrouria* (fortifications) (Paus. 3.12.8); sanctuaries of Artemis Aiginaia and Issoria, west of the Agora (Paus. 3.14.2); Artemis Hegemone, near the sanctuaries of Dioskouroi, the Graces, Eilithyia and Apollo Karneios (Paus. 3.14.6); and the sanctuary of Artemis Knagia for which he gives no location (Paus. 3.18.4f). The cult of Artemis Orthia was, however, by far the most important cult in Lakedaimon as it seems to have been the centre of religious and civic life in this area (Calame, 2001: 157, 159). The sanctuary of Artemis Orthia in Sparta lies a few kilometres NE of the modern city of Sparta, approximately 100 m away from the Eurotas river. The sanctuary – of modest size – is dominated by the Roman theatre and the temple of Artemis (Figure 6.8).

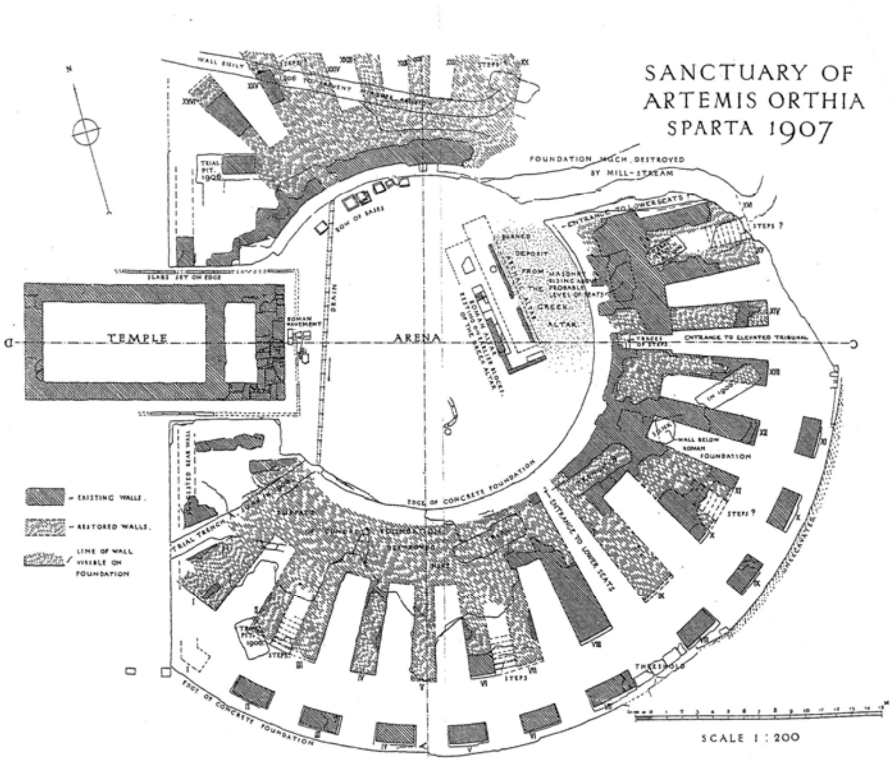

Figure 6.8: The sixth century BC temple of Artemis Orthia and the Roman theatre (after Dawkins, 1929).

The chronology of the cult of Artemis Orthia, as illustrated by the archaeological finds, dates to the tenth century (Dawkins, 1929: 1). It is possible, however, that the cult of Orthia predates the surviving archaeological evidence at the sanctuary in Sparta – Zunino argues in favour of a Mycenaean origin for the cult (1997: 52–54). In Sparta however, the earliest structure at the sanctuary is the early Geometric altar (built in 950; used until 850 BC), which was replaced by another three consecutive altars built in the Archaic (around 850), Classical (around 450BC) and Roman (AD 250) periods (Dawkins, 1907: 68–69; Dawkins, 1929: 8, 49; Rose, 1929: 399), all constructed in the same location with the same orientation. The first temple was constructed sometime before 800 BC (Dawkins, 1929: 10, 19), and was replaced by another temple built only a few centimetres to the north in 600 BC (Dawkins, 1929: 21, 34; Rose, 1929: 399–400), with a slightly shifted orientation further to the east (dec. –6, alt. 4, az. 100). This later temple was rebuilt in the Hellenistic period (second century BC) on the foundations of the earlier structure and remained in use until the second half of the fourth century AD (Dawkins, 1907: 55; 1929: 32, 34), when the site is thought to have been abandoned. A century before the site fell out of use, the Roman theatre was constructed (in the second half of the third century AD), encircling the temple and altar (Dawkins, 1929: 34; Rose, 1929: 400, 404). The position and layout of the theatre indicate clearly that the theatre was built to accommodate the spectators of the cult rites performed around the altar and in front of the temple. The seats extended so far round, and the front of the temple was so far within the theatre, that it occupied the space where the stage would have been. Additionally, the altar was placed in the middle of the orchestra. This layout would have limited the types of performances that could have taken place in the theatre; the only possibilities were cult rites performed at the altar and in front of the temple (Bosanquet, 1906: 311–312; Dawkins, 1929: 38) (Figure 6.8).

Several festivals were held at the site, the majority of which were introduced at a later time (on the festivals see Rose, 1929: 406; Tillyard, 1906: 361; on their date see Kennell, 1995: 137). The most ancient of those festivals seems to have been the 'Procession of the girls' of which very little is known; it is thought to have been introduced when the cult of Orthia at the site was at an early stage. The majority of inscriptions from the sanctuary refer to this rite – an indication of its importance to the cult of Artemis Orthia (Rose, 1929:406). It is believed that the ode called *Partheneion*, written by Alkman (allegedly an immigrant from Sardis in Lydia) around the middle of the seventh century BC (Bosanquet, 1906: 333; West, 1965: 192), describes the rite that took place at the sanctuary of Orthia in Sparta, during the procession of the girls. To date, it has not been established whether the rite was borrowed through the contacts with Lydia that were present at the time and are testified by artefacts found in Sparta (Bosanquet, 1905–06: 331) and by the fact the Alkman himself was allegedly brought to Laconia as a slave. However, the written and archaeological evidence agree on the presence of the cult of Orthia at least as early as the seventh century BC, the time when the *Partheneion* was written.

The poem, which comprises 101 surviving lines, narrates the performance of a rite, during which two choirs of young girls (one of which is called *Peleades*, equivalent to Pleiades) bring their offering to the goddess to the altar, at the hour before dawn (Bowra, 1936: 48, 52; Carter, 1988: 91, 92; Garvie, 1965: 187; Griffiths, 1972: 17; Page, 1951: 75-76). The excerpts which confirm the significance of this particular time of the day are:

ταὶ Πεληάδες γὰρ ἆμιν
ὀρθρίαι φᾶρος φεροίσαις
νύκτα δι' ἀμβροσίαν ἅτε σήριον
ἄστρον ἀϝηρομέναι μαχόνται.

For the Pleiades,
As we bear the robe to (the) *orthria**
[are] rising through the **ambrosial night**
like the star of Sirius and fight against us.
*translated as ‘the Goddess of the **morning twilight’**. (lines 60–63)

ἐγὼν δ' ἀείδω
Ἀγιδῶς τὸ φῶς· ὁρῶ
ϝ' ὥτ' Ἅλιον, ὅνπερ ἆμιν
Ἀγιδὼ μαρτύρεται,
φαίνην.

and so I sing
the radiance of Agido: I see her
like **the sun,** which
Agido summons
to shine. (lines 39 –43)

Ἀώτι μάλιστα
ϝανδάνην ἐρῶ·

...to please most of all
the **Lady of the Dawn**; (lines 87–88)

[author's emphasis]

The sun is summoned by Agido, as the Pleiades rise in the morning sky bright like Sirius. The described offering had to take place at the dawn when the heliacal rising of the Pleiades occurred in May–June. This was the first viewing of the constellation just before dawn in the eastern horizon after its annual forty-day period of invisibility (Hes. *Works and Days*, 383–387). If we suppose that the rite depicted in the poem was describing activities that were taking place at the sanctuary of Artemis Orthia in Sparta, then allowing a few days' delay for the altitude of the local horizon and extinction, the ‘procession of the girls’ would have been taking place around 22 May.

My measurements of the present temple of Artemis Orthia indicate an orientation a little south of east (az. 100°). With a measured altitude of 4° the calculated horizon declination in this direction is –6°. The temple is oriented between the Pleiades dec. 12 (in 800 BC when the first temple was constructed and 13° in 600 BC) and Orion (dec. –7° in both 800 and 600 BC). The sun's declination between 20 and 25 May is between 18.3° and 19.5°. Although Orion seems to be oriented closer to the temple than the Pleiades and its catasterism myth is the same as the Pleiades, its heliacal rising would take place on 7 July, much later than the Pleiades. There is another reason why the Pleiades make a more suitable candidate: as the main function of the temples was to accommodate the cult statue (Mylonas, 1974: 78–79) and in some cases to protect the sacred areas of the cult, Greek festival rites were performed in the open and the offerings were placed on the altar. The altar at the sanctuary of Artemis Orthia was not parallel to the temple (Figure 6.8), but instead at an angle of a few degrees from the temple, facing a little further NE around declination 15°. This orientation is much closer to the declination of the Pleiades than the temple. Given that the offerings would be placed on the altar and that the procession would conclude at the altar, we can assume that the altar's orientation would be just as significant. This idea seems to be enforced by the archaeological evidence, which shows (as already mentioned) not only that the altar was the earliest structure but also the remains of four altars, all of which were constructed with exactly the same orientation. The declination of the Pleiades in 950 BC when the first altar of Artemis Orthia (approximate dec. 15°) seems to have been constructed was 11°. Consequently, when the maidens of Artemis Orthia would have been taking their offerings to her, placing them on the altar, the Pleiades would have been seen rising above the Spartan horizon almost straight in front of the altar.

The Pleiades were for Hesiod (in the seventh century BC) 'the Virgin stars' and 'the seven Virgins' and had been known to the Greeks, along with Sirius, at least since the eighth century BC. Hesiod refers to the signalling of the time of harvest at the time of the heliacal rising of the Pleiades and the time of sowing during their setting (*Works and Days*, 383–4). Aristotle wrote that honey was never gathered before their rising (*History of Animals*, 5.22).

In mythology, the Pleiades were associated with Artemis. They were her Maidens (Page, 1951: 25), who after being chased by the mighty hunter Orion were placed in the sky by Zeus. Orion in his turn and his dog Sirius were catasterised by Artemis, and according to Hesiod are still seen in the sky chasing the Pleiades (*Works and Days*, 618–622). The constellation of Orion was for Homer the finest of men, a hunter and a giant (Webb, 1952: 65). The figure of Artemis, destined to be forever a young girl (always a virgin), was the protector of young girls whose participation in the Artemis cults was widespread through Greece. Possibly Page's remark (1951: 53) that this naming also makes sense from the point of view that Pleiades were often said to dance (Eur. *El.* 467; [Hyg.] *Astr.* ii.21) may be associated with the ritual dancing of the girls performing the rites at the sanctuary of Artemis Orthia. The confirmation of the performance of these dances comes from Plutarch who describes that Helen – who was a maiden of Artemis – was carried off by Theseus while she was dancing at the sanctuary of Orthia (Paus. *Thes*. 31) (for more references on dancing see Page, 1951: 24). The Pleiades–Artemis Orthia connection also seems important in the role that the movement of the cluster played in the farmer's year, the mythological correlations between Artemis and the Pleiades, and the movement of the Pleiades in relation to the periods of earth fertility and Orthia's attributes.

Alkman's reference to the Pleiades seems natural, therefore. In addition, it justifies and binds the rites carried out at the sanctuary of Artemis Orthia with the time referred to in the poem. Several testimonies confirm that the usual time for a Maiden-song was at night and offerings were given at dawn: Pindar mentions (*Pyth*. 3.78–9) the Maidens who sing by his door all night to Pan and the Great Mother, and Callimachus's (305–240 BC) references to night-long dances of Maidens connected to the Pleiades make such a ceremony not unusual for Artemis. Callimachus remarks that the Pleiades were daughters of the Queen of the Amazons and were the first to establish dancing and night-long festivals for maidens (αἱ Πελειάδες, φησί Καλλίμαχος, τῆς βασιλίσσης τῶν Αμαζόνων ἦσαν θυγατέρες, πρῶτον δ' αὗται χορείαν καὶ παννυχίδα συνεστήσαντο παρθενεύουσαι, schol. Theocr. 13.25 in Segal, 1983: 264). Further confirmation of this timing comes from Sappho, who describes Maidens standing round an altar by moonlight: πλήρης μὲν εφαίνετ' ἁ σελάννα αἱ δ' ὡς περὶ βῶμον ἐστάθησαν ('the moon was shining at the full, and when they stood about the altar…'). The procession held at the sanctuary of Artemis Alpheaia, near the mouth of river Alpheios in Elis (NW Peloponnese), commemorating the myth of the goddess and the Nymphs who were said to have covered their faces with clay in order to escape the advances of Alpheios (Bosanquet, 1905–06: 339), is thought to be similar to the rites performed at the sanctuary of Orthia. Numerous terracotta masks have been found at the Orthia sanctuary, where an interplay with daylight and darkness seems to have taken place during the procession, and the nocturnal character of the Orthia rites is confirmed by the abundance of lamps (Parisinou, 2000: 151 and 199 n. 93) and the vast number of masks (Carter, 1988). The procession would start while the sky was still dark and would carry on until the first rays of the rising sun would hide the Pleiades. The nocturnal character of the majority of Greek festivals, commencing at sunset and lasting until dawn (Parke, 1977: 49), which is confirmed by the ceremony described in Alkman's poem, is an affirmation *per se* of the role of darkness in Greek religious rites. Since such rites were performed in the open, the scarcity of artificial light would have enhanced and encouraged the observation of astronomical phenomena. Line 40 can be taken as a confirmation of this interplay: Agido's face is so radiant that the spectators see her shining 'like the sun which she summons to shine'; brilliance needed darkness in order to be appreciated to its full extent.

The offering of a robe, the singing and dancing, and the time that these rites were taking place are not only attested in Artemis Orthia. The Hyacinthia in Sparta, a festival dedicated to hero Hyacinthus and ouranic Apollo, commemorated the accidental killing of the hero by Apollo. Here again we are informed of a major procession, which was taking a *chiton* (tunic) woven by Spartan women to Apollo, the celebration of the *pannychis* (all-night festival) on the night before the procession and the singing of the paean (Xen. *Hell*. 4.5.11 and *Ages*. 2.17; Mikalson, 1976: 148–151).

Messene

Messene is located 80 km west of Sparta. The area of the Asklepieion is what used to be the heart of the city of Messene, with evidence of occupation and cult from the seventh century BC (Themelis, 1998: 182). The Asklepieion was constructed in the third to second centuries BC after Messenian independence from the Spartan occupation in the 4th century (Themelis, 1992: 26, 40). In the complex of the Asklepieion there was a small temple dedicated to Artemis Orthia, which was incorporated in one of the several *Oikoi* surrounding the temple of Asklepios (Figure 6.9). It seems that at the time of construction of the Asklepieion the cult of Artemis Orthia was overshadowed by the cult of Asklepios. The cult of the goddess was though one of the earliest in the city (Themelis, 1994: 101). A little to the north of Oikos K (Artemision) are the remains of an earlier temple of Artemis Orthia dating to 800–700 BC (Themelis, 2003: 16) (Figure 6.9). During the Hellenistic period which witnessed the transfer of the cult to the new Artemision (Themelis, 1994: 107), the altar of Artemis Orthia was also constructed on the other side of the stoa, inside the enclosure where the great temple of Asklepios stood, parallel, nevertheless, to the

Artemision (Figure 6.10). The cult of Artemis Orthia ceased at the site around 150 BC (Themelis, 1994: 106) and if we take the archaeological evidence of the early temple as the earliest signs of the cult, the worship of Artemis Orthia in Messene was present for more than six hundred years.

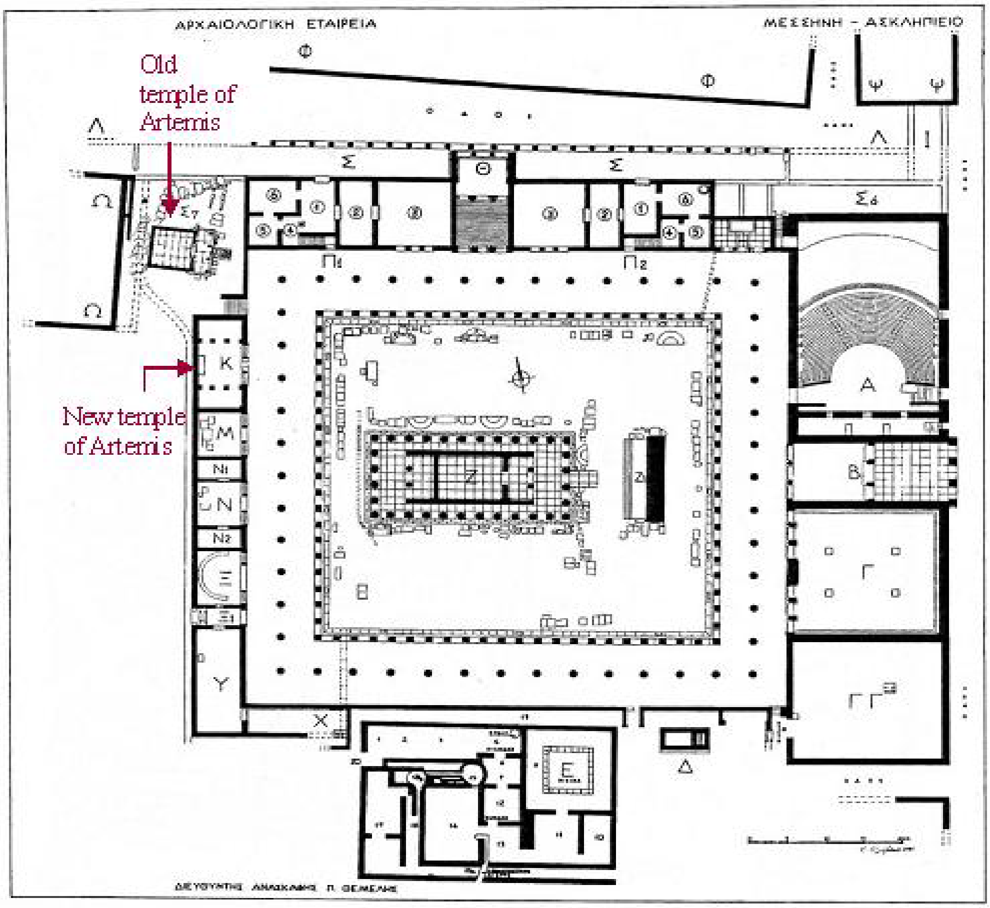

Figure 6.9: Plan of the Asklepieion in Messene showing the old and new temples of Artemis Orthia.

The epithets attested in the sanctuary for the goddess are *Oupesia* and *Phosphoros* (Themelis, 1994: 111–115). The Messenian Orthia, although depicted on the figurines in a huntress outfit and carrying a torch (see translation of inscription in Chamoux, 2003: 275; Themelis, 1994: 105), did not lose the other attributes of Artemis and was thus worshipped by women as the protector of pregnancy and childhood (Themelis, 1994: 116). The cult rites performed at the sanctuary involved the participation of young girls dressed in long ceremonial *chitones* (robes), carrying the *xoanon* and lighting the altar with a torch (Themelis, 1994: 101).

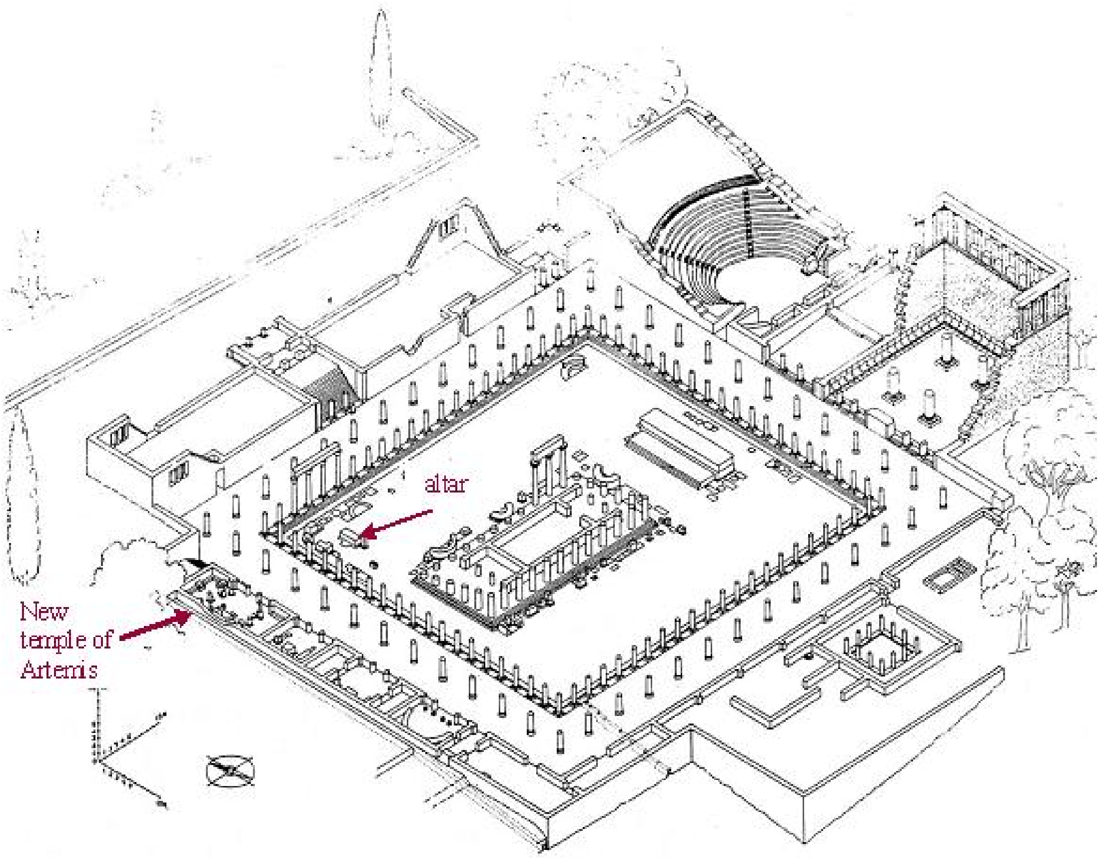

Figure 6.10: Plan showing the new temple of Artemis Orthia and the position of its altar.

Little evidence survives for the Messenian cult of Artemis Orthia, especially with regards to the time of the year that the rites were performed. Since both cities traced the origins of the cult to the Dorian invasion (for Messene see Themelis, 1994: 122) (although the invasion as such is now discredited: see Doumas, 1996–7 and Alty, 1982) the presence of numerous similarities between the Spartan and Messenian cults enhances our knowledge. In both cities, the participation of young girls seems to have been essential (for Messene see Themelis, 1994: 122); both goddesses were worshipped as huntresses (Themelis, 1991: 28), protectors of young girls, of child-bearing (Themelis, 1994: 116) and human fertility and protectors of the growth of all living things; goddesses of wild creatures: evidence from the wild-life votives dedicated to Orthia as well as figurines depicting the goddess accompanied by a dog (Page, 1951: 73–74; for Messene see Themelis, 1994: 115; Themelis, 1991). In Messene, it seems that the characteristic of the goddess as *Phosphoros* (bearer of light) (Themelis, 1991) is strongly stressed. This attribute is also attested in the Spartan cult (see above *Partheneion,* line 87 (’Αώτι)). The rituals performed in the two cities seem very similar indeed. They took place in the open, in front of the altar (compare *Partheneion* and Themelis, 1994: 101) by the young initiates. Both rites involved the carrying of the *xoanon* (for both cities see Themelis, 1994: 116); the same type of robe was dedicated to both deities: φάρος in Alkman's *Partheneion* (line 61) for the Spartan goddess, whereas in Messene figurines resembling the *xoanon* of the goddess depict her 'covered with a cloth called φάρος' (Themelis, 1994: 116). Dancing seems to have been an important element of the cult in both cities. In Sparta, this is supported by three pottery fragments representing boys and girls dancing (Dawkins, 1907: 75, 93–95; Parker, 1989: 151; Pettersson, 1992: 52; in Messene it is attested in epigraphic evidence). The evidence for the nocturnal character of the Spartan festival has already been discussed. Themelis has suggested the following order for the rites of Artemis Orthia in Messene: a mystic ceremony in the Artemis Orthia temple which included the enactment of the revelation of the *xoanon*; a procession carrying the *xoanon*; the exhibiting of the *xoanon* in the open next to the altar; dramatic performances and athletic contests ending with torch-races at night and setting fire to the altar for the sacrifice; and finally, a nocturnal banquet (Themelis, 1994).

My measurements show that the early temple of Artemis Orthia in Messene is oriented south of east (az. 129°, alt. 11°) yielding a horizon declination of –22°. The later Artemision is oriented slightly further northeast (az. 115°) facing the same horizon at declination –12°. This orientation is closer to Orion's belt (dec. –7°) and Sirius (dec. –17°) rather than the Pleiades (dec. 12°).

The prominent position of the altar of Artemis Orthia in the Asklepieion, inside the court of the temple of Asklepios (Figure 6.10), demonstrates that the performances carried out around the altar would have enjoyed the freedom of open space that the court offers, as opposed to the cluttered narrow space of the temple in *Oikos* K. The added advantage of such a positioning is that the distant horizon would have been perfectly visible, and although the theatre on the opposite side of the peristyle court would have risen up to around 10 m the altar would have been at sufficient distance in order for the east horizon to be visible.

Given the apparent similarities in the cult, it would be expected that if the altar in Sparta was deliberately facing towards the Pleiades, this would have also been the case for the Messenian temple. The declinations of the two sites are, however, considerably different (–6° in Sparta and –12° / –22° in Messene). If the heliacal rising of the Pleiades did indeed play a role in the rites performed at the sanctuary of Artemis Orthia in Sparta, it seems that this was not taken into account by the builders of the temples in Messene. It is perhaps possible, however, that other factors may have been taken into account in the orientation of the temple. The Pleiades rise heliacally in the Spartan horizon in late May. As Hesiod mentions, their rising signifies the beginning of the harvest season (*Works and Days*, 383). This time of year until the middle of July is in Greece the busiest time in the farmer's calendar, as straight after harvest comes threshing and winnowing. In the exclusively military Spartan society these dates would have been of little importance, as for citizens the agricultural activities were limited. Instead, the Spartan economy depended on the *perioikoi* (inhabitants of the free but dependent city-states (*poleis*) in Spartan territory, mainly in Laconia but also some in Messenia) and the helots (*heilotai*, a class of semi-free agricultural 'serfs' who were possibly the descendants of conquered people, mainly in Messenia but some in Laconia) (Hodkinson, 2000: 335–364). In the case of Messene, the region of Messenia including the settlement of Messene is usually believed to have been invaded by the Spartans in the second half of the eighth century BC, perhaps with a second invasion in the seventh century, and its people reduced to the status of helots (Luraghi, 2002:46, 59; Shipley, 2003; 2004: 547–550). As a result, the Messenians had to supply the Spartans with agricultural products. This meant that during May–June, when the Spartans would have celebrated the Artemis Orthia festival, the people of the town of Messene in the area around the Artemis Orthia sanctuary (as well as other helot communities) would have been busy harvesting and then threshing their produce. Looking back at the Messenian temple of Artemis Orthia, its orientation seems to be close to Sirius (dec. –17°) and Orion (Orion's belt dec. –7°). Sirius rises heliacally around 8 August. The heliacal rising of Orion's belt would take place in Messene around 17 July and the entire constellation would be seen to rise before the sun by 25 July, right after the end of the threshing season, at the begining of the time of rest in the farmer's year.

It is possible that the Messenians had shifted the celebration of the festival of Artemis Orthia to late July or early August, when the heliacal rising of Sirius or Orion would have signalled the end of the farmer's year. This therefore, was an appropriate time to honour the goddess of nature and thank her for the produce of the year. It is possible that such a shift could have been the result of the celebration of different stages in the farmer's cycle: for example First Fruits in May celebrated at Sparta and the completion of harvest and threshing in July–August in Messene. This difference could be simply the result of the Messenians wishing to celebrate the festival at a different time, or it could possibly be the result of the Messenians' wish to differentiate themselves from the Spartans.

Discussion

Whether or not the cult of Artemis Orthia in Messene was the result of Spartan contacts makes little difference. The old temple of the goddess, dating to the period around the time of the Spartan occupation, has a very similar orientation to the temple which replaced it after Messenian independence, but both have a very different orientation from the Spartan temple. Whatever the reason for this change, it was maintained in Messene after independence, which leads us to think that the change in orientation was not imposed, nor did the Messenians perceive it as foreign. Despite this difference, the Messenian cult sustained the attributes and mythological aspects of the cult as known in Sparta. The myth that narrates the catasterism of the Pleiades and associates them with Artemis includes also the catasterism of the hunter Orion and his dog Sirius, who were the reason why the Pleiades pleaded to be rescued. In Alkman's *Partheneion* it is stated that the Pleiades are competing against Sirius (line 63). The star was undoubtedly known to the Greeks from at least the time of Homer, who compares Achilles to Sirius when viewed by Priam (*Il*. 22:26–30). The orientation of the temple of Artemis Orthia in Messene, although orientated towards a different celestial body, could have still been connected to the goddess through a different aspect of the same myth. The weakness of this argument is admittedly the lack of direct evidence on the timing of the festival of Artemis Orthia in Messene. However, the strong similarities of the cult in the two cities make the argument of the role of the heliacal rising in the cult a possibility. The festivals of Artemis Orthia did not have an agricultural undertone *per se*, but they would naturally have been affected by agricultural practices given the attributes of the deities, the time of the year at which they were celebrated and the role that farming played in the subsistence of that society. The reason behind the change in orientation of the Messenian temples could either be a manifestation of Messenian identity as opposed to Spartan, distancing themselves from their conquerors who had reduced the status of free Messenian men and aristocrats to that of serfs, or the practical reason of adopting the heliacal rising of a different celestial body that would have been better suited to the agricutural community of Messene.

The cult of Erechtheus in the Athenian Acropolis

The following case study discusses the cult housed at the Erechtheion on the Athenian Acropolis. The cult rites performed in the area of the Erechtheion, in their earliest form, date to the Mycenaean period. The present Erechtheion was constructed over Mycenaean remains, which – as will be discussed – date to the earliest period of human presence on the Acropolis. The following pages will explore the significance of the orientation of the Erechtheion and its possible astronomical alignment with the constellation of Draco. The aim of this case study is to view the architecture and shape of the building as the end result of a long development of cults and rites that were carried out in that area of the Acropolis for a number of centuries before the construction of the present Erechtheion. The architecture of the Erechtheion is approached from a perspective which aims to explain its shape and orientation through its function, the cults it housed and its surrounding landscape.

Placed in the north-eastern corner of the Acropolis, the two entrances of the Erechtheion are perpendicular to each other at approximately cardinal points. The entrance of the Athena Polias *cella* faces almost due east (az. 85°, alt. 3.5°, dec. 6°) and the entrance of the north porch is oriented just west of due north (az. 353°, alt. 3°, dec. 54°) (Figure 6.11).

The Erechtheion and earlier structures

The Erechtheion is divided into two main areas: the east *cella* (accessed through the east porch) and the west *cella*, entered through the north porch (Figure 6.12). There is no archaeological evidence to support the idea of a door connecting internally the east and west *cellas*. The only suspicion that this might have been the case comes from Philochorus's reference (quoted by Dionysius of Halicarnassus, *De Dinarcho judicium*, 3) to the dog that ran in the east *cella* and through an open door to the west. When Pausanias visited the temple, though, he had to exit the east *cella* and re-enter the temple through the north porch, in order to visit the west *cella*. Although it has been argued that maybe the connecting door was closed at the time, it seems unlikely that the opening of the door was strictly controlled in the case of Pausanias but not in the case of the dog. It is possible that the door in the story with the dog was a fictional addition, or when Dionysius is talking about an open door allowing the dog to enter the west *cella*, he is not necessarily talking about an internal door. Furthermore, it is clear that the west *cella* was divided into two further *cellas*, which were open towards the west and entered through the north porch which led to a corridor-like area in front of the two entrances (Figure 6.12). Had there been an internal doorway connecting the east *cella* with the west, it would have been constructed on the back wall of one of these two rooms, which would mean that the door would have been positioned next to the cult statue of Athena and squeezed behind the *adyton* of the tomb of Erechtheus (Figure 6.13). The division of the two *cellas* with no intermediate doorway, is also in agreement with the name that Pausanias gave to the temple, 'double structure' (*diploun oikêma*), and the presence of two distinct cults under the same roof. Of the two entrances, the largest in size and more monumental is the one to the north, the entrance of the west *cella*, which was dedicated to the cult of Erechtheus. Figure 6.12 shows distinctively that the west *cella* occupies a larger floor area and has a more monumental entrance. In addition to the architectural features, the west *cella* contained the most sacred places of Athenian mythology: the crypt to the tomb of Erechtheus, the sacred snake's dwelling, Zeus's thunderbolt marks, Poseidon's salt sea and his trident marks, the nest of the sacred guardian snake; it also housed the most ancient *xoanon* of Athena and the tomb of Cecrops (Neils, 1992: 26) (Figure 6.13). The *cella* was also adjacent to the sacred olive tree planted by Athena. On the other hand, the east *cella* accommodated only the altars of Poseidon and Erechtheus, Zeus, Hephaistos and Boutes, the thrones of the priests and the offerings (Pausanias 1.27.1ff). Since the west *cella* was the reference point and the core of the entire structure it is not peculiar that the cult of Erechtheus had given its name to the entire structure (including the Athena Polias *cella*) and those preceding it, at least since Homer's time (Hom. *Odyssey*, 7.78–81). The reference by Herodotus (8.55.1) in the

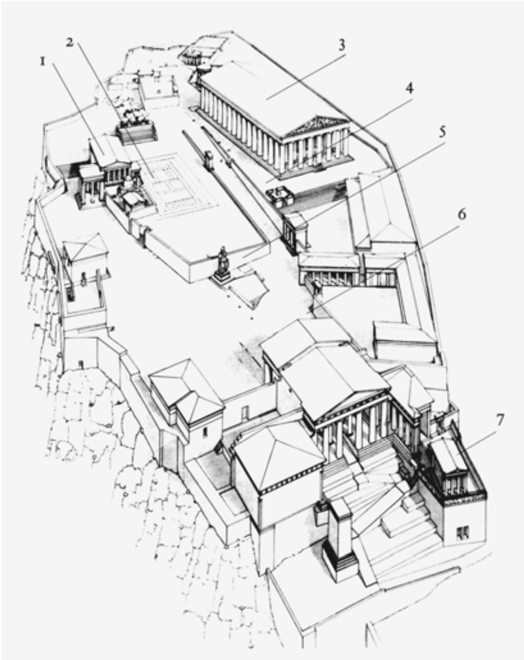

Figure 6.11: Bird's-eye restoration plan of the Acropolis in the first century BC. 1: Erechtheion (after Ridgway, 1992).

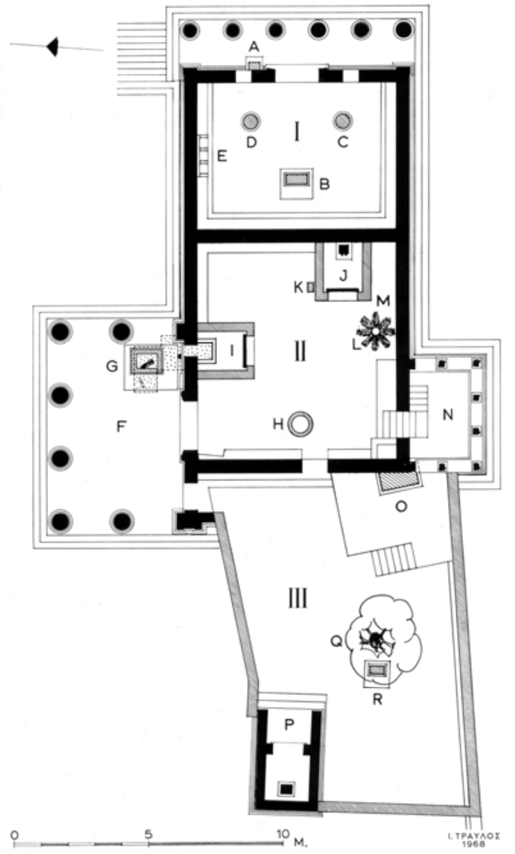

Figure 6.13: Plan of Erechtheion with altar bases and cult spots (after Travlos, 1971: 218):

I. *Eastern section*: A. Altar of Zeus Hypatos; B. Altar of Poseidon and Erechtheus; C. Altar of the hero Boutes; D. Altar of Hephaistos; E. Thrones of the priests.

II. *Western section*: F. North porch; G. Altar of Thyechoos; marks of the thunderbolt on the rock below; H. Prostomiaion, salt sea and the trident marks; I. Adyton for the tomb of Erechtheus and the sacred snake; J. Adyton or megaron for the wooden cult statue of Athena Polias; K. Wooden statue of Hermes; L. Kallimachos' lamp with eternal fire and bronze palm tree chimney; M. Booty from the Persian Wars; N. Porch of the Maidens

III. *Pandroseion:* O. Tomb of Cecrops; P. Temple of Pandrosos; Q. Olive tree of Athena; R. Altar of Zeus Herkeios.

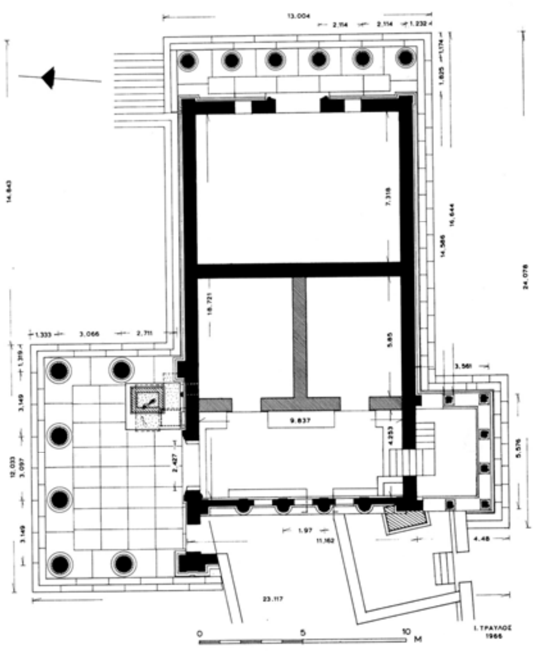

Figure 6.12: Plan of the Erechtheion showing the division of the west *cella* (after Travlos, 1971).

440s to the 'temple of Erechtheus' (Herodotus uses the word νηός which means temple) can be considered as evidence of a predecessor to the classical building we see today, as Herodotus alludes to nothing later than the 420s and the construction of the existing Erechtheion began in 421 BC. The architectural remains found under the foundations of the Erechtheion make it clear that the present structure was fitted against something older than itself (Stevens, 1946: 93), an idea which will be examined further in terms of the archaeological evidence. This notion is also confirmed by the presence of the crypt beneath the north portico, the foundations of which were built around the space that had to remain untouched and was thus protected by the construction of the crypt (Stevens et al, 1927: 104) (Figure 6.14). The significance of the crypt and its association to the cult is also corroborated by the presence of the roof opening of the north porch (Figure 6.15). The opening is positioned in line with the floor opening left for the crypt below the floor level, indicating that the 'fissures' enclosed by the crypt had to remain exposed and 'in direct contact' with the heavens, with no obstruction intersecting between them (Stevens et al, 1927: 104). The significance of this is confirmed by the fact that no other stone or slab was in contact with the rocky surface protected by the crypt (Stevens et al, 1927: 105) and that this was where the 'sacrificial libations' were offered (IGI^2 372.79, 203 cf. Burkert, 1983: 157 n. 99) (Figure 6.16). The evidence on the antiquity of the cult and the arguments claiming that cult rites were performed in the area covered by the west *cella* of the Erechtheion, are presented in the following sections.

Both Dörpfeld (cf. Holland, 1924d: 433) and Holland (1924d: 433–434), believed that the architect of the Erechtheion determined the entire building as being symmetrical with the axis of the north porch and the area of the west *cella*, which led from the north porch to the porch of the Maidens (Figures 6.12 and 6.13). It was within or on the edges of this space, after all, that all the sacred areas were located. In support of this argument, Holland (1924d: 433) pointed out that this west area and the western end of the Pandroseion are equidistant from the west area and the eastern wall of the Erechtheion (Figure 6.12). Support for the argument that the north entrance was the main entrance of the structure is also found in the description of Pausanias, which starts from the altar of Zeus (1.26.5), indicating that he entered the structure from the north porch. If the north porch is accepted as the main entrance of the structure, we are faced with several unusual aspects: not only is the Erechtheion oriented to the north – which is uncommon for Greek temples – but its entrance is also positioned at

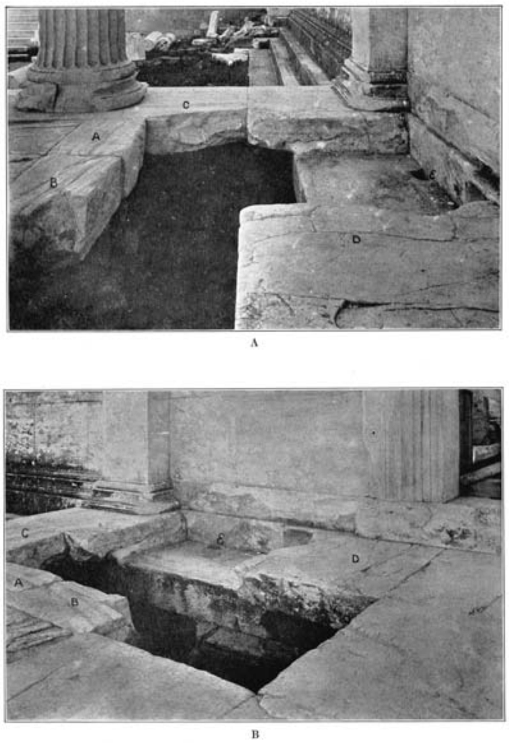

Figure 6.14: The floor opening of the north porch, above the marks of Zeus' thunderbolt. (after Stevens et al, 1927).

Figure 6.15: View of the north porch and of the roof opening above the crypt under the floor. View from north.

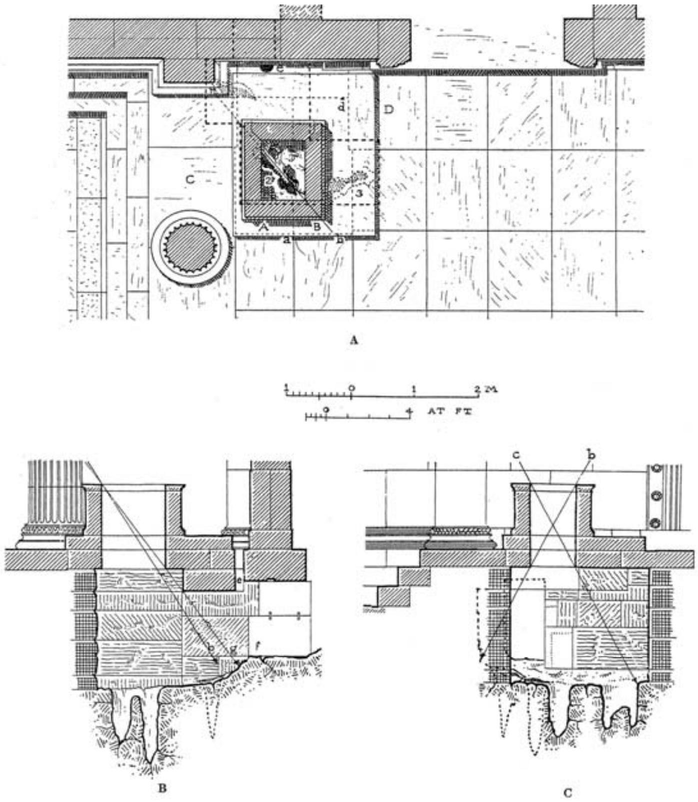

Figure 6.16: Floor opening and reconstruction of the altar of Thyechoos. A. Plan; B. Section looking east; C. Section looking south (after Stevens et al, 1927).

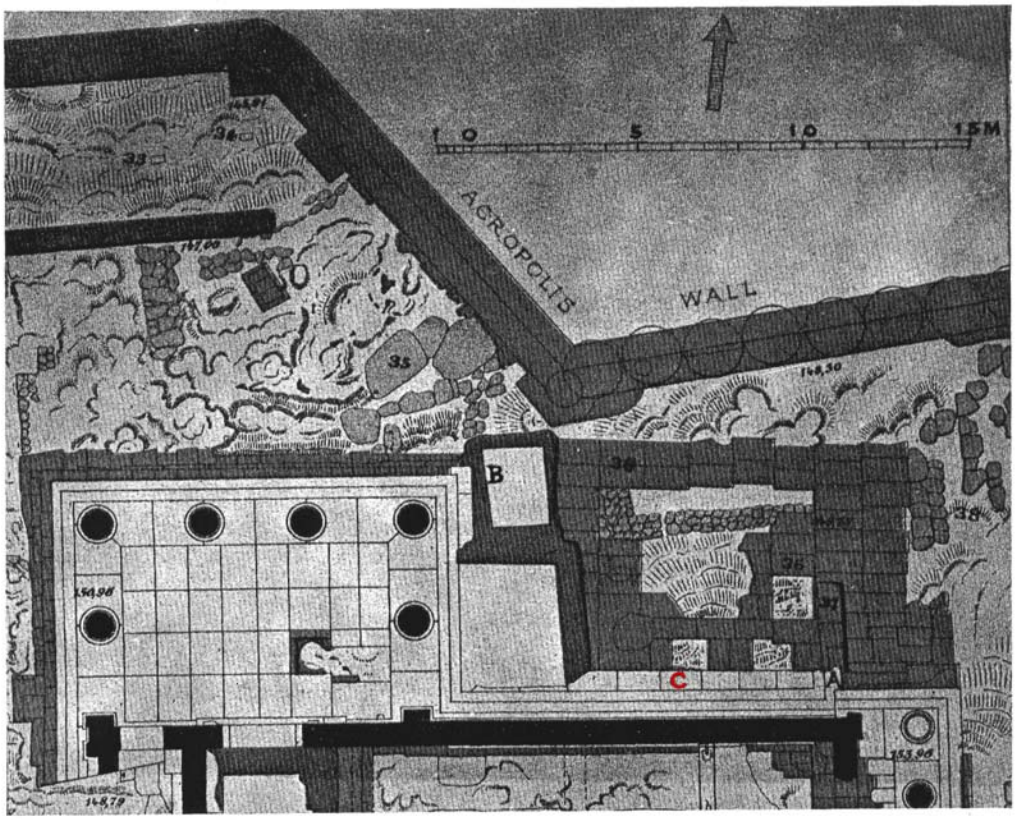

Figure 6.17: Plan of the north porch and the boundary wall (after, Stevens, 1946).

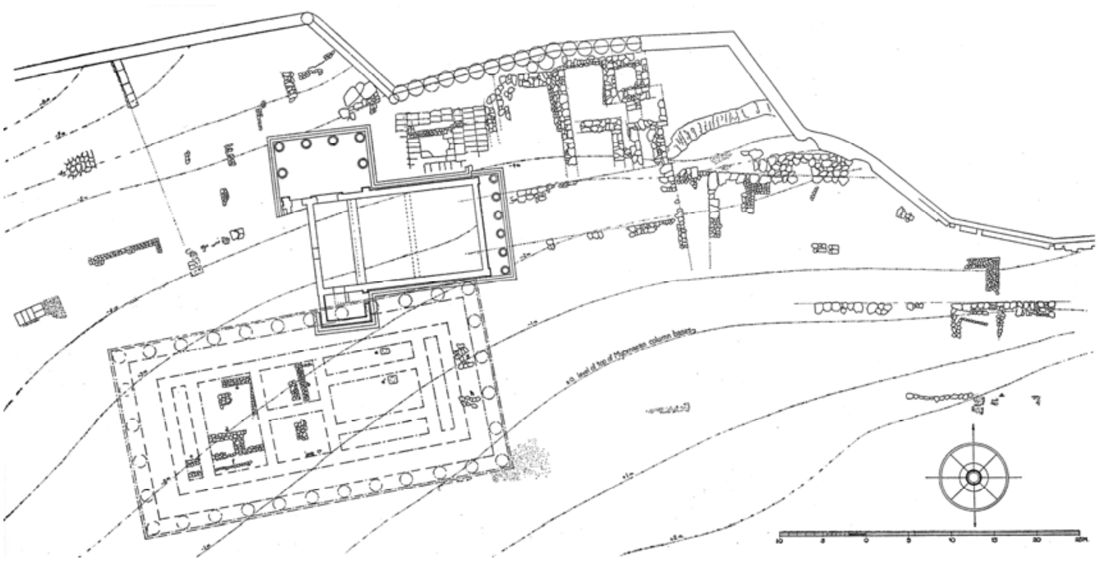

Figure 6.18: Prehistoric remains near the Erechtheion (after Holland, 1924b).

most 11.5 m from the Acropolis wall (the wall bends sharply inwards next to the eastern end of the entrance, reducing this distance to 4 m), cutting off the entrance from the rest of the Acropolis (Figure 6.17). Such a positioning seems peculiarly isolated considering that this was the entrance of a temple that played a major and central role in the cult and the rites carried out at the Acropolis.

Although archaeologists suspect that the occupation of the citadel has been continuous since the Middle Helladic period (*c.*1900–1600 BC), the actual physical evidence dates only as far back as LH I (*c.*1600–1500 BC) and is found to the north of the Erechtheion. The finds are mostly potsherds and remains of a floor and wall (Holland, 1924b: 154–7; Iakovidis, 1983: 75) which are close to the area of the tomb of Erechtheus (Figure 6.18). It is certain that the area covered by the Erechtheion (especially along the entire length of the Erechtheion north wall, the porch and the Acropolis wall – the so-called paved area discussed below) had been occupied by sacred sites since prehistoric times, and that there was definite continuity in the rites and cults practised there (Holland, 1924c: 426; Stevens et al, 1927: 429). Under the Erechtheion's foundations there seem to be the remains of foundations of at least two earlier structures (Figure 6.19), the earliest of which dates to the Mycenaean / Late Helladic periods; its axis seems to have been oriented slightly further to the north than the present Erechtheion (Holland, 1924a: 7).

The cult of Erechtheus seems to have been carried out continuously in the area later covered by the Erechtheion. Evidence also suggests that the *xoanon* of Athena was kept not in the Hekatompedon temple (which was dedicated to Athena) (Figures 6.11 and 6.18), but instead inside the temple of Erechtheus (Herington, 1955: 33). The Hekatompedon was constructed to the south of the present Erechtheion, and the foundation of its northern wall was adjacent to the later Erechtheion's south wall (Figure 6.18). Such a positioning indicates a connection between the temple and the sacred cult spots below it and immediately to its north (Stevens et al, 1927: 429). It is an interesting feature that the *xoanon* of Athena was not kept either in the Hekatompedon temple, or in the temple of Athena Polias which followed after the Hekatompedon. It is possible that the cult had been carried out for centuries in the area later covered by the west *cella*, so much so that even though other temples were exclusively dedicated to the goddess in later years (Athena Polias, Athena Nike and Athena Parthenos), it was still not considered necessary to move the *xoanon*. This peculiarity – temples were after all constructed to house the god's cult statue, and in the Acropolis the cult statue was housed in the temple dedicated to Erechtheus – will be addressed and an explanation attempted when the cult is discussed.

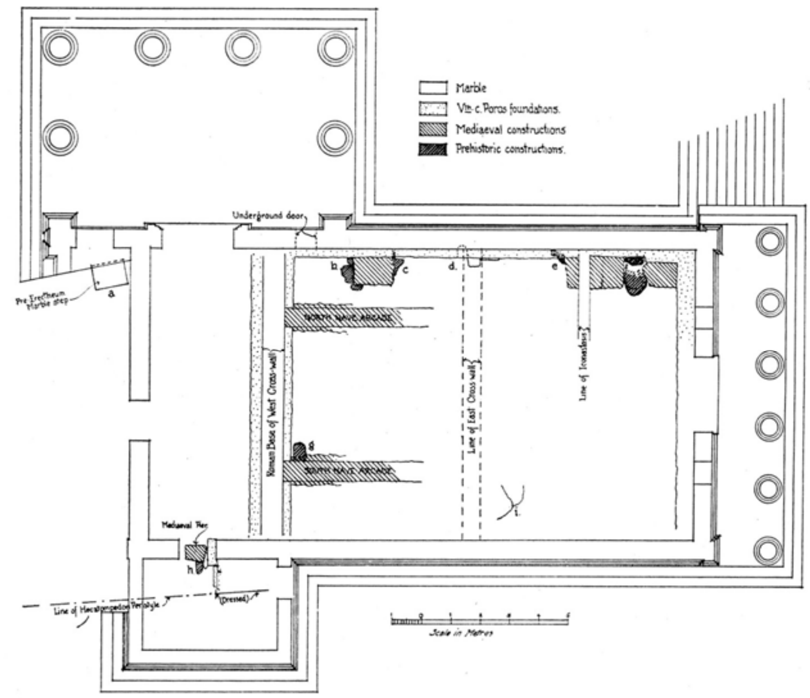

Figure 6.19: Remains of previous structures under the present Erechtheion (after Holland, 1924b).

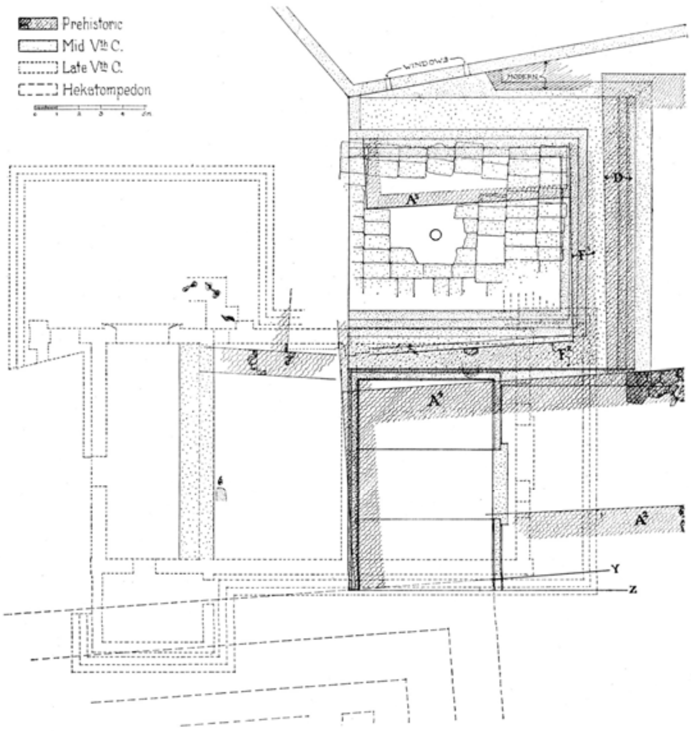

Figure 6.20: Superimposed plans of structures predating the Erechtheion (after Holland 1924c).

The earlier entrance to the Acropolis, the boundary wall and the 'paved area'

The construction of a tower in 1400 BC, framing the Mycenaean NE entrance to the Acropolis, testifies that this entrance was at least used frequently and perhaps was the main entrance (Holland, 1924b: 147).

Between the NE wall of the Acropolis and the NE side of the Erechtheion there was a so-called 'paved area' (Figures 6.17, 6.18, 6.20). This section was paved at a later stage (in the fifth century BC), but underneath the pavement the excavators recovered the floor of a room or enclosure which dates towards the very end of the Middle Helladic (*c*.1600) or the early part of the Late Helladic period (LH III A: 1400–1300) (Holland, 1924b: 155–6). The 'paved area' in its later phase was surrounded at least on three sides with a continuous set of steps for spectators, eight on the north side, three to the west and south and twelve along the east (Holland, 1924b: 159; Stevens, 1946: 100, 102). The 'paved area' as seen on the plans (Figures 6.17, 6.18, 6.20) was constructed adjacent to the north Acropolis wall and was approached by a road running from the north Acropolis entrance (A4 of Figure 6.20) through the east porch of the present Erechtheion and then turning to the north (over F2 in Figure 6.20) at right angles, ending at the 'paved area' (Holland, 1924b: 157). This area seems to have been of great importance, as it was not only used continuously from the Bronze Age to the fifth century BC and maybe later (Stevens, 1946: 102) but also 'no other pavement in the vicinity of the Erechtheion was constructed with such lavishness and care' (Stevens, 1946: 97).

Further evidence on rituals carried out at the paved area is argued by Stevens (1946: 97) to have been north of point C in Figure 6.17, where there seems to have been an altar, probably constructed at the same time as the paving of the area took place. The Acropolis wall would have stood approximately 8.5 m away from the altar of the 'paved area' and would have risen to a height of 4.6 m immediately to the north of the 'paved area' (according to Stevens's reconstructions 1946: 99, 101; Figure 6.21). As the Acropolis wall was probably no higher than today (Stevens, 1946: 99), on the NE side of the acropolis wall, approximately 1.1 m above the top row of steps of the 'paved area', two small openings were constructed on the wall (approx. 0.2 m wide and 0.5 m high) pointing towards the north. We do not know the purpose of these openings but they are not found anywhere else along the boundary wall (Figure 6.21).

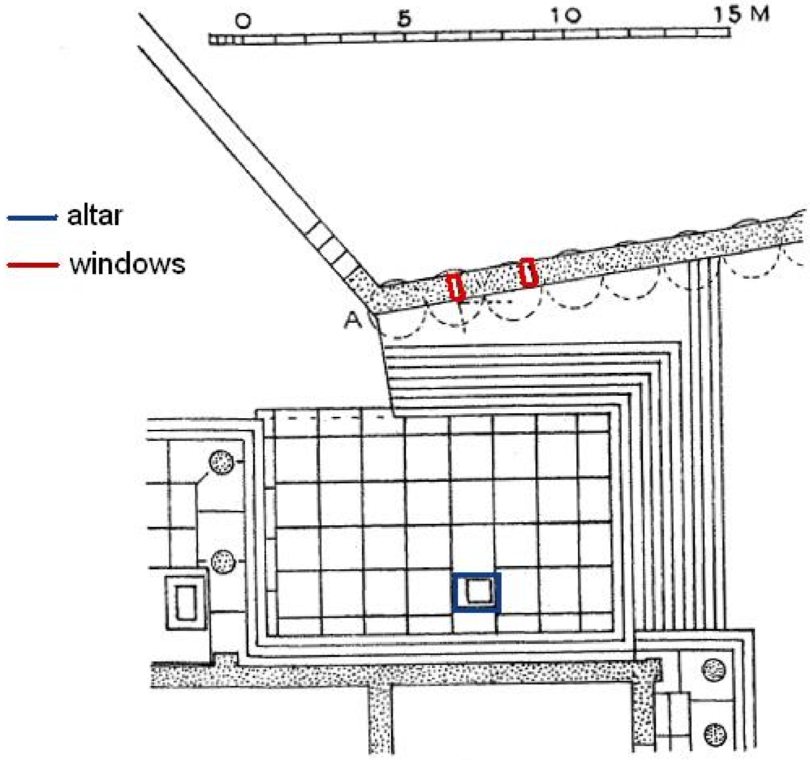

Figure 6.21: Restored plan of the 'paved area' and steps adjacent to the north porch of the Erechtheion.

The 'paved area' was constructed adjacent to the North wall of the Acropolis and would have been, from at least the early Classical period, isolated and invisible for those approaching the Acropolis from the west entrance. In earlier times, though, the north entrance of the Acropolis would have led the visitors to the terrace A4. From there, the paved area would have been to the immediate right (north) of the visitor. Since the majority of the Middle to Late Helladic or Mycenaean structures seem to have been located at the N and NE of the precinct, the northeast entrance would have led the visitors into what was at the time the central area of the Acropolis.

The myths of early Athens

The archaeological evidence is supported by the written sources as far as the antiquity of the cult of Erechtheus and the construction of early cult structures are concerned. The continuity of occupation on the Acropolis from Mycenaean times onwards seems clear from both the archaeological finds and the written sources. The cult and myth of Erechtheus were well established by the time of Homer in the eighth century BC. In the *Iliad* and the *Odyssey* we find the earliest references to the myth of Erechtheus:

> Οἳ δ’ ἄρ’ Ἀθήνας εἶχον, εὐκτίμενον πτολίεθρον,
> δῆμον Ἐρεχθῆος μεγαλήτορος, ὅν ποτ’ Ἀθήνη
> θρέψε Διὸς θυγάτηρ, τέκε δὲ ζείδωρος ἄρουρα,
> κὰδ δ’ ἐν Αθήνης εἷσεν, ἑῷ ἐν πίονι νηῷ·
> ἔνθα δέ μιν ταύροισι καὶ ἀρνειοῖς ἱλάονται
> κοῦροι Ἀθηναίων περιτελλομένων ἐνιαυτῶν·
> τῶν αὖθ’ ἡγεμόνευ’ υἱὸς Πετεῶο Μενεσθεύς·
>
> And they who held Athens, the well-built citadel, the land of great-hearted Erechtheus, whom Athena, daughter of Zeus, once nurtured, but the earth, the giver of grain bore him; and she settled him in Athens, in her own rich temple; there the youths of the Athenians, as the years roll on in their courses, seek to win his favour with sacrifice of bulls and rams; of these in turn Menestheus son of Peteos, was leader.
>
> *Il.* 2: 546–52 (Loeb translation).

> Ὣς ἄρα φωνήσασ’ ἀπέβη γλαυκῶπις Ἀθήνη
> πόντον ἐπ’ ἀτρύγετον, λίπε δὲ Σχερίην ἐρατεινήν,
> ἵκετο δ’ ἐς Μαραθῶνα καὶ εὐρυάγυιαν Ἀθήνην,
> δῦνε δ’ Ἐρεχθῆος πυκινὸν δομόν.
>
> So saying, flashing-eyed Athena departed over the unresting sea, and, left lovely Scheria, she came to Marathon and broad-wayed Athens, and entered the well-built house of Erechtheus.
>
> *Odyssey*, 7: 78–81 (Loeb translation).

Homer not only mentions the joint cult of Athena and Erechtheus on the Acropolis, but also notes that they were worshipped in the same temple, at a time that long predated the construction of the Hekatompedon temple. His reference to the ‘strong House of Erechtheus’ has been the subject of several articles, all in agreement that Homer was most probably talking about a Mycenaean *megaron*, or at least a temple dedicated to Erechtheus (Burkert, 1985: 50). Against Burkert’s (1985: 50) conclusion that the two deities were worshipped together from the end of the fifth century, Homer’s reference to Athena entering the strong house of Erechtheus (*Od.* 7.80–81) confirms that the two figures had joint cults at least since the eighth century. We may be dealing then with the Mycenaean king and his house goddess (Nilsson, 1950: 485–498). The Mycenaean origin of the cult of Erechtheus is also indicated his association with Poseidon. Poseidon was an important god in the Mycenaean cult: several Mycenaean kings claimed descent from him (e.g. in Thessaly, he was the father of king Pelias and Neleus, in the Argolid he was the grandfather of Danaos from whom descended in later generations king Atreus, Agamemnon, Menelaos, Iphigeneia and Orestes. In Pylos, he was the father of king Neleus and therefore grandfather of king Nestor; in Thrace he was the father of Eumolpos etc.).

The autochthony of the Athenians was claimed through the myths of their first kings. Cecrops, the half human and half snake and first man of Attica, was also the first Athenian king (Ar. *Wasps,* 438; Eur. *Ion,* 1163–4; Parker, 1994: 193). He was called 'two-natured' (διφυής), either due to his dual nature or as a result of the myth which claimed that Cecrops came from Egypt, spoke Egyptian and Greek, and combined the Egyptian constitution with the Greek (his Egyptian origin is, however, considered a later addition) (Elderkin, 1941: 117; Kakridis, 1986, vol. 3: 19). His myth indicates a very early snake cult housed in the acropolis – probably located in, or close to the south-west corner of the classical Erechtheion, where the tomb of Cecrops was – and is closely associated with the myth of Erichthonios, who was entrusted by his mother Athena to Cecrops's three daughters. His tomb was believed to be under the Erechtheion, and more precisely is thought to have been in the SW corner, marked by the monumental porch of the Maidens (Kontoleon, 1949: 69–70), which had a secret staircase leading to the level of the Erechtheion, and according to Kontoleon leading also to the tomb of Cecrops (1949: 71).

The myth of Erichthonios – another testimony of the much sought after autochthony of the Athenians – narrates that he was born from the Attic earth, as a result of Hephaistos' attempt to rape Athena. Athena could not raise the newborn Erichthonios on Mt Olympus, so she placed him in a box with snakes to guard him and entrusted his upbringing to the daughters of Cecrops who lived on the Acropolis. When the daughters of Cecrops disobeyed Athena's strict orders not to open the box, the goddess sent madness upon them, making them throw themselves off the Acropolis cliffs. With no one to raise Erichthonios, Athena enclosed him in the Erechtheion, where she raised him herself and where he was buried after his death. The myth of Erichthonios reconciles several contradictory facts, accommodates the mythological beliefs about Athena and at the same time states explicitly the unquestionable autochthony and divine origin of the Athenians. In this way, not only did Erichthonios descend directly from the gods, although he was born in Athens, but Athena is also considered the mother of the Athenians, while at the same time, she manages to maintain her virginity. Undoubtedly, the notion of autochthony and divine descent can be viewed as collective snobbery, but even so, it does not simply attempt to define the identity of the Athenians but more significantly for this study, it unites and puts emphasis on the importance of the Attic landscape and earth in the ideals and beliefs of the Athenians.

Erechtheus (son of Pandion and grandson of Erichthonios) (Kakridis, 1986.3: 28) and thus one of the early kings of Athens – like his grandfather – was also believed to have been half-human, half-snake. The myth of Erechtheus is commonly thought to have been interchangeable with the myth of Erichthonios (Burkert, 1983:156; Mikalson, 1976: 141). The two figures share numerous characteristics: they were both born from the earth (*Il*. 2.548; Herod. 8.55), both nursed by Athena (*Il*. 2.547-48; Xen. *Mem*. 3.5.10), both autochthonous and both kings of Athens (Herod. 8.44; Eur. *Ion* 724). There are no clear distinctions between them; they seem to be parallel figures with the difference that the myth of Erechtheus seems to predate Erichthonios, who first appears in the fifth century BC but is not established until a century later, as a result of the Atthidographers adding him to the list of Attic kings (Mikalson, 1976: 141-2). Erechtheus was killed by Poseidon (Hyginus, *Fabulae*, 46) because in the battle against Eleusis he killed the Eleusinian Eumolpos, son of Poseidon (according to Pausanias, 1.5.2, 1.27.4, 1.38.3). Erechtheus was in the early Attic tradition a very ancient hero (at least as early as Homer and perhaps Mycenaean; Parker, 1994: 194) and his myth must have been completed before the cult of Athena was dominant in Athens; Erechtheus-Erichthonios was then the most ancient image of Athenian identity *par excellence*. The importance that this myth had in Athenian identity is easily verified by its longevity; at the time of Lykourgos (around 330 BC), in late Classical Athens, the myth has still a point of reference (Lyc. *Leocrates*, 1.98). The presence of snakes in early origin myths and early cults is very common in Greece (e.g. Kadmos killed snakes in Thebes, Apollo killed Python in Delphi etc.) and, like in the other examples, Erechtheus-Erichthonios must have been the personification of the guardian snake (Hdt. 8.41 and Plut. *Themistocles*, 10) of the pool of water located in the SW corner of the Erechtheion – a similar version to Python in Delphi (Elderkin, 1941: 117). Regardless of whether the figure was Cecrops, Erechtheus or Erichthonios, it is evident that we are dealing with an ancient snake cult established in the north side of the Acropolis from a very early time, which was later enriched by the addition of the myth with Athena.

Festivals, cults and astronomy

The Athenian year started after the summer solstice and consisted of twelve lunar months, usually of 29–30 days, from one new moon to another (Lambert, 2002: 395; Parke, 1977: 24). An extra month was inserted periodically, in order to keep the calendar in line with the seasons, by repeating one of the months. The antiquity of this system is not certain. It is not mentioned by Homer and there is only one doubtful reference in Hesiod. It seems to have been established no earlier than the first half of the seventh century (Parke, 1977: 24).

Gregorian months	Attic months	Festivals
July–August	Hekatombaion	Panathenaia
August–September	Metageitnion	
September–October	Boedromion	Genesia –5th
October–November	Pyanepsion	weaving of *peplos* starts
November–December	Maimakterion	
December–January	Poseideon	
January–February	Gamelion	
February–March	Anthesterion	
March–April	Elaphebolion	
April–May	Mounychion	
May–June	Thargelion	Kallynteria Plynteria
June–July	Skirophorion	Arrephoria

Table 6.2: The Attic months and festivals compared to the Gregorian calendar.

A small festival called Genesia was celebrated on the fifth day of Boedromion (Lambert, 2002: 367) (see Table 6.2), a festival of the dead (Herodotus, 4.26) and a mournful day (Hesych. s.v. γενέσια· ἑορτὴ πένθιμος Ἀθηναίοις. οἱ δὲ τὰ νεκύσια. καὶ ἐν ᾗ ἡμέρᾳ τῇ γῇ θύουσι) which was probably celebrating the origins of the Athenians. It seems almost certain that on a day that celebrated the Athenian origins the first Athenian kings Cecrops and Erechtheus-Erichthonios would also be commemorated. The sacrifice of a lamb to Erechtheus during this festival is recorded in a sacrificial calendar list excavated on the south slope of the Acropolis (Lambert, 2002: 358, 362, 368, 392). Not much is known about this festival, which seems to have been annual (Lambert, 2002: 368) and due to the small size of the sacrificial animal, it must have been an ancient and small celebration, attended only by a few people (Hansen, 1969: 51 in Lambert, 2002: 369).

Three further festivals that took place on the Athenian acropolis were connected to the worship of Athena and Erechtheus. The celebrations of the coming of the new year in Athens commenced two months earlier. The culmination of the festivities and the celebration of the new year were celebrated by the grand festival of Panathenaia, held in the first month, around early–mid summer. The festivities commenced in May–June (22 Thargelion) with the Kallynteria (Table 6.2). This was a small purification rite, which involved the cleansing of the Athena Polias shrine, and the relighting of the eternal flame of the goddess. A few days later (on the night of 25 Thargelion), the purification rites continued with the Plynteria: the cult statue of the goddess was stripped and the jewellery removed. The statue was wrapped (Plut. *Alk*. 34.1) and carried in a night procession to the seashore to be bathed and purified in running (salt) water and its robe was washed (Burkert, 1985: 228). The statue was then returned to the temple, clothed with the clean *peplos* (robe) and adorned with the jewels. Kontoleon notes the possible chthonic character of the washing rites (he notes the chthonic character of water) (1949: 37), as purification rites were generally associated with chthonic cults, which perhaps contradicts the ouranic cult of Athena Polias. With the beginning of the next month, the Arrephoria (Burkert, 1985: 228), a secret and mystic nocturnal rite, was celebrated in Skirophorion (June–July) (see Table 6.2). The celebration was held in honour of Athena and Pandrosos. Girls were chosen annually to be the Arrephoroi (named after what they were to carry during the rite: the ἄρρητα (confidential, secret)) and they dwelled as Pausanias says in the Acropolis (παρθένοι δύο τοῦ ναοῦ τῆς Πολιάδος οἰκοῦσιν οὐ πόρρω… (1.27.3)). This rite was also associated with the northern part of the Acropolis. The festival was the re-enactment of the myth of

Athena entrusting newborn Erichthonios to the daughters of Cecrops. On the night before the day celebrating the festival, the priestess gave the Arrephoroi a basket – the contents of which were not known to them – and were asked to take it to the sanctuary of Aphrodite through a secret passage, descending from the north slopes (Paus. 1.27.3). They were to leave the baskets they were carrying, pick up some new ones from the sanctuary of Aphrodite (again with unknown contents) and bring them back to the Acropolis. A steep staircase has been unearthed in the area of the north slopes, which during Mycenaean times would have led to a spring (Burkert, 1985: 229). At the bottom of the north slope of the Acropolis rocks was a small sanctuary dedicated to Aglauros (one of the daughters of Cecrops), probably a reminiscence of the death of the girls, which helps us however to trace the steps of the Arrephoroi in their descent. It is not certain that this rite was preserved though the Mycenaean period, although it is possible that an early form of the rite may have dated to the Bronze Age. Archaeologically, though, the rite of the Arrephoria seems to have been either resumed or initiated in the eleventh century BC, when the stairway seems to have been restored (Burkert, 1985: 233).

Finally, the great celebrations of the Panathenaia took place in late July or early August, after harvest, on 28 Hekatombaion (Table 6.2). The antiquity of the Panathenaia, which was the major festival in Athens in honour of the patron deity, seems to have been very great. The Athenians believed that Erichthonios was the founder of the festival, and of the *peplos* ceremony and the creator of the earliest *xoanon* of the goddess (Vrettos, 1999: 563, 569). The Panathenaia lasted initially for two days and later up to three. Around 566 BC, the festival followed the example of the Olympic Games and from then on, although there was still an annual celebration of the Panathenaia (called the Lesser Panathenaia), the festivities culminated every four years with the Great Panathenaia, which lasted eight days (Lambert, 2002: 356). The athletic contests ended before the religious rites commenced, on the 28th day (Vrettos, 1999: 568–9), and were added to the festival at a later date (566/5). As Greek festivals began at sunset (Parke, 1977: 49), so did the Panathenaia, starting with a torch race on the night of 27 Hekatombaion, which took place in the city and ended at the Acropolis (Burkert, 1985: 61). After the end of the race, the all-night celebration (*pannychis*) commenced, with the sole participation of women dancing and singing (Eur. *Herakleidai* 782–783 '...ὀλολύγματα παννυχίοις ὑπὸ παρθένων ἰαχεῖ ποδῶν κρότοισιν"; Aristoph. *Frogs*, 371; Hrd. 4.76). According to an Attic inscription, the Panathenaia procession started with sunrise on Athena's birthday (28 Hekatombaion), after the all-night *pannychis*, (τοὺς δὲ ἱεροποίους τοὺς διοικοῦντας τὰ Παναθήναια τὰ κατ' ἐνιαυτὸν ποιεῖν τὴν παννυχίδα ὡς καλλίστην τῇ θεῷ καὶ τὴν πομπὴν πέμπειν ἅμα ἡλίῳ ἀνιντι (C.I.A. ii.163) (literary evidence is also given in Burkert, 1983: 155; Dillon, 1997: 142; Neils, 1992: 14, 15; Parke, 1977: 33). The procession started at the Dipylon Gate at the NW entrance to the city, then went through Kerameikos and the Agora, followed the Panathenaic Way and terminated at the altar of Athena Polias on the Acropolis (Hurwit, 1999: 44) with the dedication of the new *peplos* for the goddess followed by the sacrifices (Vrettos, 1999: 572). The presentation of the *peplos* to Athena is traced back to the seventh century, but its origin was definitely much earlier (Parke, 1977: 33), as Homer mentions the gift of a *peplos* to Athena:

> ἡ δ' ἄρα πέπλον ἑλοῦσα Θεανὼ καλλιπάρῃος
> θῆκεν Ἀθηναίης ἐπὶ γούνασιν ἠυκόμοιο...
>
> and fair-cheeked Theano took the robe and laid it on the knees of fair-haired Athena…
>
> *Iliad*, 6.303–4 (Loeb translation).

The weaving of the *peplos* had started nine months earlier, in Pyanepsion (Vrettos, 1999: 569) (Table 2.2). The Panathenaia ended on 29 Hekatombaion in the manner they started, with a torch race followed by the nightlong *pannychis* (Vrettos, 1999: 572). The festival of the Panathenaia was the biggest festival of Athens, a festival which was for the Athenians the celebration of social unity and order. It was not only connected with the myth of Erichthonios but also with the battle of the Giants, 'a myth of establishment of divine and cosmic order' (Parker, 1994: 192). This divine order had been established with Athena's participation in the battle of the Giants. This battle was of such importance for the Athenians that scenes of it were woven in the *peplos* that was dedicated to the goddess (Burkert, 1985: 141), and in the fifth century scenes of the battle decorated the east metopes of the Parthenon. In astral mythology, Athena's participation to the battle of the Giants was commemorated in the night sky by the constellation of Draco, who according to one myth was the snake (Ὄφις, Δράκων) snatched from the Giants by Athena during the battle and whisked up to the sky (Allen, 1963: 203). In recalling this myth we should not leave out the reference of Pherecydes's cosmology (sixth century BC) who mentions that in the war of the gods 'the battle was between forces led by

Chronos (Time) and Ophioneus (or Ophion)' referred to as a 'serpentiform creature' (West, 1963: 161). We have then two groups of myths (the battle of the Giants and the myths of Cecrops, Erichthonios-Erechtheus) that formed part of the Athenian identity, both of which involve snakes of divine descent.

Although at first glance the Panathenaia seems like an ouranic celebration of the Olympian Athena, at closer look it is possible to detect the undertone and remains of an earlier chthonic cult and celebration to Erechtheus, which it seems by classical times was long forgotten. It was during the Panathenaia that the sacred snake, which dwelled in the Erechtheion, was offered honey cakes. The classical Panathenaic celebrations seem to have been ouranic, since the meat of the sacrifices was eaten and not completely burned, as was the case for the chthonic cults, but the cows and sheep sacrificed in honour of Athena (Vrettos, 1999: 570) are not that different from the bulls and lambs sacrificed annually to Erechtheus in early Athens (Hom. *Il.* 2.550–51; Eur. *Erech.* fr.65, line 94). Furthermore, the undisputed similarities of the Panathenaia to the chthonic festival of Hyacinthia in Amyklai in Laconia, which was celebrated in the same month (Hekatombeus corresponding to the Athenian Hekatombaion) July–August (Trümpy, 1997: 139) and was for the Spartans their greatest festival (Theodoret. *Affect. Cur.* 8.28), offer a different perspective of the festival. The Hyacinthia, a festival dedicated to the hero Hyacinthus and ouranic Apollo, commemorated the accidental killing of the hero by Apollo, a myth which seems similar to that of Erechtheus being slain by Poseidon. The major procession, which was taking a *chiton* (tunic) woven by Spartan women to Apollo, the celebration of the *pannychis* on the night before the procession and the singing of the paean (Xen. *Hell.* 4.5.11 and *Ages.* 2.17; Mikalson, 1976: 148–151) in conjunction with the two festivals taking place on the same month, all make it clear that the early form of the Panathenaia was the celebration of the chthonic Erechtheus (Mikalson, 1976: 153). The Panathenaia were held at the very beginning of the new year and this was not only highlighted by the rites held in honour of the newborn Erichthonios, but in addition it involved the offering of the new *peplos* of the goddess which was placed in the northern temple (Erechtheion). None of the entire ceremony of the Panathenaia 'can be directly connected with the Parthenon' (Herington, 1955: 31), or any other of the Acropolis temples apart from the Erechtheion, even though the festival celebrated also Athena's birthday. Of the aforementioned festivities, the Kallynteria and Plynteria were not associated with the cult of Erechtheus but focused on the cleansing of the cult statue of Athena. Still, both rites were of chthonic character, an attribute which fits better with the chthonic Erechtheus-Erichthonios than the ouranic Athena. The Arrephoria and Panathenaia had direct references to the cult of the early king, although it seems that the Arrephoria were more so – since they re-enacted part of the myth that established the sacred snake cult on the Acropolis.

The foundations of the present Erechtheion were laid in 421 BC (Travlos, 1971: 213). The axis of the north porch entrance is oriented with an azimuth of 353° (Figure 6.22). The horizon altitude in this direction is 3° yielding a declination of 54°. There are a few constellations located around that declination: Ursa Minor, Draco and Cepheus. Of these three constellations, Draco seems to be the obvious choice if there was an astronomical association with the religious rites and mythology of the cults housed at the Erechtheion. It is possible that the constellation was seen as the symbolic representation of the snake cult housed in the north part of the Erechtheion. The constellation is also associated with Athena through a myth

Figure 6.22: View of the horizon standing in the centre of the north porch of the Erechtheion.

that seems to have been of great importance for the Athenians, since as was previously mentioned, scenes of the battle of the Giants were depicted on the

Parthenon metopes. The testimonies associating Athena with snakes (at least in Athens) are unequivocal and unanimous. She is commonly depicted holding snakes as part of the aegis (Figure 6.23) and in the famous gold and ivory statue of Athena Parthenos placed inside the Parthenon, a snake was crawling out from under her shield (Figure 6.24):

> αὐτὸ δὲ ἔκ τε ἐλέφαντος τὸ ἄγαλμα καὶ χρυσοῦ πεποίηται.
>
> The statue itself is made of ivory and gold Pausanias 1.24.5
> (translation Jones and Ormerod, 1918).
>
> καὶ Νίκην τε ὅσον τεσσάρων πηχῶν, ἐν δὲ τῇ ἑτέρᾳ χειρὶ δόρυ ἔχει, καί οἱ πρὸς ποσὶν ἀσπίς τε κεῖται καὶ πλησίον τοῦ δόρατος δράκων ἐστιν·
>
> [Athena] ...holds a statue of Nike (Victory) about four cubits high, and in the other hand a spear; at her feet lies a shield and near the spear is a serpent. This serpent would be Erichthonios. Pausanias 1.24.7
> (translation Jones and Ormerod, 1918).

A final testimony of the importance of the snake cult comes from the Parthenon's pediment, where half-man half-snake creatures are depicted (Figure 6.25), (possibly Cecrops or Erichthonios), and at least two great snakes in the Hekatompedon pediment (Figure 6.26). *γ Draconis* (dec. 54.9° in 1400 BC and 51.5° in 400 BC) (Figure 6.27) is the brightest star of the largely circumpolar constellation of Draco, located in the head of the Serpent. Next to *γ Dra* is *β Dra* (Rastaban) (dec. 57.7° in 1400 BC and 52.3° in 400 BC) and the last star on Draco's tail is *λ Dra* (dec. 80° in 1400 and 80.2° in 400 BC). Culmination is the moment at which a celestial body reaches the highest altitude above the horizon, the moment when it crosses the observer's meridian. This was known to the Greeks (Hesiod *Works and Days* 609–610, Aveni and Ammerman, 2001: 90). For circumpolar stars, upper culmination is the moment that they reach the closest to the observer's zenith and the lower culmination the moment that they reach the furthest from the zenith. The possibility of an astronomical orientation offers an entirely new perspective on the religious activities carried out at the Erechtheion, integrating the structure in the landscape and the cosmos. As the constellation of Draco is largely circumpolar, it is always visible in the night sky. Only *γ Dra* would have been seen to set when the constellation would be close to its lower culmination. At that time the brightest star of the constellation would sink below the horizon of the Erechtheion.

Figure 6.23: Athena the warrior (*c.*580–560) bronze statuette (after Ridgway, 1992).

Figure 6.24: Roman copy of Pheidieas' statue of Athena Parthenos (after König, 2000).

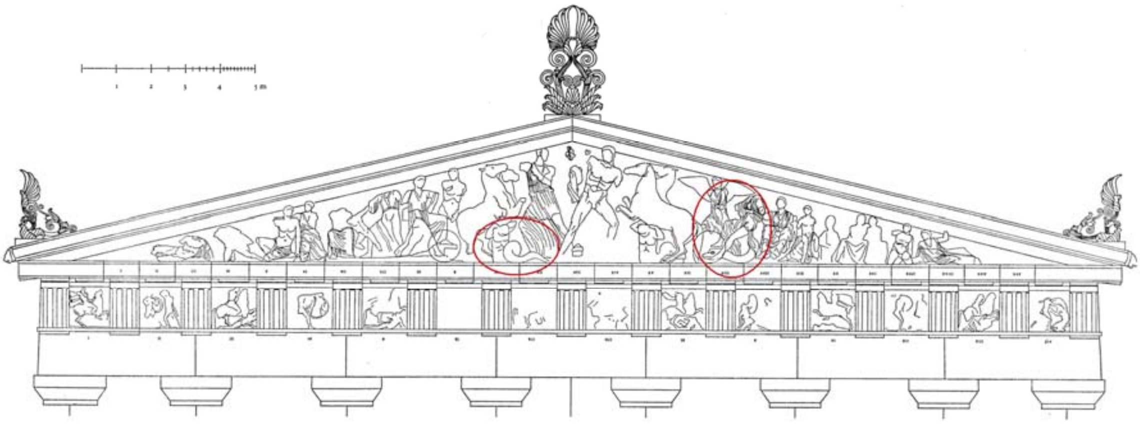

Figure 6.25: Parthenon west pediment. On the left side the half-human half-snake creature supporting Athena's chariot may be Cecrops or Erechtheus and on the right, the seated man surrounded by a snake may also be Cecrops.

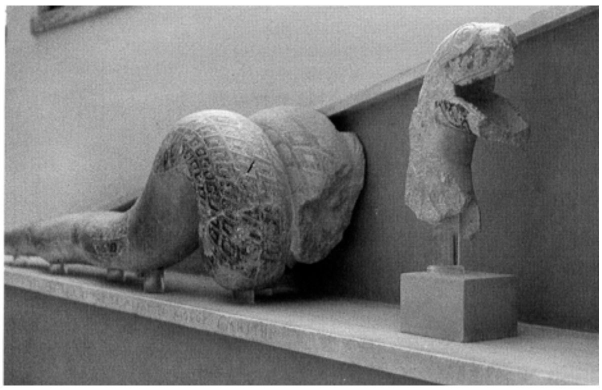

Figure 6.26: Great snake from the Hekatompedon pediment (after Hurwit, 1999).

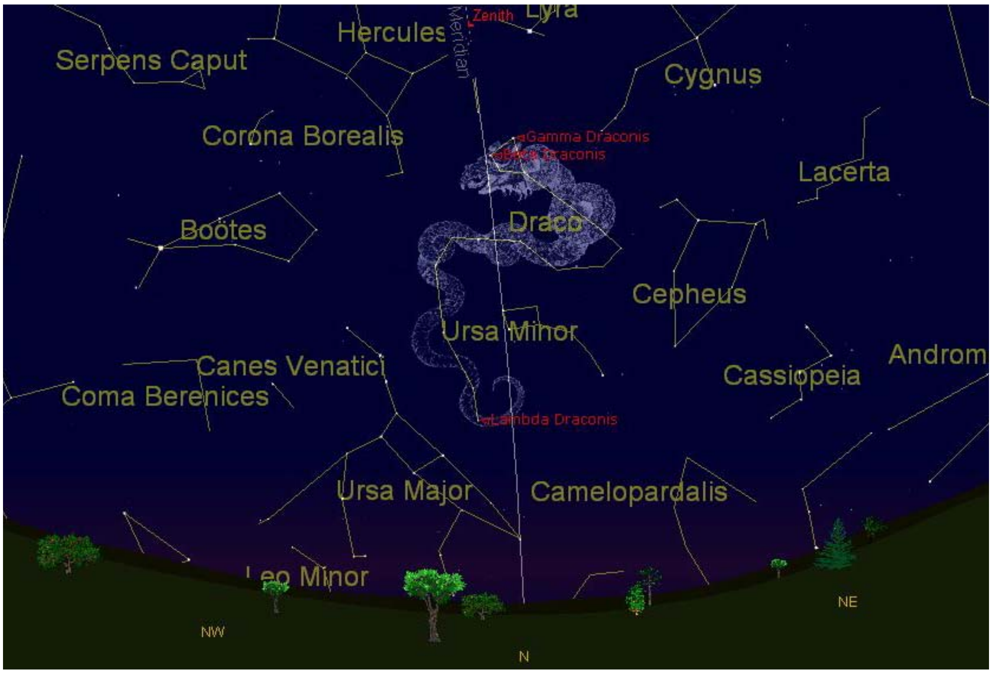

Figure 6.27: A reproduction of the constellation of Draco as it would have been seen from Athens in 700–500 BC in late March, before dawn (Generated using Starry Night Pro software).

From the end of September until the beginning of February, it would have been possible to view the lower culmination of Draco's head after sunset. During most of March, no culmination would have been visible during the night. From the end of March and through April, the upper culmination of Draco's head occurs within two hours before dawn. With non-circumpolar constellations, the periods taken to be of importance are those when the constellation reappears in the night sky after a period of invisibility, when it has been rising and setting above the horizon during the day. As circumpolar constellations are always visible at night, we can conclude that for circumpolar constellations the equivalent period to the invisibility period would be the period when neither culmination is visible and the most important period would be when both culminations would be visible in the same night. In the case of Draco, neither culmination of the head is visible, from 1 to 17 March and during the middle of August to just after the middle of September (Table 6.3). If the constellation was of the suggested importance to the cult, it could be that a) no festivals were held during the periods of obscurity of either culmination and b) some celebrations or cult rites would be performed during the time when the culmination becomes visible again, right after the end of the period of invisibility, or just before (i.e. before the middle of August (Hekatombaion) and/or after the middle of September (Boedromion) and during April (Elaphebolion–Mounichion). Indeed, no celebrations took place in the periods when neither culmination was visible (Table 6.3). In addition to that and most importantly, the Panathenaia, which was the greatest celebration in Athens, took place during the last few days when the upper culmination of Draco's head was still visible, occurring one hour after sunset (Table 6.3). As we have seen, the Panathenaia were the culmination of smaller rites which commenced two months earlier, when the upper culmination was also visible. Although the head of Draco is visible for the first time again during its upper culmination two months prior to the celebration of the Kallynteria in May–June, during these first two months only the head of Draco culminates before dawn. It is not until the middle of May that the 'entire' constellation is in a sense seen to culminate just before dawn, with *λ Dra* seen to cross the meridian during its lower culmination. From the middle of May onwards and for a few more weeks, *λ Dra*, the southernmost star of Draco's tail,

Gregorian months	Attic months	Festivals	Upper culmination	Lower culmination
July-August	**Hekatombaion**	Panathenaia	**21:00–20:00**	**9:00–8:00**
August-September	Metageitnion		**19:00–18:00**	**7:00–06:00**
September-October	**Boedromion**	Genesia -5th	**17:00–16:00**	**05:00–04:00**
October-November	Pyanepsion	Weaving of *peplos* starts	**15:00–14:00**	**03:00–02:00**
November-December	Maimakterion		**13:00–12:00**	**01:00–00:00**
December-January	Poseideon		**11:00–10:00**	**23:00–22:00**
January-February	Gamelion		**09:00–08:00**	**21:00–20:00**
February–March	Anthesterion		**07:00–6:00**	**19:00–18:00**
March-April	**Elaphebolion**		**05:00–4:00**	**17:00–16:00**
April-May	**Mounychion**		**03:00–02:00**	**15:00–14:00**
May-June	Thargelion	Kallynteria Plynteria	**01:00–00:00**	**13:00–12:00**
June-July	Skirophorion	Arrephoria	**23:00–22:00**	**11:00–10:00**

Table 6.3: The timing of the culminations of Draco's head in the years 700–500 BC. Yellow text indicates time in the year when the culmination would not be visible.

passes the meridian an hour before sunrise during its lower culmination, right after the head of Draco has completed its upper culmination. During June–July, when the Arrephoria were celebrated, Draco's head's upper culmination started with the culmination of *β Dra* followed by the culmination of γ *Dra* and was completed almost two hours later, when the last star of Draco's tail (*λ Dra*) passed the meridian. An upright snake would have been visible from the north porch of the Erechtheion for the entire night during the nocturnal celebration of the discovery of the half-human half-snake king who was found in a basket guarded by two snakes. The Arrephoroi carried the baskets to the north slope of the Acropolis using the north entrance of the precinct, and the constellation would have been visible throughout the rite. The time of the year when this rite was taking place does not coincide with the movement of either of the other two major constellations: the upper and lower culmination of Polaris, which is the brightest and most important star in Ursa Minor, would have occurred when it was still light, and Alkaid (the last star in Ursa Major's tail) culminated during the day.

The upper culmination of Draco's head occurs approximately one to two hours after sunset from the end of July to the middle of August, so the phenomenon would have been perfectly visible at the time when the Panathenaic rites started. In the years when Hekatombaion started late, during August, the culmination of the two stars (*β* and γ *Dra*) would have occurred right after the sunset, but while it was still too bright to see them. However, the *pannychis* would have started at night, as it followed the torch race, which would have started after sunset (Vrettos, 1999: 568). This means that by the time the nightlong celebrations started, the constellation would have been visible at an upright position, having just crossed the meridian. If observed from the north porch or nearby, it would have been an impressive sight as the constellation is one of the largest in the sky. If one stood in front of the North porch, the constellation would have taken up most of the observer's view of the horizon.

It could be argued that the constellation of Draco did indeed play a part in the timing of the Athenian festivals connected to the Acropolis. The festival of Genesia was celebrated right after the end of the period of culmination invisibility and in the following month – at the one time in the year when the lower culmination of the constellation takes place just before dawn – the *peplos* of Athena started to be woven, in Pyanepsion (October–November). When examining the phenomenon by taking into account the Athenian horizon, it becomes apparent that in September–October, when the lower culmination of the head becomes visible again, it takes place within the hour before dawn. So the head of Draco (*γ Dra*) is seen to sink below the horizon and disappear for a few minutes, while *β Dra* is seen to culminate scraping along the horizon line. During this month though, the rays of the rising sun cover the constellation, before *γ Dra* has time to rise above the horizon again and so by dawn only half of the head of the snake has become visible after the lower culmination. A month later though (October–November), during Pyanepsion, the full culmination and rising is completed just a few minutes before sunrise. The culmination starts when γ *Dra* dips below the horizon around 1am. Then, *β Dra* crosses the meridian approximately one hour later and the event is completed when γ *Dra* (apparent magnitude 2.2) is seen to rise above the horizon again, at altitude 5° (allowing for atmospheric extinction) (Figure 6.28). *γ Dra* reaches altitude 7° one hour before sunrise. The altitude of the north horizon from the Acropolis is 3°, which means that, as the lowest altitude that *β Dra* (apparent magnitude 2.8) reaches at this time of year is 3.9°, the star would be visible throughout its culmination. This remains the case even if we account for atmospheric extinction.

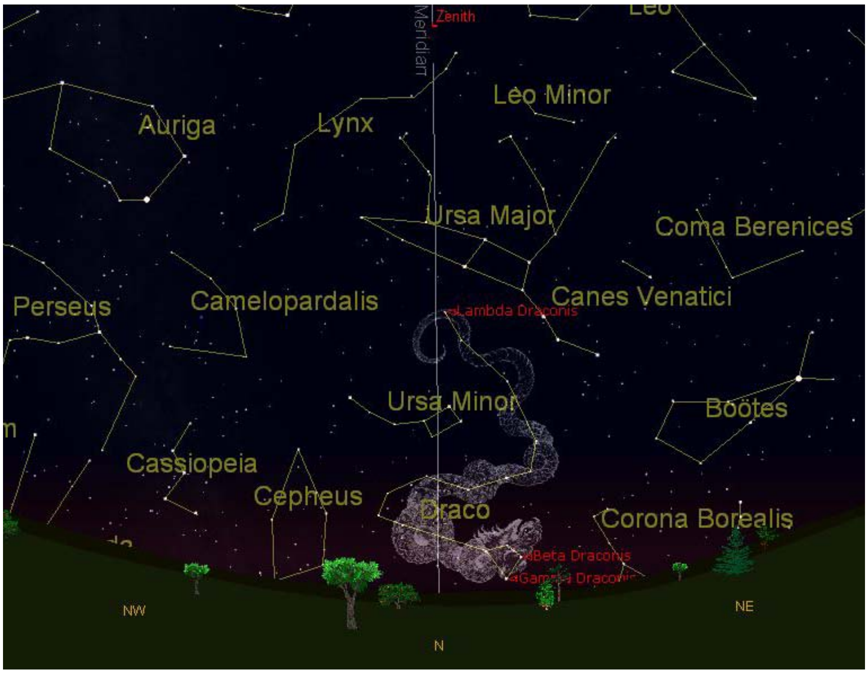

Figure 6.28: The lower culmination of Draco's head at the time that γ *Dra* has reappeared above the horizon. The horizon in the figure is at 0° altitude but *γ Dra* is at 3.5° altitude.

Discussion

The best known and most ancient inhabitant of the Athenian Acropolis was the sacred snake, which lived in the grounds of the Erechtheion. The snake symbolism in mythology is vivid. Cecrops, the first Athenian king born from the earth, was buried inside the Erechtheion. Cecrops, Erichthonios ('the-one-of-the-very-earth', Robertson, 1996a: 62) and Erechtheus were the personifications of the sacred snake that dwelled on the Acropolis (Kontoleon, 1949: 19; Parker, 1994: 196). Snakes come out of the earth and can be found underground; they slip to and fro between the two worlds, the upper and the lower. Even though the Olympian Athena seems to have increased in importance over the chthonic and primordial Erechtheus cult from at least after the founding of the Great Panathenaia in ca.566 BC, the importance of the cult of Erechtheus is still vivid throughout the lifespan of the Athenian city-state. Even when the new temple of Athena was constructed (447–432) (Lawrence, 1996: 110), solely dedicated to Athena, references to Erechtheus, Cecrops and their snake cult decorated the interior and exterior of the temple. In this, a decisive role was played – I believe – by the retention of control of the Acropolis cults under the control of the family of the Eteoboutadai, who traced their ancestry back to the brother of king Erechtheus and had to supply the priestess of Athena Polias and the priest of Erechtheus (Burkert, 1985: 230, 258).

The Erechtheion as a structure seems integrated to the cosmos, not only unique in the entire Greek world for its architectural form and shape and the number of cults housed under one roof, but also for the way that it seems so well integrated to the cosmic order. It unites under the same roof the chthonic and ouranic cults, bringing together the worship of deified heroes moving in the realm of the underworld and the worship of the heavenly gods. This role is perhaps the reason why Homer refers to the area in which Athena was worshipped as 'temple' (νηόν) (*Odyssey*, 2.549), whereas he calls the area occupied by Erechtheus as 'house' (δόμον) (*Odyssey*, 7.81). Such a distinction is in accordance with the function of the two *cellas* of the Erechtheion: a temple was to shelter and protect the god's cult statue; in the case of hero cults however, no cult statue would have existed and the structure protecting the tomb of the hero could not be called a temple. The presence of the *xoanon* of Athena in the Erechtheion need not contradict this. Its presence in that part of the structure must have been the result of a long tradition. The Erechtheion was by no means constructed to house the *xoanon* – which is confirmed by the fact that it was not named after Athena – but instead to unite under one roof and protect all the hero and chthonic cults that had been carried out in that space over centuries. The orientation of the north porch could perhaps be viewed as combining the earthly snake with a celestial. The myth that records Athena's help to the victory of the cosmic order during the battle of the Giants, when the worlds of the living and the divine were threatened, is a reminder of the victory and success of the New Order in the cosmos, the predominance of the heavenly over the primitive chthonic (the underground forces of nature). This seems to be reflected also in the way that the emphasis of the cult was shifted from the chthonic worship of Erechtheus to the ouranic worship of Athena, maintaining nevertheless its chthonic elements.

The location of all three festivals held in the Acropolis with separate altars for the chthonic cults centred in the northern part (Herrington, 1955: 28–29, 31) asserts that the northern part of the Acropolis was undoubtedly the focal point of the cult and had been so from the very beginning of human activity on the 'sacred rock' during the Mycenaean period. However, the actual location was not what we would view as central due to its proximity to the boundary wall and the structural layout of the Acropolis. If my observations about the importance of the constellation of Draco are correct, however, they could explain why such care was taken to construct the 'paved area' against the NE wall, why the monumental entrance of the north porch is so isolated from the rest of the monuments –directly facing the boundary wall – and why some of the most important cult rites (such as the Arrephoria, the Plynteria and the concluding rites of the dedication of the new goddess' *peplos*) were carried out on that part of the Acropolis.

Eleusis: the cult of Demeter and Kore and the Eleusinian Mysteries

Eleusis is located approximately 30 km west of Athens, in the centre of the Saronic gulf, a few metres from the coastline overlooking the island of Salamis. The Sanctuary of Demeter and Kore – connected directly to Athens by the Sacred Way – is between the east slope of the Acropolis and the east fortification wall, within the city walls, but was later isolated from the citadel by a separate cross-wall at the NE (Figure 6.29). The Mycenaean megaron and the four consecutive temples of Demeter, all constructed on the ruins of their predecessors, follow the same orientation (including the Soloneion, a case for which will be made below) and are situated on an artificial terrace, beyond which the ground inclines down abruptly, so much so that it seems that the structures were placed on a hillock. The orientation of the temple (Telesterion) is to the southeast (az. 115°, alt. 2.5°dec. –18.5°).

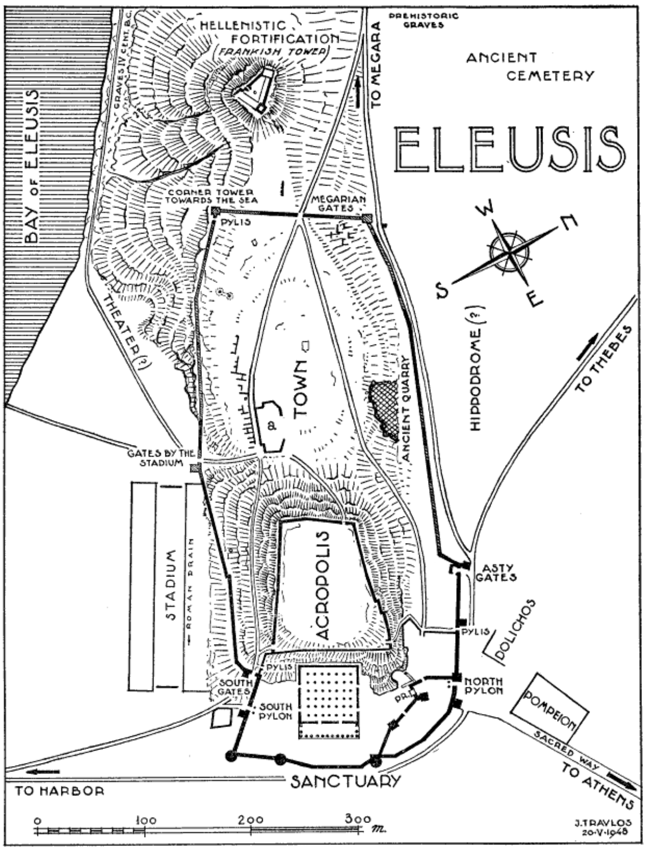

Figure 6.29: Plan of Eleusis at the end of the fourth century BC (after Travlos, 1949).

The Mysteries and the Thesmophoria: division of the two cults

It seems that the only seasonal festivals that lasted until historical times in Athens were the Thesmophoria, the Lesser Mysteries, and the Skira (another agricultural festival) (Robertson, 1996b: 361). Until recently, researchers treated the Eleusinian Mysteries as a variant of the cult of the Thesmophoria (Ardener, 1975a and b; Clinton, 1988: 72–3, 76, 79; Clinton, 1993: 113) in terms of their religious aim, mostly because both festivals were associated with Demeter and fertility and were related to agriculture. It was not until a few years ago that researchers started to see the important differences between the two cults (Clinton, 2003: 54–55; Sourvinou-Inwood, 2003: 47 n. 23). Admittedly, the two rites have a lot in common: they are ‘two of the most important and durable festivals in the ancient world’ (Nixon, 1997: 76). Both imposed secrecy, were connected to fertility and agriculture, and were held in honour of the same deity. Beyond those superficial similarities, though, they were very different cults. The Thesmophoria were celebrated throughout Greece. Nilsson (1906: 313) calls them 'the most widespread cult in Greek religion', and only citizen and married women were allowed to participate in the celebrations (Tzanetou, 2002: 331, n. 5 for ancient sources). The Mysteries, on the other hand – although also of an agricultural character (Isocrates, *Panegyricus*, 28–29; Mylonas, 1974: 275, 282; Sourvinou-Inwood, 2003: 26) – were location-specific: they were founded and held in Eleusis because this was the place where Demeter was reunited with her daughter. They were open to men, women and slaves (Dillon, 1997: 61; Robertson, 1996b: 377), but were specific to the myth of the abduction of Persephone. The climax of the celebration of the Mysteries took place inside the Telesterion, whereas in the Thesmophoria the festival took place in the open (Nixon, 1997: 76). Moreover, the two cults had very different aims: the essence of the Mysteries was the symbolic re-enactment of the cycle of life (the growth, death and rebirth representing the phases both in the agricultural and the spiritual level) (Nixon, 1997: 75) and their aim seems to have been the promise of prosperity and happiness in the afterlife for those who were initiated, although this aspect is believed to have been introduced only in the early sixth century (Sourvinou-Inwood, 2003: 26–27). In blunt terms, the initiation to the Mysteries was the guarantee to a different fate in the underworld from the uninitiated: ancient writers make a clear and distinct differentiation between the fate of the initiated as opposed to that of the non-*mystes*:

> 'Thrice happy are those of mortals, who having seen those rites depart for Hades; for to them alone is it granted to have true life there; to the rest all there is evil' Sophocles, *fr*. 719
> (translation Mylonas, 1974: 285).

> 'Happy is he who, having seen these rites, goes below the hollow earth; for he knows the end of life and he knows its god-sent beginning' Pindar, *fr*. 102
> (translation Mylonas, 1974: 285).

The Thesmophoria were less exclusive in that respect: they did not require an initiation (which was compulsory for the Mysteries); their purpose was 'to ensure the survival of the polis through the production of food and the reproduction of legitimate heirs' (Plut. *Dem*. 26, *cf*. Nixon, 1997: 75) and they were not a mystery cult. The significance of the Lesser and Greater Mysteries is clearly demonstrated by the proclamation of the Sacred Truce (Dillon, 1997: 157) for their duration. The Mysteries shared some common themes with the Thesmophoria, but they added new aspects dealing with the inevitable physical death and life in the underworld (Clinton, 1992: 94). It is necessary, then, to consider the two cults separately. This case study deals only with the Eleusinian site and rites.

Archaeology

The main and oldest architectural features of the inner sanctuary of Eleusis are the Kallichoron or sacred well, the cave and temple of Pluto, the *megaron* and the Telesterion of Demeter. Of these, the last played the most important role in the Mysteries, as it was inside this structure that some of the sacred rites took place (Figure 6.29). The fact that this structure was built to admit people differentiates it from any other temple in ancient Greece. Inside the Telesterion there was a small rectangular enclosure called the *anaktoron*, where the 'sacred of sacred' was kept, entrance to which was only allowed to the *hierophant* (high priest). Five earlier structures were found under the ruins of the present Telesterion.

<u>Mycenaean period</u>

The Homeric *Hymn to Demeter* speaks of the citadel's fortification wall, no trace of which was found during the excavations. The Mycenaean *megaron* dates to the Middle Helladic period (Mylonas, 1974: 29) (1900–1600).

Due to the Mycenaean structure being excavated at a very early date and to its damage by the construction of the later Telesteria, Mylonas could find no evidence on the function, or the interior plan of the structure. It has been accepted that the *megaron* was connected to domestic activities, with indications of cult activities performed at the raised platform constructed in front of the entrance – a feature quite unusual for Mycenaean domestic architecture. The activities seem to have involved the sacrificial burning of animals and libations, indicating the function of the platform as an altar (Cosmopoulos, 2003: 2–20). Whether the cult of Demeter was already practised in the Mycenaean period is still a matter of debate. The *Parian Chronicle* dates the cult to the fifteenth century BC (Mylonas, 1975: 40–41), and Aristotle says that the Mysteries of Eleusis were the most ancient of all the Greek ceremonies: 'πρῶτα μὲν τὰ Ἐλευσίνια διὰ τὸν καρπὸν τῆς Δήμητρος' (in Müller, *Fragmenta Historicorum Graecorum*, no. 11, *Frag*. 282). Persephone is, however, only mentioned twice in the *Iliad* and does not seem to be connected to Demeter; and the picture we get for the relationship between the two goddesses from the *Iliad* and

Odyssey is different from the one given in the *Hymn to Demeter* (*c*.600 BC). By the end of the eighth century when the *Iliad* and *Odyssey* reached their final form, the two goddesses do not seem to have been connected in the way presented by the Eleusinian Mysteries (Binder 1998: 136–137). The earliest reference to Demeter and Kore is in Hesiod's *Theogony*. Archaeologically, there is no evidence that the cult of Demeter and Kore was established in Eleusis in the Mycenaean period, or that it was continuous from the Bronze Age to the early fifth century: '…for the period between the end of the LHIIIB period and 700 exist no sherds, no other finds, no signs of life of any kind, let alone the continuity of cult...' (Binder, 1998: 132). If the Mycenaean *megaron* was associated to a cult there is no evidence that this cult was in any way the same as, or related to, the Eleusinian Mysteries (Clinton, 1992: 29; Clinton, 1993: 114; Cosmopoulos, 2003: 8; Miles, 1998: 21). The earliest conclusive evidence for the presence of the cult dates to the eighth century BC and indeed not earlier than the late Geometric period (late eighth to early seventh centuries BC) (Binder, 1998: 131, 132; Sourvinou-Inwood, 1997: 133, 134). It is for these reasons that this study does not include the examination of the Mycenaean structure.

Solonian Telesterion

To this day, scholars are convinced that the shape of the Solonian Telesterion (first half of sixth century BC) was – as argued by Travlos – like that of a normal Greek temple and facing to the north (Mylonas, 1974: 40; Sourvinou-Inwood, 1997: 135–136). The reconstruction of this temple is uncertain (Figure 6.30), given the lack of any evidence for the west wall, or for the position of the entrance. The east wall had a minimum length of 14 m (Mylonas, 1974: 68), but there is no evidence that the wall did not extend any further than that. Although no traces of the north and west walls were found and the west ends of the the north and south walls have not been traced (Figure 6.30), Travlos gave the temple the rectangular shape of Figure 6.30, which has never been questioned (Mylonas, 1974: 68). It is possible that the structure extended a few metres further to the west and had thus a square shape, which would resemble the shape of the later structures. Even if this was not the case and the south wall of the Solonian structure did measure only 14 m, Mylonas also agrees that there is still no indication of the location of the entrance (Mylonas, 1974: 68). He argues that the ascent to the Solonian terrace, where the Telesterion was located, was through an entrance to the SW of the wall (1974: 66) (marked in red in Figure 6.30).

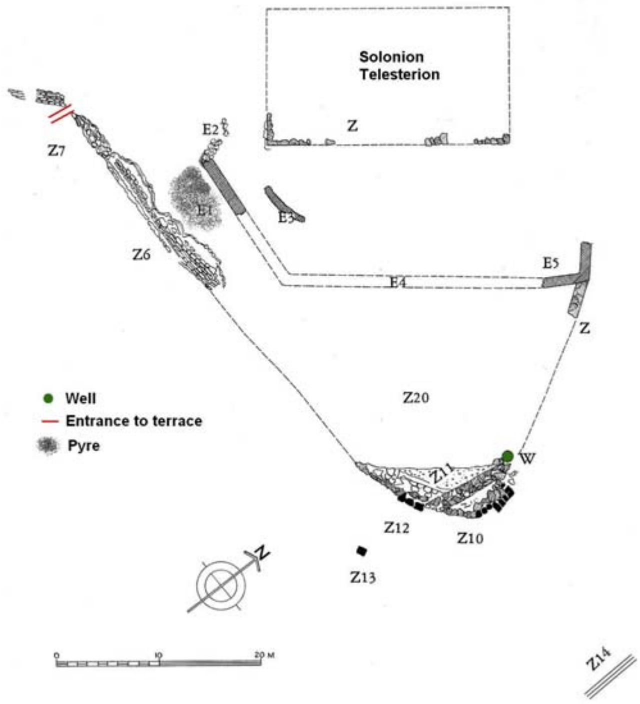

Figure 6.30: The remains of the Solonian Telesterion. The plan shows clearly the arbitrary nature of Travlos' conclusions on the positioning of the entrance and the west wall (after Mylonas, 1974 adapted).

If the entrance to the terrace was indeed there (as Mylonas argues there is a cut in the wall to support that, although Sourvinou-Inwood argues that the sanctuary was from the beginning approached by the north (1997: 135–136)), then the visitors would have arrived at the back wall of the Solonian temple. There are no known examples where the entrance to the sanctuary would lead the visitor to the back wall of a temple, and it seems unlikely that this was the case in Eleusis. The presence of the *pyre* on the southeast corner of the Solonian temple and the sixth-century altar base (Z13 in Figure 6.30) (Mylonas, 1974: 70–71, 169–170), and the possibility of cult rites taking place in both of these areas, especially on the east – which Mylonas (1974: 72–73) connects to the Homeric well pointed out by Demeter – make the hypothesis that the entrance was facing towards the north untenable. The presence of all this activity taking place at the court located on the east end of the terrace, the presence of which is attested to pre-date the Solonian Telesterion (Mylonas, 1974: 73, 91), make it more plausible that the entrance of the Telesterion must have faced towards the east. Such a conclusion is consistent with the orientation of the previous (Mycenaean) structure and all four later Telesteria, and also with the Athenian

Eleusinion (*c*.500 BC) (Miles, 1998: 38–39), in which were held the first stages of the Great Mysteries celebrations.

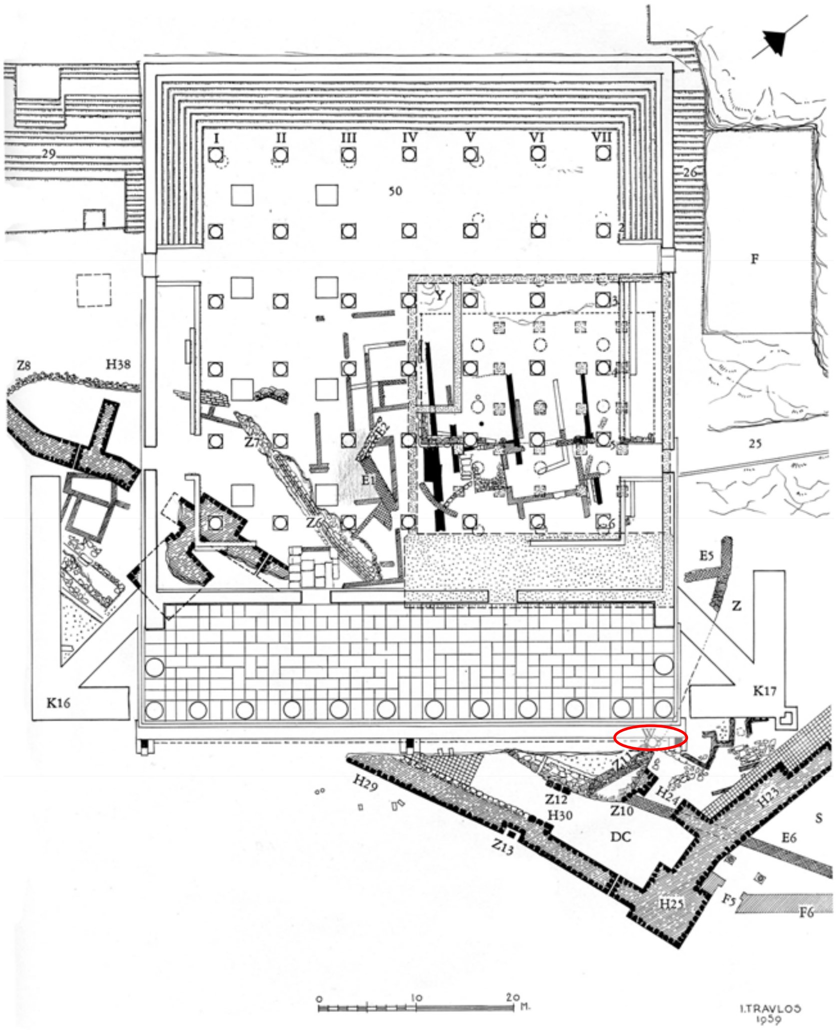

Figure 6.31: Plan of all the superimposed phases of the Telesterion. The dotted line inside the Telesterion indicates the shape of the Solonian structure according to Mylonas. The red circle marks the position of the Kallichoron well (after Mylonas, 1974 adapted).

The area of the *anaktoron* overlaps with a part of the inner room of the Mycenaean *megaron*. Other examples (e.g. Tiryns, Erechtheion, Iria in Naxos, Thermon, etc.) indicate that it is possible that later structures respected and maintained an area that would have been sanctified in the course of previous periods and their structures. The natural rock, adjacent to what was suggested by Travlos to be the west wall of the structure (marked Y in Figure 6.31), was maintained and was not levelled inside the later Peisistratean Telesterion although it was 0.32 m higher than the floor of the Peisistratean structure (Mylonas, 1974: 83). This was possibly because it was of some importance to the cult. If this rock was of such importance to the Telesterion, built a century later than the Solonian, that it was left untouched and was included in the later *anaktoron*, why would it be excluded from the Solonian structure? The western borders of the Solonian Telesterion shown in Figure 6.31 exclude this rock. It seems justified to assume that, given the lack of evidence on the length of the structure, this natural rock would have been enclosed and protected by the Solonian Telesterion. In this case then, the Solonian structure would have extended at least approximately 4 m further to the west, changing the shape of the structure to resemble more that of the later Telesteria.

<u>Peisistratean Telesterion (dec. –18.5°, az. 115°, alt. 2.5°)</u>

The terrace where the Solonian Telesterion stood was extended to the west (Mylonas, 1974: 78) and the new temple was built at a much larger scale, in order to accommodate the growing demand for participation in the Mysteries. The Peisistratean Telesterion, built in the sixth century, was almost one-quarter the size of the later Classical structure (Miles, 1998: 28; Shear, 1982: 131; Sourvinou-Inwood, 1997: 136) (Figure 6.32). It was a square structure, with accurately reconstructed dimensions and plan, accessible by three doorways and a portico on its southeastern side with a small enclosed chamber constructed along the southwestern wall (the *anaktoron*), which was the most sacred space of the Eleusinian cult (Mylonas, 1974: 79–81; Shear, 1982: 132) and was the place where the *hiera* (the most sacred representations of the cult) were kept. Archaeological evidence for the position of the *anaktoron* is scarce, but written sources (Aelian *Frag*.10; Athenaios 4.167F) testify to the existence of a room accessed only by the *hierophant* inside the Telesterion. No walls of an enclosure have been found inside the Peisistratean Telesterion, but the conclusions have been drawn from the presence of the unworked natural rock that projected in the SW corner of the temple and the position of the *anaktoron* of the later Telesteria.

In Eleusis, the initiates had to enter the temple in order to be shown the *hiera*, so the function of the Telesterion was that of a congregation hall rather than a temple. In Greek architecture, the buildings constructed for congregations were hypostyle halls (with the six entrances, as discussed in Chapter 5), and this is the shape that the Eleusinian Telesterion took.

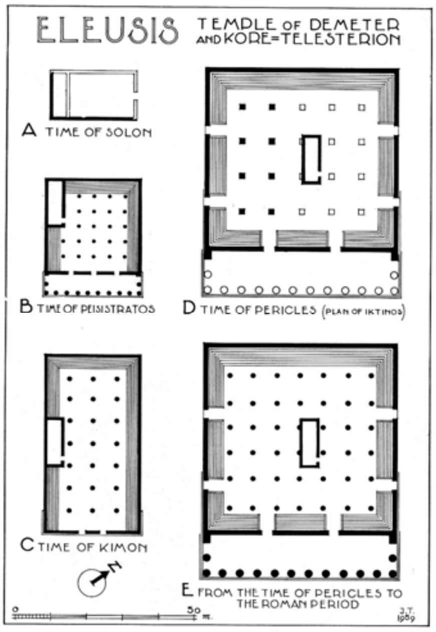

Figure 6.32: Plans of the successive Telesteria (after Mylonas, 1974).

Kimonian period

The construction of the Kimonian Telesterion was initiated between 479 and 461 (Mylonas, 1974: 107), just after the Persian invasion (490–480 BC). The structure was an extension of the archaic, with the three doors of the archaic Telesterion being possibly reduced to two (Mylonas, 1974: 112) (Figure 6.32). The width of the structure remained the same but it now extended further to the northwest than its predecessor (Mylonas, 1974: 111), which resulted in the *anaktoron* being now equidistant from the east and west walls, still in the same place as in the previous structure. The new structure changed in shape, becoming long and narrow and could accommodate twice the number of initiates (Shear, 1982: 138), but seems to have been abandoned at the first stages of its construction (Shear, 1982: 139–140).

Periclean Telesterion

Two phases of this structure are visible; the first, planned by Iktinos (Strabo 9.1.12; Vitruvius *De Architectura*, 7.16) seems to have been abandoned and then replaced or continued a few years later, around 446–440 BC (Mylonas, 1974: 114). The Periclean Telesterion maintained the depth of its Kimonian predecessor but extended to the south by almost twice its width, being thus square, and as a result having the *anaktoron* in its centre (Figures 6.31 and 6.32). The Periclean structure resembles precisely in its architecture the layout of other hypostyle halls. It had six entrances, two on each wall apart from the west, and the ceiling was supported by rows of columns.

The Myth of Demeter and Kore

The Homeric *Hymn to Demeter* (*c*.600 BC) (Clinton, 1993: 110; Evelyn-White, 1982: xxxvi; Mikalson, 2005: 83) gives a very detailed account of the arrival of the goddess at Eleusis and the founding of her cult: Persephone (Kore), daughter of Demeter was abducted by the god of the underworld (Hades). Demeter starts her search for her daughter. For nine days she has no rest and then she arrives at Eleusis, where Demeter stops to rest by the Kallichoron well. Transformed into an old woman, she is found by the daughters of the king of Eleusis, Keleos, whom she asks to take her to their parents as a maid. She is put in charge of the raising of the king's newborn son. Every night she places the baby inside the fire as part of the mystic practice of making him immortal. When discovered by the queen, Demeter reveals her identity and asks the king to build her a temple in the hill above the Kallichoron well. Locked in her temple, Demeter refuses to give her blessing to the fields and crops until the gods return her daughter. Forced by the famine about to eradicate mankind, and by the lack of offerings to the gods, Zeus asks Hades to return Persephone to her mother. Although Persephone is returned to the world of the living, the pomegranate seeds she was given to eat before her ascent keep her tied to the underworld. Persephone can from now only spend two-thirds of the year with the other gods, and for the rest she must stay in the underworld. Upon her daughter's return, Demeter puts an end to the famine and before she departs, she shows the kings of Eleusis how to honour her by giving them the gift of the Mysteries (Kerényi, 1967: 13).

The Cult and the Mysteries

By the year 760 BC, the cult of the Eleusinian Mysteries had already acquired a Panhellenic character. The connection of the Eleusinian Mysteries to the agricultural year and the growth of cereals seems to have been established from the early days of the cult but may have not been pre-eminent (Foxhall, 1995: 103). The cult flourished in Imperial times (Mylonas, 1974: 8), but with the arrival of Christianity and the laws issued by Theodosios (AD 379–395) against secret cults, the popularity of the cult declined rapidly. After a lifespan of more than a millennium, the cult vanished in the fifth century AD.

The key reason for the veil of mystery that covers the cult is the sworn secrecy of the initiates over everything they saw and heard during the the rites (Xen. *Hell*. 6.3.6). Sacrilege towards the Mysteries was considered treason to the same level as the destruction of democracy (Isocrates, *De bigis*, 6) and was dealt with in the most strict manner — Alkibiades was condemned *in absentia* for the impiety he had committed towards the Goddesses of Eleusis because in a drunken state he allegedly imitated acts of the Mysteries, and although he had very recently been given the honour to lead the Sicilian expedition, his property was confiscated and all the state priests and priestesses were called to pronounce curses upon him (Plut. *Alkibiades*, 19–22). Aeschylos almost lost his life because people thought that in his tragedies he revealed some of the sacred rites (Aristotle, *Nicomachean Ethics*, 3.1.17). The fear of revealing the sacred information is present in Pausanias, who states that he deliberately leaves out descriptions of the structures present within the Sanctuary of Eleusis (1.38.7) and the City Eleusinion in Athens (1.14.3). Most of the information about the cult comes down to us from descriptions by early Christians and should be used with the outmost caution with regards to its validity, as no first-hand information is passed on. The part of the cult held in public (such as the proclamations), open to both initiated and unititiated, seemed to have not been considered mystic and there are several sources discussing it (e.g Aristoph. *Frogs*, 323–372).

The *hierophant* (high priest) of the Eleusinian cult held office for life and was the only person allowed to enter the *anaktoron* and the one to show the *hiera* to the initiates. The priestess of Demeter, a descendant of the Eumolpids or the Philaidai families, held office for life and dwelt in the Sacred House (*Hiera Oikia*) in Eleusis (Mylonas, 1974: 229–231). The initiation was organised in three stages: a) the preliminary initiation into the Lesser Mysteries which involved the initial purification (καθαρμός), b) the initiation proper during the Great Mysteries, which included the ceremony of the mystic communion (τελετή), and the crowning with garlands (ἀνάδεσις), and c) the revelation and sight of the *hiera* (holy objects) (ἐποπτεία), also taking place during the Great Mysteries. This was the highest stage of initiation for those who had been initiated in the previous year (Mylonas, 1974: 238–239). The Lesser Mysteries were an annual celebration in early spring, during Anthesterion (probably around the middle of the month), held about one kilometre southwest of Athens at the deme of Agrai, by the east bank of the Ilissos river (Chandor, 1976: 139; Kerényi, 1967: 45; Robertson, 1996b: 359), at the sanctuary of the Mother (Mikalson, 2005: 129 n. 8). The Lesser Mysteries were mystic rites, viewed as the celebration of Persephone, and were the first stage of initiation (Plato, *Phaedrus*, 250c), related to purification (Dillon, 1997: 156; Kerényi, 1967: 45), a kind of preparation for the Greater Mysteries. It seems that cleansing and purification rites were performed, sacrifices, dancing, singing of hymns and perhaps bathing in the river (Chandor, 1976: 141; Mylonas, 1974: 241). The Lesser Mysteries marked the return of Kore from the underworld, after having spent four months there (Robertson, 1996b: 346–347). A scholiast on Aristophanes states that 'The Greater Mysteries were Demeter's and the Lesser Persephone's' (Mylonas, 1974: 240). However, it seems that both goddesses were present in the Lesser Mysteries and this is also confirmed by the fragment of Douris (a Samian historian) who testifies that 'The goddess Demeter is coming to celebrate her daughter's Mysteries' (Mylonas, 1974: 239–240).

The Greater Mysteries were held annually with a special celebration every fourth year (*penteteris*), starting on 15 Boedromion (late September–early October) and lasting nine days. Before the beginning of the celebrations, messengers were sent from Eleusis to the Greek city-states – reaching as far as Egypt, Syria and Antioch by the late fourth century (Mylonas, 1974: 243) – to announce the beginning of the holy truce. On the day before the Mysteries stated (14 Boedromion), the *hiera* were taken by procession to Athens (Mylonas, 1974: 245) and deposited at the City Eleusinion, located below the North slope of the Acropolis, by the Agora (Miles, 1998: 1). On the first day of the Mysteries (the 15th), the people were called to the Eleusinion, to partake in the festivities and to be initiated (Chandor, 1976: 194; Mylonas, 1974: 247). The second day involved purification rites of the initiates in the sea and their return to Athens (Mylonas, 1974: 249). The 17th (the third day) was the day of sacrifices from individuals and of the great sacrifice to the Goddess. The fourth day was dedicated to honouring Asklepios, although this celebration seems to have been a later addition, after 421 BC (Mylonas, 1974: 251). At the dawn of the fifth day

(19th), around dawn (‘the light-bringing star of our nocturnal rite’: Aristophanes, *Frogs*, 342–343), the *hiera* were returned to Eleusis, accompanied by the initiates and a grand, festive procession, which took the whole day and involved several stops for sacrifices at the different sanctuaries that the procession passed by (Clinton, 1988: 70; Mylonas, 1974: 252–253). After sunset, the procession arrived at the sanctuary in Eleusis, where they would spend the rest of the night singing and dancing (Mylonas, 1974: 257). The actual Mysteries and the culmination of the initiation started on the sixth day, between the night of the 20th and the early morning of the 21st. The day (20th) was spent in fasting, in remembrance of Demeter’s fasting when she was searching for her daughter. After sunset the actual initiation ceremony began. We are told by a Christian source (Gregory Nazianzenos, *Oration,* 39.4) that the nocturnal ceremony of the initiation stage proper involved three parts:

a) The *dromena* (things that were ‘done’), a re-enactment of the wanderings of Demeter, the abduction of Persephone, and the reunion of the two goddesses, accompanied by singing and dancing. Demeter’s search for Persephone was enacted inside the temple (Sourvinou-Inwood, 2003: 30). It seems that this stage also involved the search for Persephone outside the temple by the initiates, lighting their way with torches (Aristophanes, *Frogs,* 340–344), most possibly in the platform outside the Telesterion (Mylonas, 1974: 261–263; 272; Sourvinou-Inwood, 2003: 29–31). The end of the search was the discovery of Persephone, which according to Sourvinou-Inwood (2003: 37) was symbolised with the initiates discovering an ear of corn.
b) The *legomena* (things that were spoken), probably short statements, explanations and invocations, which would have accompanied the previous stage (Mylonas, 1974: 272), the ‘forbidden words’ (Lysias, 6.51), very little of which we know.
c) The *deiknymena* (things that were shown), was the most important and sacred part of the initiation, a separate stage from the above two. It was at this time that the *hierophant* took the *hiera* out of the *anaktoron* and showed them to the initiates who would have gathered inside the temple (Mylonas, 1974: 273). This was probably the culmination of the reunion between Demeter and Persephone (Sourvinou-Inwood, 2003: 47 n. 19).

The *epopteia* (viewing) was a stage that was only attended by those who had been initiated in the Mysteries in the previous year and returned a year later in order to complete their initiation by achieving the highest degree of initiation. It seems that this stage also involved the revelation of secret objects (Mylonas, 1974: 274–275). The rest of the Mysteries, on 22 Boedromion, involved sacrifices and libations to the dead until the ninth day (23rd), the day that the initiates returned to Athens (Mylonas, 1974: 278–280).

The Mysteries were famous throughout the Greek world, with the participation of initiates from across the Greek world, although similar mystery cults associated to Demeter have been recorded elsewhere in Greece (e.g. in Lykosoura, Pheneos and Mantineia, all in Arkadia) (Chamoux, 2003: 331). In Megalopolis the cult traced its origins directly to the Eleusinian Mysteries and in Pheneos the similarities with the Eleusinian cult are evident (Jost, 2003: 151–154). The reasons behind the popularity of the Mysteries must lie with the myth of their origin and the strong links between the location where the sanctuary was built and the myth of the abduction of Kore.

Astronomy

The celestial representation of Demeter was thought to have been the constellation of Virgo. Ptolemy (first century AD) gives a detailed description of the stars of Virgo (*Tetrabiblos*, 1.9) and Aratus' (*c*.315 BC) reference to the constellation in conjunction with Demeter indicates that their association was established early.

> Ἀμφοτέροισι δὲ ποσσὶν ὕπο σκέπτοιο Βοώτεω
> Παρθένον, ἥ ῥ' ἐν χειρὶ φέρει στάχυν αἰγλήεντα.
>
> Beneath the two feet of Boötes you can observe
> the Virgin, who carries in her hand the radiant Wheat (Spica).
>
> *Phaenomena*, 96–97 (translation Kidd, 1997).

Although Aratus gives the myth of Justice (*Phaen*. 133–36), his reference to the constellation as the Virgin throughout the poem is considered a reference to the myth of Demeter and Kore (Kidd, 1997: 216). This conclusion is supported by the description he gives of the constellation, holding an ear of wheat, the most brilliant star of the constellation, Spica (α *Vir*. magn. 0.96, dec. 2.6°) (a depiction similar to that of Figures 6.33 and 6.34). This depiction predates Aratus and seems to have been of Babylonian origin (van der Waerden, 1974: 81). Spica was known as the ear of corn in the constellation of Virgo from at least the pre-Seleucid period (beginning

312 BC). A Babylonian tablet from that period refers to Spica as the 'bright star of the corn-stalk' and γ *Vir* 'Root of the corn-stalk' (Sachs, 1952: 146, in van der Waerden, 1974: 101). A clay tablet dating to the Seleucid period shows a depiction of the constellation as the virgin holding the ear of corn (Figure 6.35). The depiction of Virgo as a virgin holding an ear of corn was also known in Egypt (Figure 6.36). If Spica (for the Greeks Στάχυς meaning Ear of Corn) was indeed the star that led Hipparchos to the discovery of the precession of the equinoxes (146–130 BC) by comparing earlier observations of the star with his own, then we can safely assume that the star and constellation were known to the Greeks from at least the fifth century BC. The third brightest star of the constellation, ε *Vir*. (mag. 2.84), was for the Greeks Προτρυγητήρ (the fruit-picking herald) placed among the brightest stars (Aratus *Phaen*. 138; Hipparchus, *Arat.et Eudox. Phaen*. 2.5.5 and 3.1.4; Allen, 1963: 471). The name of the star implies that the Greeks had noticed it from at least as early as the fifth century. Its heliacal rising is said to have been used by Euktemon (Webb, 1952: 31) to herald the time of grape-harvesting by at least the fifth century BC.

In 600 BC, the heliacal rising of Spica took place around 7 October and its heliacal setting around 7 August (Table 6.4). Persephone was believed to return annually and to partake in the Mysteries (Mylonas, 1974: 149). Virgo returns to the night sky after its annual period of invisibility at the time of the Great Mysteries, which occur at the same time, when Demeter was thought to be renewing and bestowing her blessings to mankind (Sourvinou-Inwood, 2003: 40–41) and was believed to have been present in Eleusis (Burkert, 1983: 286–7).

If the celebrations of Thesmophoria, Skira and Eleusinian Mysteries served 'as markers before and after periods of intensive and critical work' (Foxhall, 1995: 106), this work was tightly connected to agricultural practices. As time in the farmer's year was measured by the movement of stars, the celebration of the Great Mysteries would have marked the time before ploughing.

Even though the exact details of the ceremonies remain unknown, there are some points on which all researchers agree:

a) during the initiation procedure of the Mysteries, the initiates were shown

Figure 6.33: The Empress Livia depicted as Demeter on a coin from Sardis (Lydia), holding an ear of wheat in her left hand and staff in her right (after Ramsay 1904).

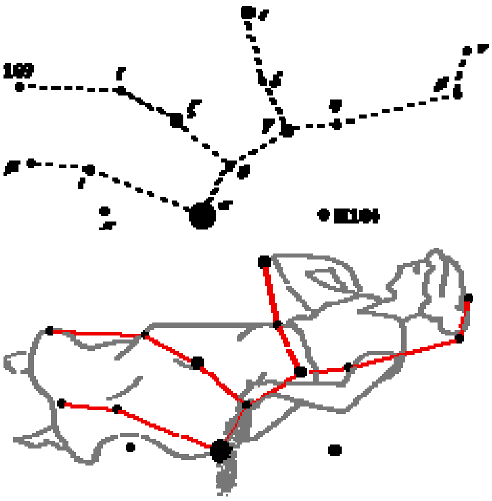

Figure 6.34: The constellation of Virgo (after Legg, 2007).

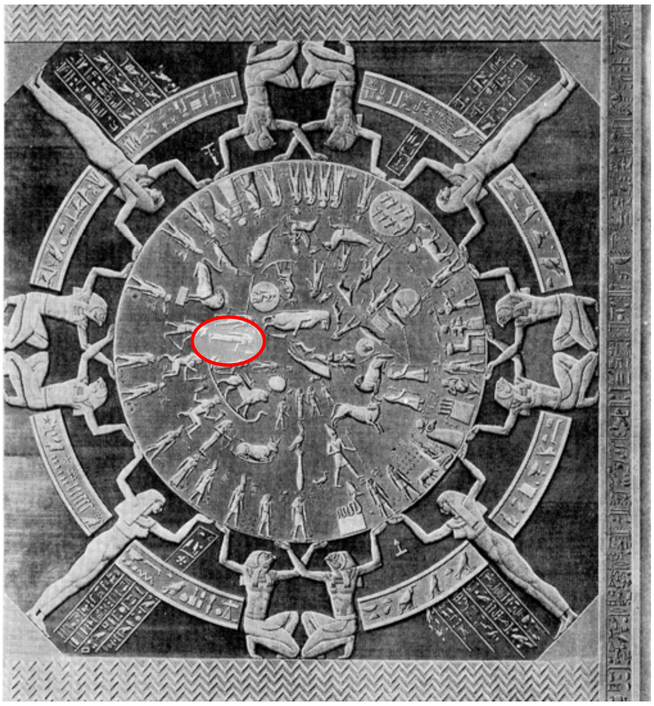

Figure 6.36: Egyptian drawing of the zodiac found on the ceiling of the temple of Dendera (Roman period): sign of Virgo in red circle, depicted as the virgin holding an ear of corn (after van der Waerden, 1974).

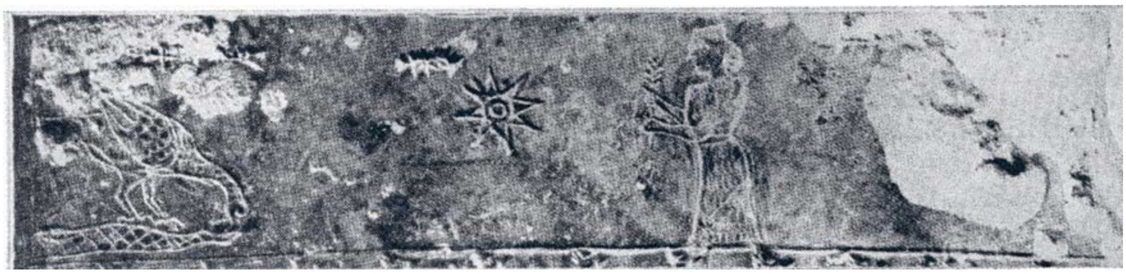

Figure 6.35: Seleucid period tablet depicting Mercury,Virgo and Corvus. The inscription AB.SIN above the star to the left denotes either the zodiac sign of Virgo or Spica (after van der Waerden, 1974).

something, a symbolism which is attested in the majority of the 'terms' associated to the mysteries: *hierophantes* (the one who shows the sacred (Hesych. s.v.)) *mystes* (the one who closes his eyes), *epoptes* (the one who sees) (Plut. *Alc*. 22.3; Chandor, 1976: 199; Clinton, 2003: 56; Mylonas, 1974: 273; Sourvinou-Inwood, 2003: 29–30).

b) It is also certain that the ceremony was nocturnal, taking place both inside the Telesterion and in the open space of the sanctuary, in front of the Telesterion.

Whatever it was the initiates were told or shown, we know that they did not learn something they did not know, but rather that they felt something (Aristotle ap. Synesius *Orat*. 48), so the mysteries aimed to offer to the followers a new spiritual experience, perhaps one that gave them a better understanding of the mechanism of the universe/cosmos, a better understanding about life and death.

Modern months	Attic months	Festivals	Movement of Virgo
July-August	Hekatombaion		**Heliacal setting** (around 28 July)
August-September	Metageitnion		**Invisible**
September-October	Boedromion 15-23	**Great Mysteries** (D) *Kore goes to underworld*	**Heliacal rising** (1–15 October) (Spica 7–9 October)
October-November	Pyanepsion	*Kore in underworld*	
November-December	Maimakterion	*Kore in underworld*	
December-January	Poseideon	*Kore in underworld*	
January-February	Gamelion	*Kore in underworld*	
February–March	Anthesterion	**Lesser Mysteries** (P) *Kore returns*	**Acronychal rising / Cosmical setting–**harvest (Spica 5–7 March / 22–25 March)
March-April	Elaphebolion		
April-May	Mounychion		
May-June	Thargelion		
June-July	Skirophorion		

Table 6.4: The timing of the Mysteries compared to the movement of Virgo and Spica.

The ear of corn that the initiates were given during the cult rites, and the iconographic representation of both goddesses with ears of corn (Sourvinou-Inwood, 2003: 35), may have had a significance that was not just agricultural. If Sourvinou-

Inwood's conclusion is correct and the search for Persephone ended with the discovery of an ear of corn, the heliacal rising of Virgo at the time that the search took place could have operated as a celestial symbolism. The belief that Demeter was not simply the goddess of agriculture but also *Thesmophoros* (the harbinger of culture), 'responsible for the step from prehuman savagery to human sociability' (Graf, 1996: 64), and the notion that she was thought to have been 'inhabiting the stars' (*Orphic Hymn,* 31), could justify her association with the constellation.

Aside from the shared depiction of the constellation of Virgo between the Babylonians, Egyptians and Greeks, there seems to be an additional, mythological connection to the story of Persephone's trip to the underworld. Virgo was for the Babylonians the goddess Ishtar. The sixth month (Ulûlu) was during August–September, and marked in Sumerian mythology the descent of Ishtar to the underworld, in search of her lost husband (Tammuz) (Allen, 1963: 463; Webb, 1952: 99). This was a month earlier than the Great Mysteries, but Isthar was going to the underworld exactly during the period of Virgo's invisibility. Hippolytos (*Haer*. 5.8.93) notes that during the Great Mysteries the initiates stretched their hands towards the sky shouting 'rain, conceive', in which case (if the rite was taking place outdoors) the night sky may have been visible during the unfolding of the Mysteries. The verbal formula could bear some symbolism in connection with the agricultural events about to take place in the next few months, the anticipation of rain in order for the grain to grow. This ritual symbolism can be associated with the time when these rites took place and the following four months. During that period, Kore resides in the underworld like the sown grains of wheat (which lie in the earth) until both Kore and the seeds appear again in the upper world in early spring with the acronychal rising / cosmical setting of Virgo.

The Mysteries introduced the initiates to a new way of viewing the cosmos. It is possible that the cosmological meaning of the name Eleusis – a reference to the underworld in a favourable way translated as 'place of happy arrival', and etymologically related to Elysion 'the realm of the blessed' (Kerényi, 1967: 23) – could be linked to the viewing of Demeter's celestial personification overlooking the rites performed in her honour at the sanctuary. Such a cosmical association is evident in the request by Philikos (priest of Dionysos in Alexandria, 3rd century BC) to Demeter: 'Lead Persephone back beneath the stars' (48) (Körte, 1931: 446, line 48 cf. Kerényi, 1967).

The agricultural year was inseparably connected to the celestial cycle and although it may be impossible to determine with certainty whether the observation of the movement of Virgo played a symbolic part in the Eleusinian Mysteries, we can assuredly conclude that there seems to be a connection between the most important phases of the constellation's cycle of movement and the timing of the Lesser and Greater Mysteries.

Thesmophoria

The study of Demeter would have been incomplete if the Thesmophoria did not form part of this analysis. The Thesmophoria, in conjunction with the Mysteries, offers an almost complete insight into the important aspects of the worship of the goddess: the purposes, aims and the role that Demeter played in the formation of beliefs in the divine intervention to the fate of mankind.

The Thesmophoria – a much older cult than the Eleusinian Mysteries (Miles, 1998: 22) – is the most widely attested festival in the Greek world (Burkert, 1985: 242; Cartledge, 1993: 101). It was an annual agricultural celebration in honour of Demeter always held in autumn, usually during the Attic month Pyanepsion (October–November). The significance of the festival is best outlined by the presence of temples named after it, also called Thesmophoria, although other festivals of Demeter were also held in those temples. The celebration of the festival seems to have been widespread across Greece by the eighth century, when every city seems to have built a Thesmophorion (Detienne, 1989: 129; Polignac, 1995: 72), and the rites were celebrated at almost the same time in several cities. Nevertheless, the festival never aquired a Panhellenic character in the sense in which we classify Panhellenic festivals today. The rites could be considered to have a Panhellenic character as they were celebrated across Greece at the same time, but they were not Panhellenic in the sense that people from across Greece were gathered together in one place to celebrate. As numerous Thesmophoria were scattered across the Greek world, there was no need for one central celebration. Instead, the cult aquired a local character, enriched by local variations throughout the course of its lifespan (Clinton, 1992: 32; Clinton, 1996: 111, 112; Mikalson, 2005: 172; Miles, 1998: 22 n. 37; Parker, 1987: 142). The Thesmophoria were a unique cult that managed to combine locality with Panhellenism, and as the festival existed since time immemorial it could hardly be considered as the contribution of a specific city (Clinton, 1996: 112). The uniquely local character of the festival is best demonstrated by the variety of the architectural form and shape of the Thesmophoria temples. In the sample presented in this study, no two sites dedicated to the cult are architecturally similar. This vast differentiation results in attribution of a temple as a Thesmophorion being difficult and risky. Recent studies by Nixon (1997: 77) and Cole (1994) have demonstrated the several questions arising in calling a temple of Demeter a Thesmophorion, which perhaps means that our identification of Thesmophoria across Greece needs to be revisited.

In total five sites with temples of Demeter were surveyed: Pella, Dion, Eleusis, Amphipolis and Sagri in Naxos. The temples of Pella and Dion have been identified with confidence as Thesmophoria. The Telesterion of Eleusis was also used for celebrating the Thesmophoria (Clinton, 1993: 113; Cole, 1999: 203; Miles, 1998: 22), but in this case study it plays a secondary role, as its primary function was the celebration of the Mysteries. Of the remaining sites, two have been excluded from this analysis on the basis of inconclusive archaeological evidence with regards to them being classed with certainty as Thesmophoria. These are the temple of Demeter in Sagri (Naxos) and the Thesmophorion-Nymphaion in Amphipolis. Although the archaeological finds at Sagri point to its association to agricultural celebrations, it is not certain that this entails its classification as a Thesmophorion. The so-called Thesmophorion-Nymphaion in Amphipolis has been excluded on the grounds of the archaeological finds associated with the temple. The name given to this temple does not seem to conform with its function. Although situated outside the city walls like the majority of the Thesmophoria, it has a pit constructed in its centre (Figure 6.37). Admittedly, we know of the use of sacrificial pits associated with the Thesmophoria, called *megara*, into which the sacrificed pigs were thrown to decompose before they were pulled out again (see below). However, in the case of Amphipolis, there is only one pit – as opposed to several – and its design does not match that of the *megara*, which were shallow and more open (compare this to the layout of the *megara* in the Thesmophorion of Pella, Figure 6.40). Several ceramic vessels were deposited inside the temple (Lazaridis, 1997: 27) (Figure 6.38), a feature that is in contrast to evidence from other Thesmophoria.

Figure 6.37: The Thesomphorion-Nymphaion of Amphipolis (after Lazaridis, 1997).

This study includes six Thesmophoria structures (Table 6.5), one from Pella and five from Dion, a sample which agrees with Kron's remark that the general trend of the Thesmophoria, in terms of their architecture, is the lack of monumentality (1992: 649). Of the five Dion structures Thesmophorion A was replaced by Thesmophorion 1 and Thesmophorion B by Thesmophorion 2. In addition, on the same site, a little further to the east, was built a small enclosure (temple 3) which housed an offering table associated with the other temples. The temples included in this case study are oriented within 20° of one another (Figure 6.39).

The cult

Information about the Thesmophoria is far from adequate. The reason is not simply the mystic nature of the cult, as there were other mystic cults in ancient Greece for which we have a wealth of information. Our lack of information derives mostly from the fact that the cult was limited only to the participation of women, while the vast majority of the written sources were composed by men, whose accounts are not first-hand and indeed are scarce and unreliable.

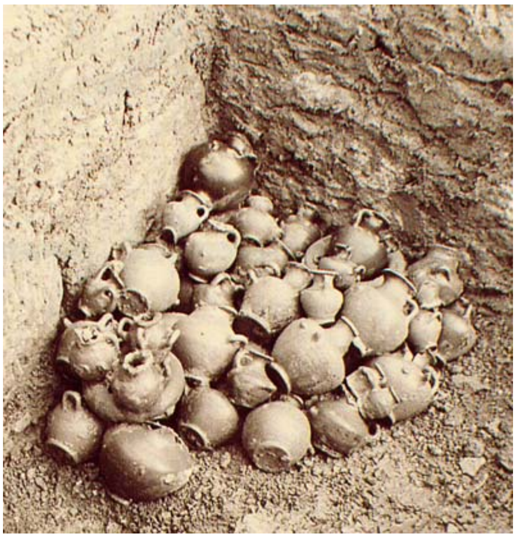

Figure 6.38: Deposited vessels inside the Tesmophorion-Nymphaion (after Lazaridis, 1997).

Location	Site	Building	Period	Az.	Alt.	Dec.
Pella	Thesmophorion	Thesmophorion E. entrance	2nd half of 4thBC	84	1	4 47
Pella	Thesmophorion	Thesmophorion W. entrance	2nd half of 4thBC	267	2	-1 1
Dion	S. of Demeter	Temple A	6th BC	64	0	19 2
Dion	S. of Demeter	Temple 1	end 4th BC	70	0	14 37
Dion	S. of Demeter	Temple B	6th BC	78	0	8 37
Dion	S. of Demeter	Temple 2	end 4th BC	71	0	13 52
Dion	S. of Demeter	small t. with offering table	end 4th BC	61	0	21 12

Table 6.5: Structures included in the case study. The Thesmophorion in Pella has two entrances, both of which are given in the table.

The Thesmophoria usually lasted for three days but the length and timing of the festival was susceptible to local variations (e.g. four days in Arcadia, seven days in Achaia, ten days in Syracuse, three days in Athens, Abdera, Eretria and Sparta) (Burkert, 1985: 242, 245; Vrettos, 1999: 360–362). The festival was held in the month Pyanopsion, usually around the 11th day, although in the Attic deme of Stenia it was on the 9th and in Halimous it was on the 10th day (Burkert, 1985: 242; Clinton, 1996: 112).

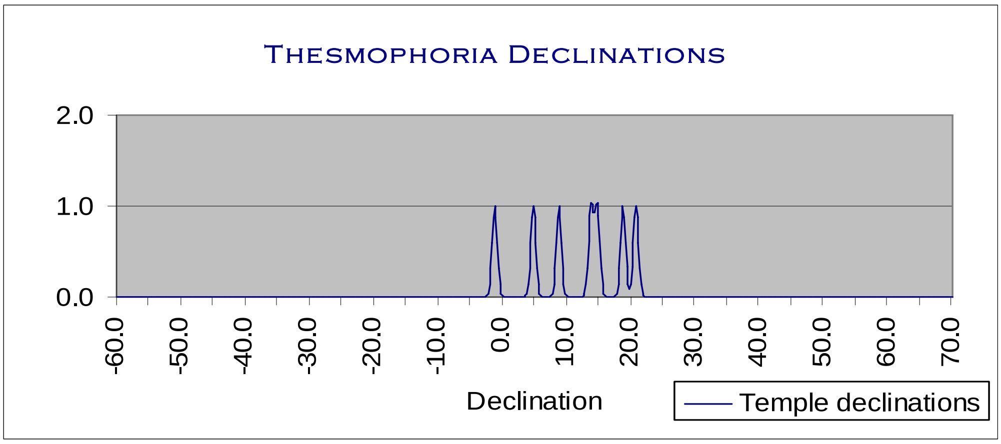

Figure 6.39: Declinations of the seven Thesmophoria examined in this study.

In Athens only (Parke, 1977: 82), the herald of the arrival of the Thesmophoria celebrations seems to have been the festival of Proerosia which preceeded the Thesmophoria by a few days, celebrated on 5 Pyanopsion (Robertson, 1996b: 331). Another name for the Proerosia was Proarktouria (Cleidemus, *FGRHist* 323F23, cf. Robertson, 1996b: 324 n. 15), meaning 'before Arcturus', most probably referring to the time of the heliacal rising of the star which took place during the last days of September or the first days of October.

The culmination of the Thesmophoria festivities seems to have been the third day. It seems that part of the rites was the exhumation of sacrificed pigs deposited in pits either on the first day of the Thesmophoria (Clinton, 1993: 114; Detienne, 1989: 133, 244 n. 33), or during the Skira, held three and a half months earlier on 12 Skirophorion (Parke, 1977: 83; Vrettos, 1999: 641). After their retrieval, the decayed remains of the pigs were placed on the altar of Demeter and were mixed with the seeds that the men would then use during the sowing (Kron, 1992: 619; Mikalson, 2005: 144; Parke, 1977: 83; Zeitlin, 1982: 138). Part of the rites also seem to have included women waiting outside, by the *megaron*, and watching during the night, as the *megaron* lay open and something was done with it (Robertson, 1996b: 365). That the purpose of the festival was evidently connected with fertility of both the land and humans is one of the few things of which we can be certain. The myth of Demeter and Kore which was the foundation myth of the Eleusinian Mysteries also seems to have been of great importance, although in this case the participation of men was excluded and no initiation was required. Table 6.7 gives a brief outline of the rites involved during the Thesmophoria.

Attic months	Festivals	Movement of Virgo	Movement of Arcturus	Movement of Pleiades	Movement of Orion	Movement of Sirius	Gregorian months
Hekatombaion						Hel. rising (30July–1Aug.)	**July**
Metageitnion		Hel. setting Virgo (1–15Aug) Hel. setting Spica (10–13Aug)					**August**
Boedromion			Hel. rising (23–26Sept)				**September**
Pyanepsion	**15–23 Great Mysteries (D)** 5 Proarcturia (Athens) **9–13 Thesmophoria**	Hel. rising Spica (7–9Oct) Hel. rising Virgo (1–15Oct.)	Hel. setting (26–28Oct)	Acron.rising/Cosm. setting (22–27Oct)			**October**
Maimakterion					Acron.rising/Cosm. setting (around 20Nov)		**November**
Poseideon							**December**
Gamelion							**January**
Anthesterion			Acron. rising (22–24Feb.)				**February**
Elaphebolion	**≈ 15 Lesser Mysteries (P)**	Acron. rising Spica (5–7Mar) Cosm. setting Spica (22–25Mar)					**March**

				Hel. setting (6–8April)	Hel. setting (18–20April)	Hel. setting (28–30April)	**April**
Mounychion			Cosm. setting (30May–1June)	Hel. rising (16–19May)			**May**
Thargelion							**June**
Skirophorion					Hel. rising (8–7July)		**July**

Table 6.6: Overview of the timing of the festivals of Panhellenic character dedicated to Demeter and associated with agriculture and the movement of the three stars and constellations connected to the goddess or agriculture.

Festival calendar	Program	Ritual myth
Anodos (Ascent)	Election of *archousai*, setting up of makeshift tents and festival preparations	Demeter's withdrawal
Nesteia (Fasting)	Fasting, sitting on the ground on anaphrodisiac plants, ritual obscenity	Demeter's mourning
Kalligeneia (Fair Offspring)	Celebration, sacrifice, feasting, prayers for offspring	Reunion of Demeter and Persephone

Table 6.7: The timetable of the Thesmophoria (after Tzanetou, 2002: 332).

Astronomy

Table 6.6 shows the timing of the festivals of Demeter that had acquired a Panhellenic character. In an attempt to test the hypothesis of the connection of festivals that had an agricultural undertone and the movement of stars used by the Greeks for agricultural activities, the Table also incorporates the movement of the three constellations that could be associated either with Demeter or with agricultural activities. The connection between the constellation of Virgo and the myth of Demeter and Kore has been outlined previously. The name given to the Athenian festival preceeding Thesmophoria (*Proerosia* or *Proarktouria*) confirms that the movement of stars played a part in the timing of at least certain, if not all, religious festivals. Hesiod refers to the acronychal rising of Arcturus signalling the beginning of spring and its heliacal rising the time of grape-harvesting (*Works and Days*, 566, 609 respectively). The rising of the star was associated with the ploughing of light soil (Vergil, *G.* 1.67f), and its setting was a marker for sowing vetch (Pliny *Nat.Hist.* 18.37). The constellation of Boötes (meaning Ox-Driver) (Rogers, 1998: 86) (in which Arcturus belongs) was known to Homer (*Od.* 5.270–3) and is mythologically connected to Demeter. He was thought to be the son of Demeter named Philomelus, the inventor of the plough (Hermippus *fr.* 99; Petellides *F Gr. Hist.* 464F1). It is for these reasons that Arcturus is included in Tables 6.6 and 6.8. The Pleiades were also included in this analysis because of their eminent role in agricultural activities (Hesiod, *Works and Days*, 383–7, 572, 615; Aristotle, *History of Animals*, 5.22; Plutarch *Mor.* 378E). However – as argued in the Artemis Orthia case study – in mythology, the constellation was associated with Artemis and not with Demeter. Two more celestial bodies were chosen for this analysis, based purely on their significance to the agricultural year: Orion and Sirius. Orion is the second most often mentioned constellation in Hesiod – after the Pleiades – and its appearance marks the arrival of the threshing period (*Works and Days*, 598) and time of grape-harvesting (ibid, 609), its heliacal setting the time for ploughing (ibid, 615). Finally, Sirius is mentioned twice by Hesiod, once to mark the hottest time in the year (417) and once in conjunction with Arcturus and Orion to signify the time of grape-harvesting (609).

The position of the sun at the time of year when the Thesmophoria and the Mysteries would have taken place seems wholly unconnected to the orientation of the temples. The sun's declination during the time of the Eleusinian Mysteries moves between declinations 4° and –4°. With regards to the timing of the Thesmophoria, between October and November, the sun's declination is between –1° and –13°.

Table 6.6 does not show any connection between the Pleiades, Orion and Sirius and the festivals. This conclusion is also corroborated by the declinations of Orion and Sirius (Table 6.8) and the orientation of the temples (Table 6.5) (declination range of Dion temples: 21° to 9°, declination of Pella temple 5° and –1°). The Pleiades and Spica seem to be close to the orientation of the Dion temples, but the movement of the Pleiades does not coincide with the timing of the Thesmophoria, so it is unlikely that the constellation was associated with the rites and cult performed at the site. The heliacal rising of Arcturus would have occurred a few days prior to the Thesmophoria, but its declination seems to be quite different, especially from the Pella temples.

Constellation	**700 BC**	**600BC**	**500 BC**	**400 BC**
Arcturus	35°	34°	34°	33°
Spica	4°	3°	3°	2°
Pleiades	12°	13°	13°	14°
Orion	–15° to 4° (belt –7°)	–15° to 5° (belt –7°)	–14° to 5° (belt –6°)	–14° to 5° (belt –6°)
Sirius	–17°	–17°	–16°	–16°

Table 6.8: The declinations of the five celestial bodies during the time of construction of the Thesmophoria. Declinations were calculated using Starry Night Pro software.

The declination of Arcturus is quite different from the orientation of the Telesterion of Eleusis. Of the possible celestial bodies plotted in Table 6.6, a connection may be detected between the movement of Arcturus and Spica and the timing of the festivals associated with Demeter.

The Thesmophorion of Pella

The Thesmophorion at Pella is a circular structure with two entrances. Built during the last quarter of the fourth century BC, it seems to have been abandoned after the second half of the second century BC (Lilimbaki-Akamati, 1996: 101). Its floor would have been below ground level in antiquity (Lilimbaki-Akamati, 1996: 19), which is in accordance with the descriptions of women having to descend into the pits to retrieve the pig remains. The structure has in its interior two platforms – one with NE-SW orientation and one with SE-NW – sloping towards the centre of the structure, where the altar was constructed. These two platforms are built adjacent to the wall of the structure, which means that they would have been attached to entrances that led the participants to the centre of the structure. (Figure 6.40). The structure seems to have had no roof (Lilimbaki-Akamati, 1996: 26). It should be noted that the structure was not a temple. Both of the entrances are discussed, as it was not possible to determine from the remains whether either entrance functioned as the main one.

The azimuth of the east entrance (88°) seems unrelated to the azimuth of Arcturus (above the east horizon) at the time of its heliacal rising (47°), and the same is the case for its setting (Arcturus' azimuth 312° and west entrance azimuth 267°). The azimuth of Spica on the other hand, seems closer. The heliacal rising and the acronychal rising of Spica would have been visible from the temple's east entrance (az. 88°, alt. 2°), as the azimuth of Spica was 89° at altitude 4° (Figure 6.42). The heliacal and cosmical setting of Spica would have also been equally close to the axis of the west entrance (az. 267°, alt. 2°), as Spica's azimuth was 270° at altitude 3° (Figure 6.41). In addition, when considering the entire constellation in regard to the entrances, it becomes apparent that the temple's entrances are aligned to the 'axis of symmetry' of Virgo. As Figure 6.40 and Table 6.5 show, the two entrances are positioned at an angle, not in a straight line. The construction of the two entrances in a straight line from one another would have shifted considerably their orientation resulting in one of the two entrances being shifted from Virgo's 'axis of symmetry'.

Figure 6.40: The Thesmophorion of Pella. View from the NE. The pits in the interior of the structure are the *megara*, where the piglets were deposited. In the centre of the structure the altar is visible (after Lilimbaki-Akamati, 1996).

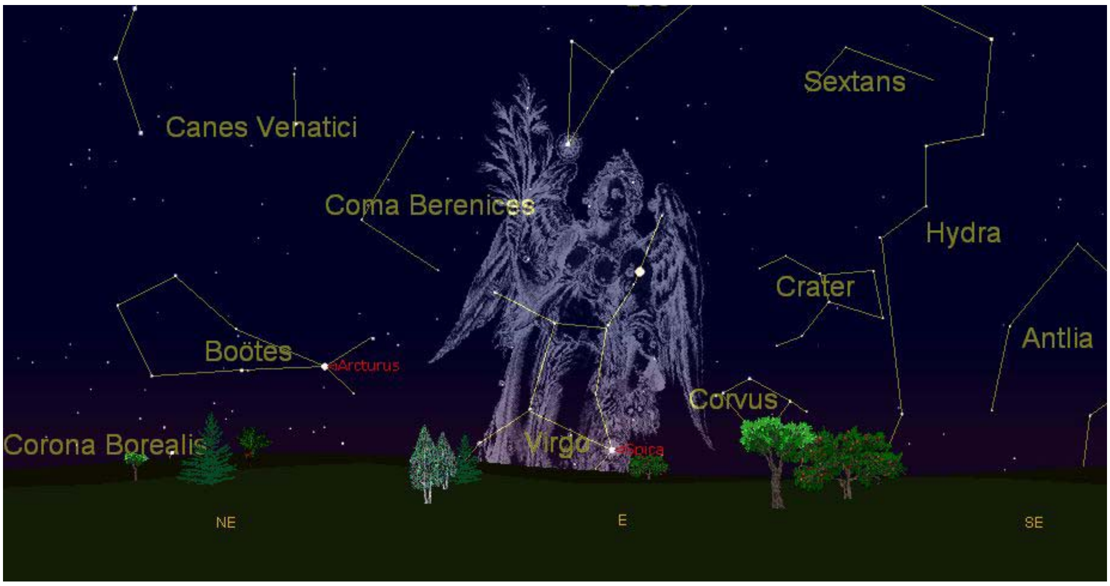

Figure 6.41: View of the east horizon of the Thesmophorion in Pella (Spica alt. 3° az. 88°. Arcturus alt. 11°, az. 55°). Reconstruction of sky was generated using Starry Night Pro.

Discussion

The timing of the festival, the orientation of the Thesmophoria (especially that of Pella) and the movement of Virgo corroborate the idea of a connection to the festival.

Virgo and Boötes were mythologically associated with the goddess, and the myths of both constellations were directly related to agriculture and the cultivation of cereals. The association of the heliacal rising of Arcturus as a signifier for the festival of Proarcturia in Athens, approximately two weeks before the heliacal rising of Spica and Virgo (Table 6.6), may indicate that the latter was associated with the Thesmophoria. It is not possible to be more conclusive with regard to such a relationship. Our knowledge of the cult rites for both the Mysteries and the Thesmophoria does not allow a more detailed analysis.

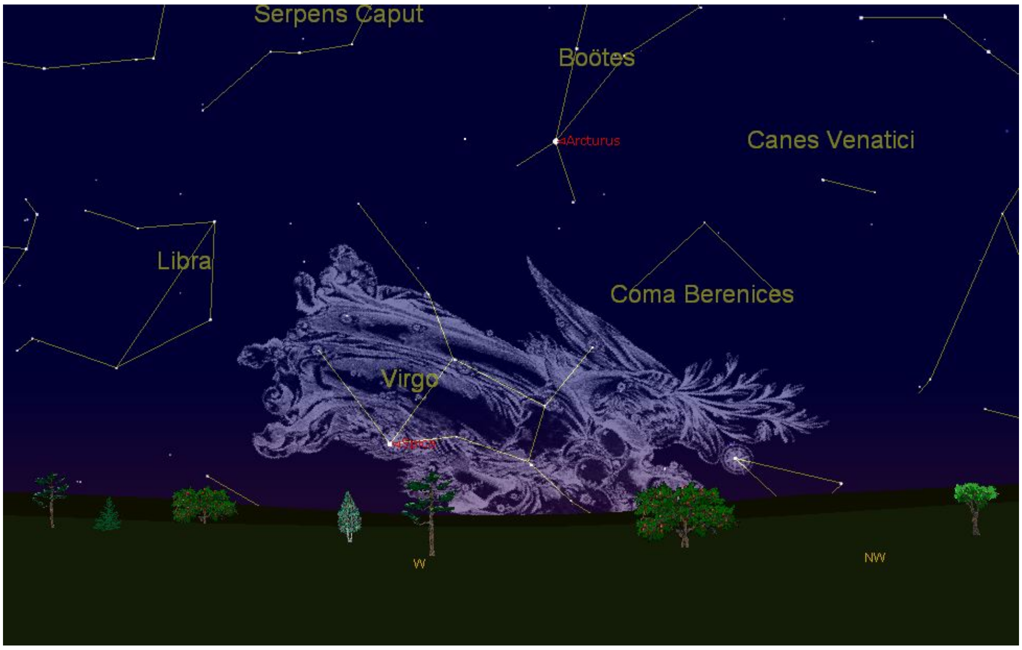

Figure 6.42: Setting of Virgo as would have been seen from the west entrance of the Thesmophorion (Spica alt. 5°, az. 268°. Arcturus alt. 35°, az. 285°).

The period from the second half of Boedromion until the first half of Pyanopsion seems to have been of great importance to the Athenians. In Athens, within twenty or so days the celebration of four festivals took place: Great Mysteries (between 15–23 Boedromion, Proerosia (Proarcturia) (on 5 Pyanepsion), Pyanepsia (on 7 Pyanepsion) and Thesmophoria (on 9 Pyanepsion). Most pilgrims would have returned from the nine consecutive days of the celebration of the Eleusinian Mysteries, almost ten days earlier. It is evident that these twenty or so days (including the Mysteries) were crucial, probably owing to the importance of the approaching period of agricultural activity. All four festivals were connected to agriculture.

The idea that the determining factor for the timing of women's festivals was the time when men were busy in the fields (Foxhall, 1995) seems an oversimplification of the complexity and multiple aspects of Greek religious activity and cult, and overlooks the importance of the timing being also determined by a period which would be associated with the attributes of the deity whose help was sought. The celebration of the Thesmophoria was indeed at a very busy time for the farmers and did exclude men who would have been working in the fields, but was also the time when the blessing of the goddess for the new agricultural year was most essential. Undoubtedly, Foxhall's argument (1995: 97–108) corresponds to the celebration of the Skira, Thesmophoria and Haloa, all of which accommodated strictly female participants, but it is in juxtaposition with the grander and possibly more important (in the social and political sphere) festivals of the Greater and Lesser Mysteries and the Panathenaia, in which the participation of both sexes was expected. The timing of festivals seems to have been determined by more parameters than solely their timing in relation to agricultural activities. If the statement that the busiest time for the farmers did not coincide with the festivals, but instead the festivals marked the periods before and after the agricultural activities (Foxhall, 1995: 106) is correct, we would expect that the celebration of the largest festivals – which demanded several days of participation – would fall during the time of the farmer's rest (i.e. January, April and mid–late August). This, however, does not seem to be the case. The celebrations of the Greater Mysteries (early October – grape-harvesting and pressing, manuring and cleaning fields), the Lesser Mysteries (early March – weeding cereals and vine digging and pruning) and the Panathenaia (early August – end of threshing) were evenly distributed in the year and overlapped with busy times in the farmer's year. This is also the case with the Panhellenic festivals: the Isthmian games were held in the middle of Thargelion (May–June), the time of harvest, and the Olympic games around the middle of July in every fourth year which overlaps with fallow ploughing, cereal harvest and the threshing period. Although perhaps not as busy as the time after the Thesmophoria (ploughing and sowing of cereals, and manuring and pruning vines) or during the Skira (harvest), they were busier than the time when the Haloa (late December–early January) were held and more importantly, participation in those festivals meant several days' absence from the fields (Greater Mysteries nine days, Lesser at least two days, Panathenaia at least four days).

Conclusion

The analysis of the five cults presented in this chapter has offered an initial insight to the possible astronomical connections of certain Greek festivals. In Delphi the connection between the movement of Delphinus and the presence of Apollo at the sanctuary is supported in the myth of Apollo moving to the land of the Hyperboreans during the months of Delphinus's invisibility and also by the timing of the operation of the oracle. In Sparta and Messene it is possible that the festival of Artemis Orthia was associated with the viewing of the Pleiades and/or Orion at the time of their heliacal rising. The analysis of the Erechtheion in Athens and the cult of Erechtheus may have been linked to the movement and presence of the constellation of Draco in the part of the sky directly in front of the north porch of the Erechtheion. Apart from the link of the snake cult being established in the area near the Erechtheion from a very early date, this correlation is also supported by the combination of the timing of the festivals associated with the cult of Erechtheus and the north porch and the culmination of Draco. Such a connection could perhaps explain the positioning of the elaborate north porch facing directly the Acropolis boundary wall. Finally, the case studies of the Eleusinian Mysteries and the Thesmophoria indicate a possible correlation between the two celebrations and the movement of Virgo and Spica, which was in ancient Greece the celestial representation of Demeter holding an ear of corn. In all cases I have attempted initially to consider all the possible stellar bodies (including the sun) and to identify a particular association based on the archaeological evidence, the timing of the festival, the written sources and the orientation of the structure. With some case studies we can be explicit because of the wealth of information that we have with regards to the cult and rites. Such was the case with Delphi, Artemis Orthia in Sparta and the Erechtheion. In those cases where the written and archaeological records are not as extensive, such as those of Artemis Orthia in Messene, the Eleusinian Mysteries and the Thesmophoria, it is more challenging to suggest a convincing correlation between the rites and celestial movement. I hope to have convincingly demonstrated that the orientation of religious structures and the performance of certain cult rites may have been interlinked with the observation of stars or constellations connected to the myths of the particular cult, or the deity associated with the cult.

Chapter 7
Discussion

> For both the archaeologist and the native dweller, the landscape tells – or rather is – a story. It enfolds the lives and times of predecessors who, over the generations, have moved around in it and played their part in its formation. To perceive the landscape is therefore to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past.
>
> (Ingold, 1993: 153)

The analysis of temple orientation, coupled with the archaeoastronomical methodology and the historical and archaeological evidence for cult practice, has enabled a new insight of the orientation of certain types of structures. The orientation of stoas seems to have been such that made use of sunlight in the optimal way with regards to the function of these structures, keeping them cool during the summer and warm during the winter months. The analysis of the religious structures has established that only a small majority of temples face within the solar range (53%), deconstructing thus the established view that Greek temples are in their majority oriented to the east. In addition to this result, it has been demonstrated that the orientation of Greek religious structures was not location or deity specific. In examining the possibility of astronomical associations of these structures it has become apparent that the movement of the moon was not connected to their orientation and that previous studies seem to have overestimated the role of the sun in the orientation of Greek temples. The specific case studies presented in this thesis indicate that a stellar orientation may be true for some temples. Such an orientation seems to have been interlinked with the timing of the major festival held at the sanctuary and the establishment myth of the cult, or the deity connected to the cult.

The case studies presented in chapter 6 aimed at a better understanding of the local character of cults in Greece. I hope to have demonstrated that the performance of cults and religious rites was the result of an amalgamation combining several aspects such as landscape, ethnic identity, agricultural practices, continuity of earlier practices, mythology and astronomy. The analyses presented in the previous chapters have confirmed the importance of locality in cult practice, even in the case of those cults that were celebrated throughout Greece. Such a result agrees with the observations of other researchers (e.g. Sourvinou-Inwood, 1991: 302) and I hope to have emphasised the need for the deconstruction of culturally determined conclusions that result in the oversimplification and grouping of Greek religious practice.

The celestial associations observed in Chapter 6 may provide the evidence for the idea that the compilation of extensive star lists resulted from the need to define the timing of agricultural festivals more accurately and that some of the stars had a significance in the timing of the festivals, or the gods associated with those festivals (Hannah, 2001: 156–157). Bridging local calendars with a Panhellenic method of measuring time, however, would only have been needed in cases where contact was necessary between city-states on specific days in the year. As a result, it is possible that stellar observations were of significance to Greek religion, but this does not mean that all Greek religious festivals were associated with the movement of stars or constellations.

The use of star-calendars for religious purposes is much easier to demonstrate during and after the Classical period. Astronomical observations are displayed on the fourth-century *parapegma* of Eudoxos in an Egyptian papyrus from Hibeh, a festival calendar dating to 300 BC, which recorded astronomical movements of interest to the religious authorities, assisting in the keeping of the festival celebrations ‘in time with the agricultural seasons to which the cults were attached’ (Hannah, 2005: 62). *Parapegmata* may have been used throughout the Greek city-states in order to assist with the timing of the religious festivals (in addition to other functions). The example of the Pythais in Athens (the religious procession that the Athenians sent to Delphi every year) demonstrates clearly that watching the skies for a sign (in the case of the Pythais a meteorological sign) before commencing a religious procession was a reality in ancient Athens at least from the second century BC (Dillon, 1997: 24, 234 n.118).

The case studies presented in the previous chapter, as well as the literary evidence that discusses astronomical observations, suggest the importance of astronomical observations and of the landscape in Greek religion. Michel Foucault (1986) noted that the work of Galileo offered a new perspective in which macrocosm was depicted in microcosm, so the celestial cosmos was mirroring the earthly world and vice versa. Modern studies in archaeology, landscapes and perceptions of past cultures, however, have departed from this perspective and *en masse* they overlook the importance of the sky and focus on terrestrial features (hills, lakes, rivers, caves). This study brings back the importance of the sky and by integrating the land and sky it aims to approach the 'total perceived environment' (Ruggles, 2005:11). There is every reason to suspect that non-western cultures saw this as an integrated whole. The research in this thesis supports the argument of an intertwining of the structures, and the cosmos extended also to the perception of the landscape that surrounded the religious site. In the following pages, I will discuss the implications of considering landscape and sky in Greek archaeology: their role, perception and place in the formation of Greek mythology and identity, as a means of demonstrating the role of the total perceived environment in Greek religion and cosmological beliefs.

Landscape is not strictly the 'repository of human striving' (Tuan, 1971: 184) and dwelling, simply the result of choice and action dictated by optimal and efficient decisions, or by everyday social life and existence. Postmodern and phenomenological approaches touch upon the role of the landscape as the 'cultural image' the presentation of which draws 'images' of landscape meaning, or ways of 'reading' it (Daniels and Cosgrove, 1988: 1; Head, 1993: 489–490). Such approaches turn the study of human dwelling in the past into a meaningful and contextual account of how the landscape was perceived. The formation of such cognitions is naturally determined by experience and by stories of the past, factors which result in undisputedly subjective and localised perceptions. Greek literature demonstrates a plethora of references and descriptions of landscapes: the dramatic landscape of Delphi is for instance described in *Ion* as the ridge of Parnassus holding the high rock and seat of heaven (Eur. *Ion*, 714–715). In *Phoenissae* the landscape of Delphi is personified:

> Ὦ λάμπουσα πέτρα πυρὸς
> δικόρυφον σέλας ὑπὲρ ἄκρων
> Βακχείων Διονύσου,
> οἴνα θ', ἃ καθαμέριον
> στάζεις τὸν πολύκαρπον
> οἰνάνθας ἱεῖσα βότρυν,
> ζάθεά τ' ἄντρα δράκοντος οὔ-
> ρειαί τε σκοπιαὶ θεῶν
> νιφόβολόν τ' ὄρος ἱερόν, εἱ-
> λίσσων ἀθανάτας θεοῦ
> χορὸς γενοίμαν ἄφοβος
> παρὰ μεσόμφαλα γύαλα Φοί-
> βου Δίρκαν προλιποῦσα.
>
> 'Hail, rock that lights up a double-crested flash of fire above the frenzied heights of Dionysus; and the vine, that every day lets fall the lush cluster of grapes; and the holy cavern of the serpent and the gods' watchtower on the hills, and the sacred snow-swept mountain! Would I were free of fear and circling in the dance of the deathless god, having left Dirce for the valleys of Phoebus at the centre of the world'.
>
> *Phoen*. 226–238 (translation Coleridge, 1938).

The horizon and landscape for the Greeks were viewed, it seems, as an integral part of the cosmos, a living entity with human features (Clarke, 1997: 70).

> Ἦ ῥα, καὶ ὁρμήθη ὄρεϊ νιφόεντι ἐοικώς,
> κεκλήγων, διὰ δὲ Τρώων πέτετ' ἠδ' ἐπικούρων.
>
> So he [Hector] spoke, and set out like a snowy mountain, and with loud shouting he sped through the Trojans and allies.
>
> *Il*. 13.754–5 (Loeb translation).

The human characteristics of landscapes are more clearly seen in the following excerpt where the hills of Troy are seen as resembling eyebrows:

> τῷ δὲ μάλιστ' ἄρ' ἔην ἐναλίγκιον, ὡς εἰ ἅπασα
> Ἴλιος ὀφρυόεσσα πυρὶ σμύχοιτο κατ' ἄκρης.
>
> To this was most like as though all eybrowed Ilios [Troy] were utterly burning with fire.
>
> *Il.* 22.410–11 (Loeb translation adapted).

Other examples where the hills are compared to eyebrows are found in *Il*. 20.151 and Hesiod fr.204.48 (Merkelbach and West, 1967). The concept of the living properties of the landscape and/or horizon do not appear to have been restricted to the poetic imagination of the Homeric epics. Alcman, in the seventh century BC, draws a very vivid picture of the landscape's lively presence during the night:

> εὕδουσι δ' ὀρέων κορυφαί τε καὶ φάραγγες

> πρώονές τε καὶ χαράδραι
> φῦλα τ’ ἑρπέτ’ ὅσα τρέφει μέλαινα γαῖα
> θῆρές τ’ ὀρεσκώιοι καὶ γένος μελισσᾶν
> και κνώδαλ’ ἐν βένθεσσι πορφυρέας ἁλός·
> εὕδουσι δ’ οἰωνῶν φῦλα τανυπτερύγων.
>
> The peaks and crags of the mountains are asleep, and the headlands and gullies, and the creeping tribes that the black earth rears, and the mountain-roaming beasts and the race of bees, and the beasts in the depths of the dark sea, and the tribes of spread-winged eagles are asleep.
>
> *Fragment*, 89 (translation Page, 1968).

Similarly, we find the personification of mountains in plays:

> ξύνοιδ’ ὄρος
> Παρθένιον, ἔνθα μητέρ’ ὠδίνων ἐμῶν
> ἔλυσεν Εἰλείθυια
>
> The Parthenian mountain knows it, where Eileithyia released my mother from the pangs of my birth.
>
> Euripides, *Telephus fr*. 696.5 (translation Page, 1968).

And also:

> πᾶν δὲ συνεβάκχευ’ ὄρος
> καὶ θῆρες, οὐδὲν δ’ ἦν ἀκίνητον δρόμῳ.
>
> The whole mountain with its beasts was possessed as they were, and everything was set in rapid motion.
>
> Euripides, *Bacchae* 726–7 (Loeb translation).

Even supposing that the above descriptions are simply figurative speech and not a ‘co-ordinated system of mythical imagination’ (Clarke, 1997: 71), the role of the landscape in Greek thought is evident. For Greeks, whether they were farmers, sailors, travellers, philosophers, priests, or even artists, the observations of the horizon and sky would have been a common activity. Philosophical debates on the nature and composition of stars were an inspiration and influence for Greek artists who depicted celestial bodies in anthropomorphic representations (e.g. the sun and moon on chariots, or riding) and in geometric shapes, as well as a combination of both (see the list of artefacts in Yalouris, 1980: 316–317). If the landscape was a living part of Greek everyday life, then location must have also played a significant role in the formation of environment perceptions.

Locality

Monuments are integrated in their landscapes from the time of construction. Their construction alters and transforms the landscape. The role of monuments in the landscape, then, is not that their construction represents certain social conditions, but that 'through their construction those conditions were gradually transformed' (Barrett, 1999: 257). The interests and needs of a *polis*, determined by political, social and economic structures, define the composition of its pantheon and the relative importance of its deities. This includes placing emphasis on particular functions of the gods, which usually were present with the Panhellenic character of a deity, but were ignored, or raised to particular significance, depending on local circumstances (Villing, 1997: 94). If such is the character of Greek religion, we must move away from the popular tendency to cluster together cults simply led by the name of the god or the epithet. The case studies presented in Chapter 6 were in agreement in their conclusion that the study of Greek religion needs to account for the local variations in worship and divine attributes.

We arrive then at the role of locality in the formation of these perceptions. Local myths and perceptions embroidered the development of cultic activities and worship, resulting to a large extent in the differentiation of cults that appear identical on the surface. This is most evidently demonstrated in the difference in cult and depictions of Artemis Orthia in Sparta and Messene. The importance of locality in Greek religion is also stated in the ancient literary sources. When for example Pausanias visited Tanagra, he failed either to notice, or to comment on, the sanctuary of Demeter. He did not, however, fail to remark that the people of Tanagra were exceptional among the Greeks for their consideration of the gods, because they built their sanctuaries 'far away from their houses, in an unpolluted place, kept separate from human affairs' (Paus. 9.22.2, translation Perseus). The archaeological evidence is in agreement with the importance of local aspects in the formation of religious practices and beliefs within those communities. An example is Athena. Her function varies from *polis* to *polis*; her cult in Corinth was associated with the taming of horses. She lacks here the role of warlike city-protector, but occupied an important function in the Corinthian *polis* as a goddess of crafts and invention (Villing, 1997: 94). In Sparta, the goddess emphasized military aspects and the role of the influential daughter of Zeus (Villing, 1997: 95).

In dealing with Greek religious activities the temples must play a significant role. The construction of a religious monument in ancient Greece was a manifestation of the religious importance of that site; the construction of a visual imprint to mark the performance of acts and their significance; the transmission of this non-verbal statement to the members of the community and to visitors. Temples can be seen to have played a role – they can be viewed as the projection of a community's actions to maintain the cosmic order. In the religious domain, this order was controlled by a select group which revealed and represented the sacred order and (if the conclusions of this thesis are correct) manipulated astronomical knowledge and observations.

I hope that my analysis so far argues convincingly that Kron's claim that the orientation of a structure plays no role (Kron, 1992: 621) has to be reconsidered. A total of 111 temples made up the generic results presented in Chapter 5, but the timeframe of this thesis allowed only the detailed study of five case studies. This analysis indicates that Greek temples may have been positioned in such a way that they were perceived as integrated in the cosmos – maintaining the existing order – and also as agents for the demarcation of space. 'The world as it already existed will always have been imbued with meanings and have been used as a background of reference against which contemporary acts, including monument building, were played out' (Barrett, 1999: 255). *En masse*, these spaces had been sanctified several centuries earlier through mythology and cult activity. It is possible that as a result, the construction of temples had as a purpose – apart from housing the cult statue – to also link to the myths of the cult and define the cosmic importance of the particular site. This may have been achieved by orienting structures to relate to celestial bodies of significance to the specific cults.

The Greek Landscape

The results of this study assist in the conceptualisation of the ideational (imaginary) landscapes, as well as the ceremonial and cult activities that would have taken place within those landscapes. For the participants, a certain level of knowledge was assumed in order to detect the connections between the rites, the landscape and the sky (i.e. the observation of the relevant asterism), although it remains uncertain whether the latter was common knowledge. Even in the case that not all participants could visualise the stellar connections, they could at the very least detect the importance of the specific location for the particular rite, drawing from the mythological narrations. An obvious example of this is the role of the particular geographic location of the Eleusinian Telesterion and the Mysteries. The sources describe rites and activities taking place both inside the Telesterion and in the open during the initiation to the Mysteries. The procession of the initiates to Eleusis started at dawn, while the morning star was still visible in the sky (Aristophanes, *Frogs*, 342–343). The stage when the initiates were sent outside to look for Persephone, or the point at which they looked at the night sky and shouted 'rain' and 'conceive' (Hippolytos, *Haer*. 5.8.93) demonstrate the integration of both the land and the sky in Greek ritual.

While we may never be able to completely reconstruct the entire network of stories and myths of ancient landscapes, we can use historical and archaeological sources in order to shape and improve our cognition of the impact of these stories on social and religious life and identity. This thesis deals with the possibility that landscape and sky may affect and determine ritual and ceremonial activity. This does not, however, imply that social or cultural aspects should be overlooked. Quite the opposite in fact. The social constitution of the land plays a decisive role in the way that cultural relations are formed (Ashmore, 1991; Layton, 1995: 229; Schmidt, 1997). The activities of the members of a society result in the landscape acting as a reference point in expressing group as well as individual identity (Derks 1997: 126). This point is directly applicable in Greece.

The case studies of Messene, Sparta and the Erechtheion argue that the formation of local, autochthonous identity and religious identity were processes that were intertwined through mythology. In addition, individual identity is demonstrably a determining factor in several Greek cult sites. The rituals carried out in the Erechtheion and Eleusis had to be led by the priests. In the case of the Erechtheion the family of Eteoboutadai had to supply the priestess of Athena Polias and the priest of Erechtheus during the historical period and perhaps earlier than that. In Eleusis, the family of Eumolpidae had to supply the *hierophant* (the high priest of the Mysteries) and the family of Kerykes (Heralds) were in charge of proclaiming the sacred truce that secured the initiates to travel to Eleusis, banned the murderers and non-Greek speakers from the Mysteries and provided the *dadouchos* (torch bearer) for the Mysteries. These families traced their ancestry as far back as the creation of the city of Athens and Eleusis respectively. It is possible that the performance of these rituals functioned on two levels. On the first, the recreation of the social and political hierarchy of the living. The Eumolpidae and Kerykes, for instance, exercised authority over virtually all the cult activities that were associated with Demeter and Kore and, more significantly, served as interpreters and enforcers of Eleusinian laws and traditions (Mikalson, 2005: 87). 'Knowledge appears to be profoundly linked to a whole series of power effects', and archaeology and the literary sources enable us to detect these effects (Foucault, 2004: 128). Secondly, cult may have been the medium that maintained mechanisms of identity awakening that enhanced feelings of pride, belonging and power on the part of those attending the rituals who were of Athenian and Eleusinian ancestry respectively, through the use of the landscape, topography, sky and religious practice. Such ancestor and hero cults function as the medium of transmission of identity and power between generations.

Landscape and sky phenomenology

Plato's *Republic* ends with the description of a landscape in the underworld, images of the souls waiting to be reincarnated and sent back to earth. With the exception of the river that Plato calls Ameles, the landscape features described in this passage (i.e. the river of Lethe, the plain of oblivion, the parched souls, and the cool water flowing from the spring with supernatural powers) were not invented by him. They were already familiar to Greeks. This was an imaginary, or as is now called an ideational landscape. The real landscape of Acheron (central Greece), where the souls would arrive after death, was very different. The ideational landscape then, offers 'an explicit separation between cosmology and the "real" landscape' (van Dommelen, 1999: 282). This is only an example of the infinite variability of landscape as a concept, the relativity of the meaning and understanding of the viewed environment. Ideational environments are constructions of the intellect which result from the combination of specific factors. These factors are sensitive in terms of their variability not only from one community to another, but even between individuals. They are thus dependent on the viewer and the context of the individual's viewing. This point stresses the risks and difficulties of attempting such interpretations for past cultures. Although historical sources can function as aids to such attempts, our reconstructions are still very limited and sources are, again, only one possible account (one person's account). The definition of an abstract 'absolute landscape' (Hirsch, 1995: 23) cannot be achieved for past societies. The very concept of landscape is a 'cultural construct of modern European society' (Lemaire, 1997: 6–9) and by employing the term we run the risk of applying modern concepts to past societies in inappropriate ways. Interpretations, such as for example that of Scully on the horizon of Hera Akraia in Perachora ('the temple itself, was focused eastwards toward the goddess's head, the conical hill which rose above the raised arms of horns of the land') (Scully,1979: 48), are not probably valid interpretations of past perceptions. However, the conceptions of landscapes played a significant role in Greek thought (see pages 183–184) and society (Shipley, 2006).

Exploring the potential role and meaning of landscapes can lead us to recover diverse domains of human activity, approaches and experiences (Knapp and Ashmore, 1999: 6). Historical changes in the way that archaeologists now perceive space, and the widespread applications of social theory and archaeological interpretation, encourage the study of the meaning and role of the cosmos (Knapp and Ashmore, 1999: 2). Schama (1995: 14) gives a lengthy outline of the significant contribution that myths and ideas related to landscapes can make to our understanding of the complexity and antiquity of past communities. This is where the identity of the inhabitants relates to the local landscape.

Knowing 'which elements were significant in the memory of a particular society or at a specific time' (Knapp and Ashmore, 1999: 14), when there is not one universal perception about natural, cultural and mythical landscapes and the heavens, requires the combination of different types of evidence. The mythical and cosmological concepts associated with the land around the Telesterion of Eleusis, the springs of Delphi and the peaks of Mt Lykaion for example, were explicitly temporal and cultural. They were the result of combining mythical memory, religious thought and dwelling in those landscapes. The relationship between space and time has been recognised by all landscape studies. One of Marx's central tenets on capitalist logic was the ability of time to obliterate space. Casey (1996: 36) remarks that in phenomenological terms 'space and time come together in place'. This consequently leads us to the temporal use of landscape and the various activities that take place in a landscape during the different seasons or periods in the year. This study has offered new insights into the impact that Greek religious festivals can have upon this, both on a short scale (i.e. the timing of cult in terms of the time of day or night, therefore the ‘daily transit’) as well as in a long scale (i.e. seasonal festivals, therefore ‘seasonal transit’).

The monuments built in ritual sites played an active role in the perceptions of these landscapes. Even after they fell out of use these monuments were still integrated into the way that these landscapes were perceived, a factor that many archaeologists tend to overlook by focusing only on the function of these structures during their periods of use. Yet, the seemingly abandoned oracle of the dead in Acheron, for instance, would have still been part of what may be called the ‘active’ landscape. Greece has one further temporal aspect of landscape to demonstrate: the nature and development of Greek cult is such that in the majority of Greek cult sites the construction of a temple took place in a landscape already sanctified by open-air cult for centuries beforehand. In most cases, these earlier cults are only attested in the literary sources, with no, or sparse, archaeological evidence and definitely no architectural remains. In Greece then, we have the temporal dimension of the landscape during the construction and use of the temple, whose archaeological remains are still visible, the perception of the landscape during the ‘afterlife’ of these monuments, but also the perceptions of this very landscape during the period prior to the construction of the temple when cult and ritual were being performed: the landscape as seen during the ‘ante-life’ of the monuments. A constant element in all of the above is the role of the sky and more specifically the night sky. With regards to the land, the demarcation of space may be the result of a long tradition of activities in that place. Such activities may have acted as identity markers. Shrines function as markers of territorial boundaries. The activities within the sanctuaries would act as the hallmark of community identity.

Landscape and Mythology

Research in cognitive science infers that memory operates by constructing rather than retrieving, leading to the suggestion that perceptions of the past have their source in the elaboration of cultural memory (Holtorf, 1997: 48–50). As such, human memory constructs social, mythical and ethical codes to be practised within the society, and memories of victories and disasters that may have occurred in the past (Knapp and Ashmore, 1999: 13). From this respect then, F. W. Jackson Knight’s statement that ‘myth […] is used as a mental container to hold the facts of some new event [… which] can be called an archetypal pattern', is still valid (Jackson Knight, 1936: 91). The construction of such memories blends the landscape and sky with the narration of the myths and memories. If this functions as a mechanism of lingering memories, then the 'sites of memory' (Nora, 1989) are part of these perceptions, which then affect people's perceptions of identity, belonging and territory, perceptions thus of their cosmos. In Greek mythology many features of the landscape have been shaped by divine and ancestral beings, which are retained in the mythology as symbols of creative and destructive forces of the universe (e.g. during the battle of the Titans and the battle of the Giants). Greek gods cause wars, floods, and meteorological phenomena; they also create the sky through catasterism myths. The ideational landscapes and sky can then be associated with 'moral messages, recount mythic histories and record genealogies' (Knapp and Ashmore, 1999: 12). All these possibilities can be easily summarized in one example from Greece, the area and myth of the Erechtheion and king Erechtheus. The narration of the myth of Erechtheus passes a moral message in the reasons why Poseidon killed him: upsetting a god will lead to divine intervention and punishment. Erechtheus' genealogy can be traced all the way back to the first king of Athens who was also the first man to be born in Athens. With the creation of the myth of Erechtheus, all Athenians were also known as Erechtheidae (descendants of Erechtheus), being distinguished therefore from all other Greeks. The descendants of Eteoboutes, the family of the Eteoboutadai, became the guardians of Erechtheus's cult, and along with the Athenians would have traced their ancestry back to the mythical king. As the case study of the Erechtheion has argued, this cult has direct ties with the constellation of Draco, both in terms of the constellation's movement, which coincides with the religious festivals, and also in terms of its myth associating Athena who played also a significant role in the myth of Erechtheus. Such ancestor and hero cults function as the medium of transmission of identity and power between generations.

Natural features are frequently points of great ritual importance in the spatial organization of Greek religion and mythology. They are very often the locations where a new cult is established by divine intervention: the Castalia spring was the habitat of the great snake slain by Apollo before he established his cult in Delphi. The temple of Demeter in Eleusis was built near the well at which the goddess stopped to rest. The myth of river Alpheios falling in love with Artemis resulted in the construction of the temple of Artemis Alpheia. In addition, natural features like rivers and caves were viewed as entranceways to the underworld (the most well-known being the river Acheron and Cape Tainaron). This is a confirmation that ‘myths and rituals successfully combine as forms of cultural tradition’ (Burkert, 1983: 32). The results of this study strengthen this relationship. The spot where Erechtheus’ tomb lay in Athens, where Poseidon or Zeus struk him dead, was interlinked with the sky directly in view (through the roof opening) (see p. 125). The timing of the Artemis Orthia festival in both Messene and Sparta would have direct references to the rising of the constellations that were directly related to the goddess in Greek mythology, and in the case of the Pleiades, direct references to the attributes of the girls giving the offerings. In Delphi, the myth of Apollo moving to the land of the Hyperboreans explained and was embodied in the invisibility period of Delphinus. In Eleusis the celebration of the nocturnal Great Mysteries would have enjoyed the presence of the celestial figure of Demeter. Consequently, the function of myth can be perceived as complementary to ritual, not in the sense of ritual being the manifestation of myth, but in the sense that both myth and ritual express the unity and organization of the group — a common identity. This is strengthened and attains a visual dimension through the myths depicted in the night sky.

Future Directions

The study of Greek religious practice is a process that requires a multifaceted approach that does not simply focus on one type of evidence. I hope to have presented sufficient evidence during the course of this study in support of this statement. The evidence seems to support the idea of an astronomical link with the religious festivals, but the length of this study has not been adequate for an extensive in-depth study of a large number of sites. The methodology adopted in this thesis might be usefully applied to future studies.

The future analysis of more case studies seems imperative at this stage. The results of the Delphi case study could be tested by the examination of the other sites of Delphinios Apollo in Olous, Dreros, Delos, Athens and Sparta because of the commonalities in the same cult. Of particular interest will be the results of the Cretan sanctuaries (Olous and Dreros), as according to the myth the cult of Apollo

Delphinios originated in Crete. Also, the birthplace of Apollo, Delos, should be of particular interest in this analysis due to the importance of Apollo's cult on the island.

Delos is in addition one of the most intriguing sites of the dataset (see Chapter 5). Not only is this because of the great number of structures found in the site, but – more significantly for this study – because of the noticeably conspicuous orientation of the vast majority of the Delian temples, being oriented towards the west. This group also includes the five temples associated with the cult of Delphinios Apollo, some of which seem to have quite diverse orientations. In addition to the examination of the reasons behind the unusual orientation of the Delian temples, a separate study of the reasons behind the significant change in orientation between the consecutive Apollo temples in Delos is needed, the results of which could be contrasted to the other sites of Delphinios Apollo mentioned above.

A prospective enquiry into the reasons behind the shift in orientation between subsequent temples could not leave out the major Panhellenic sanctuaries: Olympia, Athens, Delphi, Nemea and Isthmia. The earliest evidence for cult activity on these sites is – with the exception of Nemea showing evidence for cult activity in the sixth century BC – almost contemporary: Olympia and Isthmia were established at the end of the tenth century and Athens and Delphi at the end of the ninth century BC (de Polignac, 1995: 12). More significantly, all sites have a common trait: they were initially established as areas of local cult, the initial subject of worship being a local hero, whose death was commemorated by athletic and musical competitions held as funeral games: the Panathenaic games were possibly initially held in honour of Erechtheus (see Chapter 6 and Mikalson, 2005: 79); the Isthmian games in honour of Palaimon (Paus. 2.2.1); the Delphic games in honour of Pyrrhos (Pindar N.7. 34–35 and 44–47; Paus. 10.24.6; cf. 1.4.4); the Nemean games in honour of the baby hero Opheletes (Paus. 2.15.2-3); and the Olympic games in honour of Pelops (Paus. 5.13.1., Pindar *Ol*. 1.90–93, Burkert, 1983:95). The overshadowing of the local hero by an Olympian deity was accompanied in later years by the construction of new temples. A preliminary study I have carried out indicates that this dramatic shift in cult between the cult structures associated with the hero and those with the god may have been marked in a more apparent way than by the construction of a new temple to house the Olympian deity: the significantly different orientation of the Olympian temple from that of the earlier hero cult structure.

The Mycenaean palaces are another group of structures that need further consideration (see chapter 5). Not many sites can be added to the existing set of structures, but adding the three additional structures will extend the dataset to include all the extant evidence, the analysis of which could inform us about the orientation of Mycenaean structures and the role of astronomy in Mycenaean societies. This, combined with an extensive survey of the orientation of Mycenaean tombs, will comprehensively improve our knowledge of aspects of Mycenaean life that have been so far overlooked.

The wealth of information that resulted from this study leads us to contemplate the underpinnings of these practices. Astronomical observations may have influenced later Greek philosophical, cosmological and cosmogonical ideas, to a considerable extent. It would be interesting to compile a study that will attempt a new synthesis of the cosmological foundations underpinning Greek theological theories. In order to examine this topic we would need to examine the nature of cultural and religious interaction that occurred in Greece, along the west coast of Turkey (Phrygia, Troad, Lydia, Ionia and Caria) and in Cyprus from the 9th to the 2nd century BC. Foreign influence is attested in Greek sanctuaries (surveyed during this project) such as Delos (Sanctuary of Syrian deities, temples of Serapis, Isis, of Poseidon-Baal and Astarte, etc.) and Dion (Sanctuary of Egyptian Gods and Sanctuary of Isis), and is also present in Samothrace (Sanctuary of Great Gods and the Mysteries, which seem to have been introduced and influenced by non-Greeks: Her. 2.51.1; Diod. Sic. 5.64) which is not included in the presented dataset. In the eastern Aegean originated some of the most influential intellectuals of antiquity including Thales and Anaximander of Miletus, Pythagoras of Samos, Xenophanes from Colophon (Lydia) and Herakleitos. It is thus possible that the melding of ideologies and religious practices that was taking place in Anatolia and Cyprus initiated a process of major religious change, which had an impact on the emerging Greek pre-Classical astronomy, philosophy and cosmological thought that flourished in the north-east Mediterranean. This analysis will contribute to our understanding of religious interaction there.

This thesis has, I hope, improved our perceptions of Greek ritual and cult and the role of astronomy in religion and religious architecture. The employment of interdisciplinary research and the application of archaeoastronomical methodology have enabled us to approach Greek religion from a new perspective that would have not been possible if one of the elements of this approach were missing. Such an application and its results encourage the development of Archaeology and Classics to make use of other disciplines in their attempt to reconstruct past cultures and societies.

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