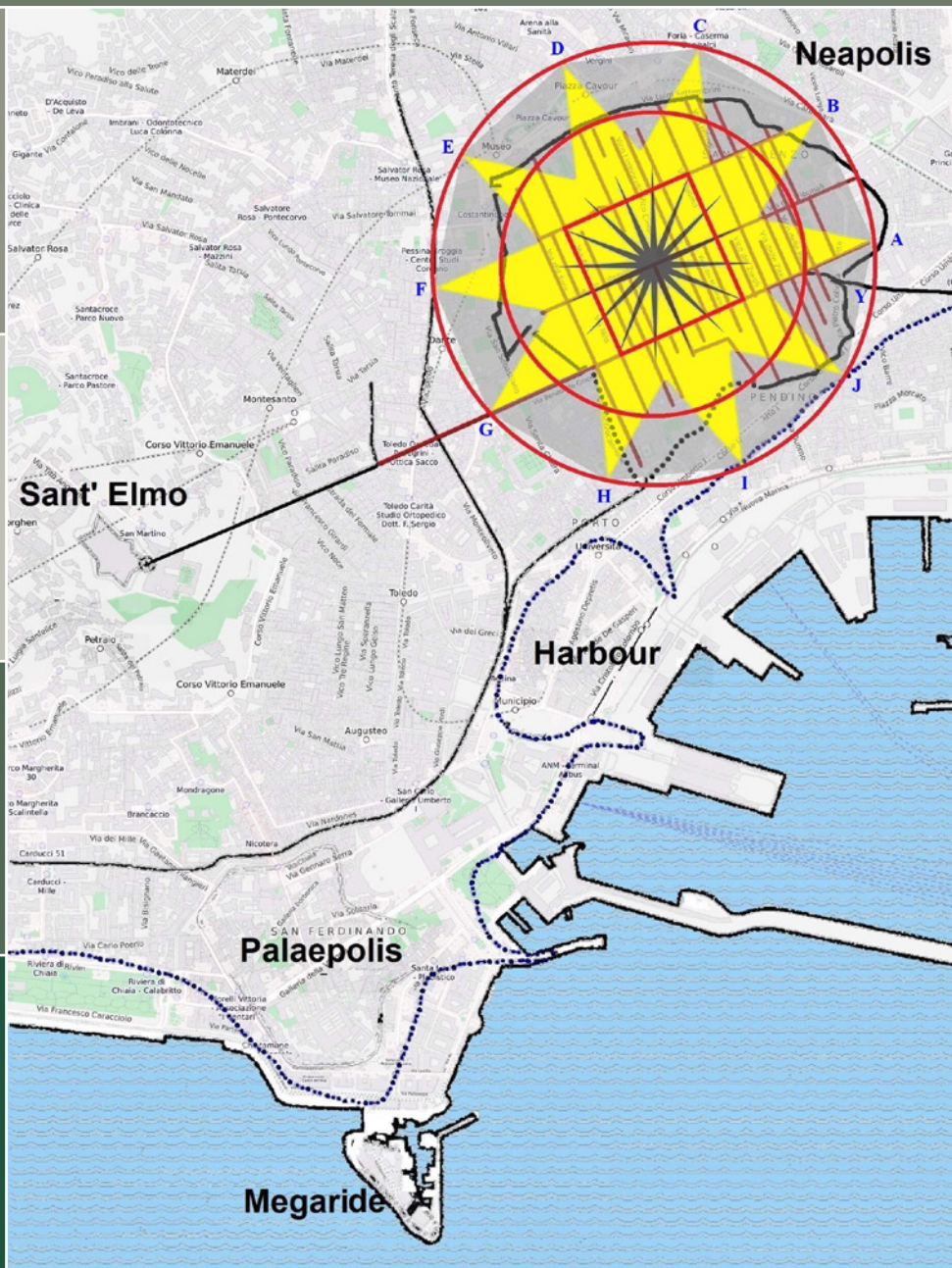
Nicola Scafetta

Naples: the city of the Sun and Parthenope

The role of astronomy, mythology and Pythagoras in the urban planning of Neapolis



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to Sophia & Nicole

... among all these places the most distinguished are
those areas of the territory in which a certain divine breath blows ...

Plato, *Laws* (book 5, sec.747)

Contents

Foreword

In his essay '*The Two Cultures and the Scientific Revolution*' (1959), Charles Percy Snow (1905–1980) denounced the conflict between the sciences and the humanities. Sixty years after its publication, one can say, without a doubt, that the most contemporary trends in Classical Antiquity Studies are oriented towards a more active and fruitful dialogue with the natural, physical, biological, and mathematical sciences. In particular, despite some difficulties and a certain resistance, archaeology has, for some time now, shown an undeniable tendency towards interdisciplinary collaboration with other academic disciplines. At least since the beginning of the 20th century, when Mortimer Wheeler (1890–1976) adopted the principles of geological stratigraphy in archaeological excavation, which over time became one of the methodological cornerstones of the discipline, the collaboration with the so-called hard sciences has progressively consolidated.

The integration of traditional archaeological research methods with new disciplines such as geoarchaeology, archaeometry, palaeopathology, and archaeogenetics, or physical methodologies applied to archaeology, the now-famous radiocarbon tests, or even 3D computer graphics processes, has allowed us to obtain data and information on sites, contexts, monuments, and artefacts of the past that were unimaginable at the dawn of the archaeological discipline. Today, the realisation that a more complete reconstruction of ancient history can be achieved by comprehending the ways in which ancient peoples interacted with his environment allows for viewpoints that raise novel questions as well as offering new insights into the past. A fresh example is the recent essay by Kyle Harper ('*The Fate of Rome. Climate, Disease and the End of an Empire*', 2017), where, for the first time, the environment becomes one of the historical factors in explaining the causes of the fall of the Roman Empire.

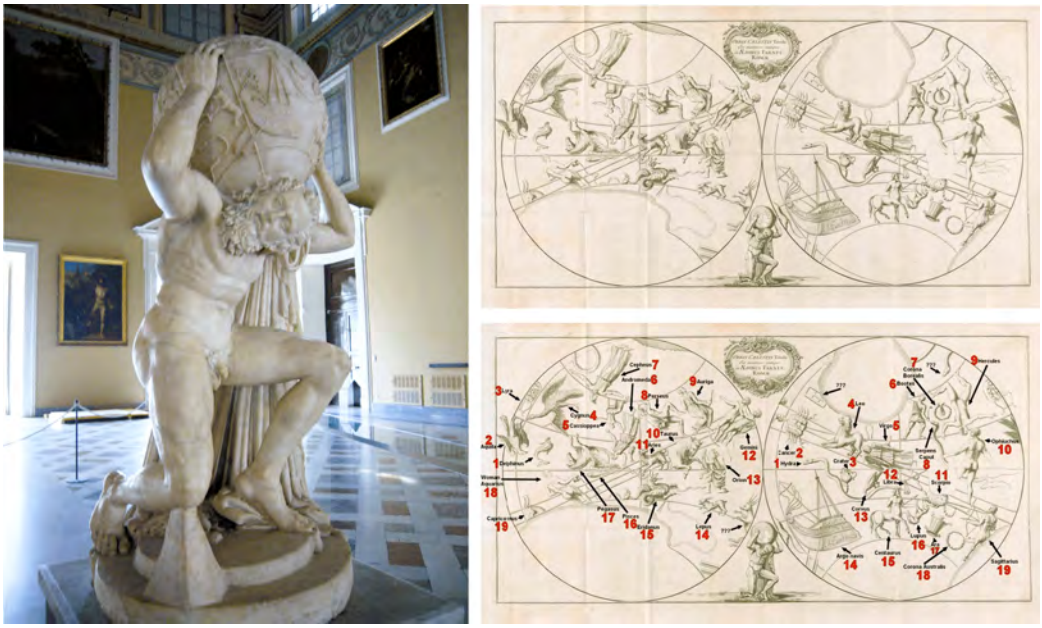
Astronomy has played a leading role among the sciences in initiating a dialogue with archaeology, despite occasional clashes and misunderstandings – a dialogue that is still alive and fruitful today. Since the early 1970s, there have

been talks of archaeoastronomy as a synthesis of two research fields that define the relationship between the sky and its phenomena on one side and the ancient man on the other. This novel discipline has sought to investigate the mentality of ancient people in a variety of contexts, including settlement selection, sacred building construction, and religious and cult practices. Archaeoastronomy encompasses a larger cultural context rather than having a narrow scientific focus. Its multidisciplinary approach has proven to be a valuable resource for archaeology. This became evident first in providing a complementary and integrated interpretation of data as well as proposing and determining the chronologies of monuments and artefacts based on astronomical computations.

A by-now large series of scientific studies – which from the late 19th century to the present day show continuity with the pioneering works of Lockyer, Thom, Hawkins, Ruggles, and Aveni – shed light on the pre- and proto-historic megalithic cultures of Insular (the most famous being Stonehenge) and Central Europe. Starting there, attention expanded to Pharaonic Egypt, Mesopotamia, and the East Asia, eventually reaching the North, Meso, and South American civilisations.

The classical world, however, is no stranger to this research approach. The combined application of archaeology and astronomy in the interpretation of ancient monuments dates to the early 18th century, thanks to Francesco Bianchini (1662–1729). Unlike his contemporary Isaac Newton, Bianchini was a firm believer in the importance of using archaeological materials to gather information on the chronology of the most ancient periods in human history. It is to this extraordinary figure of scientist, astronomer, and, at the same time, archaeologist that we owe the first correct interpretation of the *Farnese Atlas* (today kept at the National Archaeological Museum of Naples). The equinoctial precession was made known in antiquity through the Almagest of Ptolemy. Bianchini carefully investigated the complex system of astral symbols on the celestial globe that the mythological figure holds up on his shoulders. By establishing a chronological coincidence of the constellation images of the statue with the composition of Ptolemy's astronomical treatise, Bianchini was able to date the *Farnese Atlas* precisely to the 2nd century AD. Nowadays, this chronology is also confirmed by stylistic and formal analysis.

In the second half of the 19th century, also the monuments and topographical contexts of the Greek and Roman worlds became the subjects of studies based on astronomical calculations. The series began with the work of Heinrich Nissen and Francis Cranmer Penrose. Nissen has been considered by some to be the initiator of archeoastronomy. In 1869, he published his work on the orientation of Roman and Italic temples and urban sites *(*'*Das Templum. Antiquarische Untersuchungen*'), followed by the studies devoted to the Athenian temples by Émile-Louis Burnouf ('*La légende athénienne. Étude de mythologie comparée*', 1872). Being a collaborator of Lockyer, Penrose applied his method immediately after the pub-



The Farnese Atlas holding up the celestial globe with the constellations. The position of the autumnal and vernal equinoxes relative to the constellations suggests that it was made around the 2nd century AD (National Archaeological Museum of Naples).

lication of the works on Stonehenge and Egyptian temples (‘*A Preliminary Statement of an Investigation of the Dates of Some of the Greek Temples as Derived from Their Orientation*’, 1892). At the onset of the 20th century, Nissen returned to the subject with a new synthetic essay (‘*Orientation. Studien zur Geschichte der Religion*’, 1907–1910), in which he revised some of his previous interpretations.

Initially, this new discipline of archaeoastronomy was not well accepted within academic archaeology; some notions of the earliest researchers of this novel discipline were dismissed as pseudo-sciences, and archaeologists did not thoroughly consider them. What contributed to this was also, in some cases, the implausible implications of some astronomical calculations. Especially with regards to the chronologies of Greek temples, this led to results enormously distant from the archaeological dating and, therefore, irreconcilable with them. However, as famous archaeologist and historian of ancient architecture William Bell Dinsmoor (1886–1973) wrote in 1939, ‘*the error lies not in the theory itself but in the deduction of the results from incomplete data*’ and, therefore, ‘*both the information, albeit fragmentary, deriving from ancient literary sources and the findings of current orientations considered as a whole, provide sufficient proof of the existence of the general principle*’.

Today, after a century of studies and research, archaeoastronomy has confirmed and consolidated its epistemological premises in the interdisciplinary method and research objectives. It has aimed at defining the orientation of architectural monuments as well as recognising the criteria of urban planning and territory and the exegesis and hermeneutics of ancient astronomy texts. In recent years, monuments, contexts, and texts of the Greek and Roman world, such as the Pantheon, the urban plan of Alexandria, the Roman centurial organisation of Italic cities, and the astral references of the cult of Artemis Orthìa in Sparta mentioned in the lines of *Partenio* by the Spartan poet Alcmane (mid-7th century BC), have been analysed from an archaeoastronomical perspective, leading to new interpretations.

Owing to Nicola Scafetta's research and astronomical calculations, ancient *Neapolis* can now be added to the list of sites with an archaeoastronomical account of their urban layout. Despite its centuries-old existence, this Greek city has preserved the clear and legible imprint of the regular geometric design drawn when it was founded. If this aspect can still be amazing and charming for its uniqueness, the astronomical matrix of the planning of Neapolis appears to be even more fascinating. Scafetta shows that the street grid of Neapolis was not based on geo-topographical references but rather was inspired by the observations of solar paths during solstices. Hence, Neapolis was the '*City of the Sun*', that is, a city-sanctuary dedicated to Apollo (the Greeks' divine personification of the Sun). In addition, it was a Pythagorean city because its urban fabric reveals the adoption of a proportional system resulting from the golden angle of 36° and the number 10, which are mystical elements of Pythagorean geometry. Given these concomitant characteristics, we can agree with what Per Gustav Hamberg (1913–1978) believed over fifty years ago and, most likely, with what Fra' Giocondo da Verona (1433–1515) had already hypothesised at the end of the 15th century. According to their opinion, the urban plan of *Neapolis* inspired Vitruvius to theorise his '*Ideal City*', which was built on harmonious geometric proportions that were reflections of the cosmos.

Centuries after its foundation, and despite major civic, political, and social changes that have shaped the city's history, not everything has been lost of the ancient ideal, solar, and Pythagorean city. Through the pages of Nicola Scafetta's book, even a non-specialist reader will still manage to identify traces of it in the streets of the historic centre and in the lyrics of its classic popular songs that celebrate the Sun.

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Introduction

Jesce Sole! ('Come Out, Sun!') is from a sequence of rhymes that date back to at least around 1200 AD during the reign of Emperor Frederick II; *'O Sole mio* ('O my Sun') is a famed Neapolitan song composed in 1898 by Giovanni Capurro, Eduardo Di Capua and Alfredo Mazzucchi; *Chist' è 'o paese d' 'o Sole* ('This is the city of the Sun') is another well-known Neapolitan musical piece composed in 1925 by Vincenzo D'Annibale and Libero Bovio. A popular name in Naples is *Ciro* (in English 'Cyrus' means 'Sun' in ancient Persian). Near the Basilica of *Santa Maria Maggiore della Pietrasanta*, a staircase leading to the ancient Acropolis of Neapolis bears the name *Via del Sole – Vicus Radii Solis –* (which means the'Way of the Sun') as mentioned in some mediaeval papers. In the area of Naples' Metropolitan Cathedral of the Assumption of Mary stood a large Greco-Roman temple dedicated to Apollo, the *Sun-god*. At the base of the obelisk in *Piazza San Domenico Maggiore*, which was erected in honour of the saint as an ex-voto for having freed the city from the plague, sun-rays intersect with the votive monument. The great square of the city centre recalls cosmic order. The list could go on because the city, the history, and the culture of Naples make a constant reference to the Sun. What is it that determines this mysterious link between Naples and the Sun?

The purpose of this essay is to shed light on the nature of this mysterious link between Neapolis and the Sun by examining the religious motivations and cosmological ideas that could have inspired the planning of the ancient urban centre that the Greeks named *Neapolis*, which means the 'New City'. The thesis is that the street grid of Neapolis meant to embody a certain mythical archetype; more specifically, the city was a model intended to represent, in its geometric form and geographic-astronomical orientation, the world view of its Greek founders and their way of relating themselves to the cosmos and the divine.

Tradition says that Neapolis was founded around 470 BC by the Cumaeans and other Magna Graecia colonists (especially Syracusans and Athenians), presum-

ably to celebrate their definitive victory over the Etruscans in the important naval battle of Cumae (474 BC). This event, which put an end to Etruscan expansion in Hellenic Italy, led to the inception of the Greek hegemony in the region and on the coasts of Campania. Some archaeological evidence, however, suggests that the building of the city may have begun between the end of the 6th and the beginning of the 5th century BC, probably after the first battle of Cumae (524 BC) or the battle of Aricia (506 BC), in which Aristodemus (550 BC – 490 BC), the tyrant of Cumae, defeated the Etruscans.

The street grid of Neapolis was not drawn haphazardly but adopted an ordered orthogonal urban design. This orthogonal grid, which was innovative for the time, was later developed by the Greek architect *Hippodamus of Miletus* (498 BC – 408 BC). It was then adopted in the Greek world for the construction of new cities such as Alexandria of Egypt founded in 331 BC by Alexander the Great (356–323 BC), and, subsequently, for the construction of several Roman cities.

The roads of Neapolis were not determined either by topographical boundaries, such as coastlines and riverbanks, or by simple cardinal directions (north-south and east-west lines). The analysis of the orthogonal street grid of Neapolis reveals that the streets of Neapolis have specific geometric proportions and a precise geographic and astronomical orientation. Both components will be studied in detail and interpreted according to an archaeoastronomical view, namely a particular cosmological and religious ideal of that time. I will argue that such urban design and geographical orientation were carefully and intentionally chosen so that Neapolis could be recognised and celebrated as the '*City of the Sun*'. The builders of the city, who worshipped the Sun, aimed to infuse the religious and cosmological significance of the location in their city design. Neapolis was likely dedicated to Apollo, the Sun-god, and appears to have been planned with the purpose of representing the harmony of the cosmos.

The cult of Apollo, with whom *Helios* (the god who personified the Sun) was identified as early as the 6th century BC, was central to the Cumaeans. The city of Cumae was also the seat of a mythical Sibyl, Apollo's famous prophetess and oracle, whose prophetic books were later moved to Rome and kept in the Temple of Jupiter on Capitoline Hill. Thus, it is highly conceivable that the Cumaeans may have designed the new city with the intention of dedicating it to Apollo, the Sun-god. To support this hypothesis, I will show that the three parallel *decumani* (the main streets of the historic centre here called decuman) including the famous *Spaccanapoli* (the lower decuman) and the *cardines* (the small secondary roads orthogonal to them) of Neapolis were oriented according to cosmological principles based on a hexadecimal geometry defined by a circle divided into sixteen equal parts.

Such a pattern evokes the *Stella Argeade*, a Sun with sixteen rays used by the Greeks to refer to the deified Sun. The Sun was symbolised by a rayed crown on the Colossus of Rhodes and the Colossus of the Sun in Rome (both statues symbolised Helios), and it was also commonly seen in Greek and Roman reproductions of Apollo. The image is also known as the *Sun of Vergina* because a golden casket bearing a magnificent Sun with sixteen rays was found in the Greek-Macedonian townlet of Vergina, which houses the tombs of ancient Macedonian kings. The 16-rayed Sun was used as a royal emblem by the Argeade dynasty that reigned in Greece and Macedonia from 700 BC to 310 BC. To this day, in Macedonia and Greece, the Sun image continues to represent the link between ancient and modern Hellenic cultures.

The circle divided into sixteen parts was also known to the Etruscans, with whom the founders of Neapolis maintained close contact despite frequent clashes. The symbol represented their cosmology, in which the sky, viewed as an enormous temple, was split into sixteen sectors, each of which housed a divinity more or less favourable to man. In urban planning, a city that evoked such an image would have been classified as a temple, or a terrestrial representation of the gods' heavenly abode.

I will show that the 16-rayed Sun defines the orientation of the streets of Neapolis. Moreover, the city is characterised by a large central square divided into four smaller squares, each of which is further divided into five sectors by the cardines. The urban focus is the central *agorà*, which is the site of the Temple of the Dioscuri built on an ancient, raised plinth. Today's *Basilica of San Paolo Maggiore* stands on its ruins in *Piazza San Gaetano* (St. Gaetano Square). The orientation of the streets appears to follow the path of the Sun visible from that privileged place during the winter and summer solstices. On those days, the sunlight lined up along the roads at specific hours and probably marked the timing of religious ceremonies dedicated to the Sun. Several ancient populations, especially the Greeks, celebrated solstices, which marked the beginning of the summer and winter seasons, as important religious festivals dedicated to the Sun.

Neapolis was also known for its reverence for *Parthenope*, whose effigy was frequently found in its coins. Many Greek and Roman authors used the name Parthenope to refer to the city of Neapolis. Parthenope was most likely a Greek princess and/or priestess who, according to legends, could also have served as Apollo's oracle. Some legends acknowledge her as the person who guided the first Greek immigrants from Chalcis on the Greek Island of Euboea to the Campania coast, following a dove sent by the divinity. Legends also say she died in a shipwreck in the Gulf of Naples, and her body was discovered and interred in the same location where eventually a sepulchre was built in her honour. Parthenope was fondly revered by the locals and, hence, became their patron deity. In the 8th

century BC, a village bearing her name – Parthenope – was built near her sepulchre on *Pizzofalcone Hill* in front of *Castel dell'Ovo*. Neapolis would later be erected just a couple of kilometres north-east of Parthenope. After the foundation of Neapolis, the original Parthenope was denominated *Palaepolis* – the *Old City* – in order to distinguish it from Neapolis, which was created to be the *New City of Parthenope*.

In Naples, a mythical Parthenope is today also known as a siren. In Greek mythology, sirens were winged nymphs – the muses' daughters – rather than mermaids or woman-fish-like creatures who swam in the sea, as described particularly in later mediaeval and Nordic stories. In Pythagorean and Platonic traditions, they are depicted as almost heavenly beings whose melodic song created the music of the celestial spheres, bringing harmony to the cosmos. A Parthenope, a half-woman and half-rapacious monster, or harpy, was lauded by Greek and Latin poets in Ulysses' adventures, especially during the hero's voyage through the Sorrento peninsula, the island of Capri, and the Gulf of Naples. Yet, on the ancient coins of Neapolis, Parthenope was never represented as a harpy but always as a princess or a winged goddess likely associated with *Virgo*, the constellation that the Greeks called *Parthenos*, from which the name of Parthenope derives.

In the 5th century BC, during the dawn of the fall equinox (and for a few days before), the constellation, if visible, would have been seen from Neapolis hovering above the shining Sun rising above the Somma-Vesuvius complex. Stars are not visible during the day, yet everyone knew that on that day, the Sun was in the constellation of the Virgin. On the autumnal equinox, *Spica* – the brightest star in the constellation, often known as '*Virgo's ear of wheat*' – was visible for a few minutes. Indeed, it appeared on the horizon just before the Sun came up, virtually ushering it in. This is known as the heliacal rising of a star.

According to the *Tetrabiblos* by Claudius Ptolemy (c. 100 – c. 170 AD), ancient peoples used to analyse the heliacal risings of stars and planets because, on the day when it occurred, the Sun greatly dignified the divinity represented by the celestial body. The majestic celestial image of the sign of Virgo overhanging the Sun and the Somma-Vesuvius volcano complex may have been very popular, as evidenced by numerous local coins depicting a deified Bull (the Sun-god *Ebone* or the River-god *Sebethos* probably depicted as the volcanic complex itself) being surmounted by the sixteen-rayed Sun or, more commonly, by a winged goddess placing a crown on it.

The streets of Neapolis were designed to connect the Sun, the Somma-Vesuvius volcanic complex, Sant'Elmo Hill, and Mount Epomeo on the Island of Ischia during the spring and fall equinoxes. In addition, the constellations of *Virgo*, *Taurus*, and *Aquila* – which were represented by their brightest stars, *Spica*, *Aldebaran*, and *Altair* – most likely evoked the cults of Parthenope and Sebethos. Sebethos,

the deified river that surrounded and fertilised Neapolis' grounds, was portrayed by a Bull with a man-face and was believed to spring from the Somma-Vesuvius volcanic complex.

The movement of the stars associated with these deities at the spring and autumn equinoxes appears to indicate that the cults of Parthenope and Sebethos were associated with the Eleusinian Mysteries. In ancient Greece, these rituals celebrated the myths of the seasonal cycles of Demeter (the same as the Roman Ceres) and her daughter Persephone (the same as the Roman Proserpina), and the sirens played a role in them. In Neapolis, these rites may have been related to the *Lampadaforia-Lampadedromia*, a famous torch-race in honour of Parthenope followed by a torch competition. Interestingly, the decumans of Neapolis pointed exactly towards the Island of Ischia, a fact that probably recalled the myths of Parthenope, who, having journeyed with the first Greek colonists, landed specifically on *Pithecusae*, the name with which they designated the island.

The most surprising feature about Neapolis, however, is hidden inside the internal geometry of its streets. Its urban plan surrounds the agora with a complex and precise arrangement of squares and concentric circles that fit in precise proportions with the city walls and its nearest outside area. The road geometries derive from the regular decagram, which is an important Pythagorean cosmological symbol related to the number '10', that is, the *tetraktys*, the well-known ten-point equilateral triangle that the Pythagoreans revered as a sacred symbol of the cosmos. The proportions of the decagram are defined by the mystical *golden ratio* and are characterised by the 36° *golden angle*, which is one-tenth of a circle.

The choice of using proportions based on the golden ratio and its related 36° angle had a unique and mystical cosmological motivation in Neapolis. In fact, the golden angle of 36° indicated the position at dawn of the Sun relative to the east of the city during the winter solstice and the Sun's height relative to the same east point during the summer solstice. Curiously, the Temple of Apollo in Cumae and the Flavian amphitheatre in Pozzuoli were both positioned 36° south from the east towards the rising Sun at the winter solstice. These findings demonstrate the significance of the golden ratio as a religious and cosmological sign among the local population.

The argument presented above suggests that the founders of Neapolis were likely inspired by Pythagoras of Samos (580-570 BC – c. 495 BC). His followers were maybe drawn to the site by the Cumaean Sun worship. Indeed, some ancient legends connect Naples to the Pythagorean school. The crossroads between *via Forcella* (which means 'fork') and the lower decuman are denoted by the letter 'Y', which is the Pythagorean symbol for the dichotomy between good and evil, or virtue and vice. Starting in the Middle Ages, the same letter was engraved on the coat of arms of Forcella. This association was interpreted as evidence of

the presence of a Pythagorean school in this area of Naples. Indeed, several Pythagorean schools have been created throughout Magna Graecia since the 6th and 5th centuries BC, and there could have been one in Neapolis as well.

Neapolis, therefore, appears to have been planned with geometric accuracy and astronomical precision. The builders used the principal symbol of the Greek sun-cult and the Pythagorean cosmology, which is based on the number '10' and the related *golden ratio*. Etruscan cosmology could have had an additional influence. The circle divided into sixteen sections, the 16-rayed Sun, the pentagram, and the decagram represented the sky, Apollo, the divine benediction, and the harmony of the cosmos. The cosmos – the gods' abode – was thus organised in accordance with the golden ratio ideals. Furthermore, Neapolis appeared to be immersed in space because the Sun and the *Virgo*, *Aquila*, and *Taurus* constellations – essential elements to the local population – circled around the city during equinoxes and solstices, following paths rich in mythological references.

Such a symbolically rich street design would not have gone unnoticed by ancient architects. The renowned Roman architect, *Vitruvius* himself (80 BC – 15 BC) likely drew inspiration for his '*Ideal City*' from the layout of Neapolis. The New City of Parthenope most probably served as a model for other cities throughout the Greek and Roman periods, as well as the Renaissance, when cities were envisioned to be miniature representations of the cosmos.

Naples is therefore truly *O Paese d'o Sole*. This is why it has been celebrated as the 'City of the Sun' in various songs from antiquity to the present. The founders of Neapolis incorporated their myths and cosmological ideas into the construction of the city. Today, all this may appear to be a coincidence, but, as I will show, the city's architectural beauty was pursued with a very specific goal in mind: to worship the Sun-god Apollo and Parthenope.

Finally, I argue that Neapolis' cosmic and solar legacy did not die with the end of the Graeco-Roman era, but it was integrated, reinterpreted, and retained in the Christianized city. This transition began in the 4th and 5th centuries AD, following the end of the Great Persecution of Christians under Emperor Diocletian from 303 to 305 AD. The previous traditions centred on Apollo-Helius were supplanted by the faith in Jesus Christ as the city's '*True Sun*', thanks to the witness and miracles of St. Januarius ('*San Gennaro*') and other martyrs. The *Basilica of Santa Restituta*, the most ancient component of the Catholic Cathedral in Naples, was built on the ruins of the original Temple of Apollo by order of Emperor Constantine the Great (272–337 AD). Today, the Cathedral itself retains its original identity due to its architecture, symbols, mosaics, and relics, which in many ways recall the ancient Sun cult transformed and reinterpreted from a Christian perspective.

Chapter 1
Above the roofs of Naples

The author of this book oversees the educational and research activities of the Meteorological Observatory of the University of Naples Federico II.[1] The Meteorological Observatory is annexed to the Department of Earth, Environment and Resources Sciences and is located in the historic centre of Naples in *Largo San Marcellino* (Figure 1.1), near which all the sites described in this study are found.

The Observatory was established by Giuseppe Garibaldi's dictatorial decree on 29th October 1860 at the request of Professor Luigi Palmieri, the first to hold the chair of Meteorology in the United Kingdom of Italy. It, therefore, represents the highest meteorological institution in the city.

It all began with the usual walks the author and Professor Adriano Mazzarella had during lunchtime to find a pizzeria along *Spaccanapoli*, the lower *decuman*, which is the most southern of the three main parallel streets of Neapolis. The ancient Neapolis is today the historic centre of Naples (Figures 1.2, 1.3 and 1.4). During these walks, we often enjoyed speaking of the history and mysteries of Naples and started to wonder about the origin and meaning of the ancient streets of the city.

The first thing that strikes anyone walking through *Spaccanapoli* is its perfect alignment with Sant'Elmo Hill, which, like a finger pointing up, appears to invite him or her to look directly up into the sky above and wonder what the ancient citizens of Neapolis could have seen in the sky above Sant'Elmo. It gives the idea that this alignment, rather than being an accident, must have had a deliberate meaning.

Moreover, the traveller may find the 36-degree crossroads between *Via Forcella* and *Spaccanapoli* picturesque and bizarre. Then, there is the fascinating *Via San Gregorio Armeno*, the central cardo of the ancient Neapolis, today known

[1] The author replaced Professor Adriano Mazzarella, without whom this research would not have seen the light.

Fig. 1.1 *The Meteorological Observatory of San Marcellino.*

Fig. 1.2 *View of the historic centre of Naples from Sant'Elmo Hill. The long and straight road in the centre is Spaccanapoli, the lower decuman of Neapolis.*

as the *Via dei Presepi*[2], which leads to the *Basilica of San Paolo Maggiore* in *Piazza San Gaetano*, the former agora of the ancient city. Not too far from there, the traveller finds the majestic Cathedral, which houses the famous relics of Saint Januarius. These are streets and sites that still retain all the charm and mystery of ancient times.

Some columns of the ancient Temple of the Dioscuri are still visible on the facade of the church of *San Paolo Maggiore* (Figure 8.4). This remarkably ancient

[2] The street of the Christmas Cribs.

Fig. 1.3 *The historic centre of Naples viewed from the satellite. The central dot indicates Piazza San Gaetano; the lower dot indicates the Observatory of San Marcellino; and the right-upper dot indicates the Catholic Cathedral of Naples.*

edifice, placed along *Via dei Tribunali*, which is the central decuman of Neapolis, was well suited to serve at the time as an observatory from which to explore the view of the area around Neapolis and the sky above the city. Likely, this elevated area was the specific location selected for the celebration of some rituals devoted to the Sun and perhaps to Parthenope as well.

Today, such a view is covered by the tall mediaeval buildings of the historic centre but, in antiquity, this view had to be completely unobstructed. Fortunately, from the tower of the Meteorological Observatory, the view is perfect. From this elevated position, it is possible to see the precise geographical orientation of Naples relative to the sky.

Figura 1.4 *Sant'Elmo Hill seen from Spaccanapoli (Creative Commons, Wikipedia).*

From the agora of Neapolis one could see Mount Vesuvius to the east, the Sorrento peninsula (the sirens' living place) to the south-east, the island of Capri to the south, and Sant'Elmo Hill to the west-southwest. In ancient times, the Acropolis of Neapolis, which stood to the north-west of the city, was the site of large Greek temples probably dedicated to Demeter and other divinities. Currently, the same area houses the church of *Santa Maria Maggiore delle Grazie* in *Caponapoli*. Just outside the Greek walls of the city near the Acropolis stands the National Archaeological Museum of Naples, one of the most important museums in Italy.

This view, let us call it terrestrial panorama, finds its celestial complement in the vault of the sky, which is dominated by the path of the Sun over Naples and its gulf. People with minimal astronomical training can also visualise the paths of the constellations. The constellations cannot be seen during the day, but the city's ancient Greek inhabitants must have been able to appreciate their gleaming brightness in the night sky, which must have been enchantingly clear back then.

The satellite photograph of the historic centre (Figure 1.3) reveals all its beauty and harmony; both the perimeter of the city wall and the road geometry of ancient Neapolis are quite evident. Importantly, the streets in the historical centre of Naples retain the same orthogonal street grid as the original Graeco-Roman one.

Figure 1.4 shows Sant'Elmo Hill as it was and still is seen from the lower decuman, known today as *Spaccanapoli*. Figure 1.5 shows how one can enjoy the view of Neapolis from the turret of the Meteorological Observatory with the Vesuvius to the east, Capri to the south, and Sant'Elmo Hill to the west.

The above observations prompted the author to investigate whether the founding of Neapolis could have had a specific cultural significance closely related to its specific geographical environment and the astronomical views from the city. The following pages will explore the roots of this remarkable and fascinating city. The reader will be guided step-by-step to walk through the elements needed to solve the enigma of Neapolis.

The study investigates ancient and modern literature on the history, traditions, and legends of Naples, as well as conducting a rigorous geometric examination of the city's street map and spatial orientation. The study's findings derive also from a careful reconstruction of the Sun's and stars' paths as seen by the founders of Neapolis in the first decades of the 5thcentury BC during solstices and equinoxes, when the ancient Greeks observed significant religious celebrations.

Stellarium astronomy software,[3] which is capable of transporting us back thousands of years like a time machine, Google Earth Pro,[4] and other simple available tools of data analysis made this research possible and easily replicable.

[3] Stellarium astronomy software is available at https://stellarium.org/ (accessed on 21/05/2024).
[4] Google Earth Pro is available at https://earth.google.com/ (accessed on 21/05/2024).

Fig. 1.5 *The Vesuvius (on the east), Capri on the south, and Sant'Elmo Hill on the west as seen from the Meteorological Observatory of the University of Naples Federico II (Fig. 1.1). S' is the likely south point reference adopted in Neapolis.*

Chapter 2
The Hippodamian orthogonal street grid of ancient 'new cities'

Plato (*Laws*, book 5, 747)[5] and Aristotle (*Politics*, book 7, 1327)[6] agreed on the need to consider various criteria when determining where to build a city. The ideal site had to be on elevated terrain and well connected with the hinterland, the sea, and the entire surrounding area. Equally essential were the air quality, the direction of winds and sunlight, the fertility of the surrounding areas, and the availability of clean water. Within their walls, cities had to be designed to facilitate the interactions of the plurality of individuals, groups, and institutions that were part of them.[7] However, it took a while for this idea to develop in human history.

The oldest centres, which usually developed gradually, were characterised by intricate and disorderly street geometries like those of Athens (Figure 2.1). From the 6th century BC onwards, it became customary among Greek colonies, especially in those places where the construction of a new city was allowed without pre-existing constraints, to found entire new cities by using an orthogonal street grid. This scheme gave the city a certain pre-established order. One example is *Akragas*, founded in Sicily in the 6th century BC. *Akragas* is the ancient Greek city of Agrigento, which is today renowned for its *Valley of the Temples* (Figure 2.2).

The orthogonal urban architecture was developed during the Classical and Late Classical periods (the golden age of Greek civilisation), which span between the onset of democracy in Athens (507 BC) and the death of Alexander the Great

[5] Plato, *Laws*, translated by R. G. Bury, Cambridge (MA), Harvard University Press 1967 & 1968, book 5, sec. 747, http://www.perseus.tufts.edu/hopper/text?doc=urn:cts:greekLit:tlg0059.tlg034.perseus-eng1:5.747 (accessed on 21/05/2024).

[6] Aristotle, *Politics*, translated by H. Rackham, Cambridge (MA), Harvard University Press, 1944, book 7, sec. 1327, http://data.perseus.org/citations/urn:cts:greekLit:tlg0086.tlg035.perseus-eng1:7.1327a (accessed on 21/05/2024).

[7] Andrew T. Creekmore III and Kevin D. Fisher, *Making Ancient Cities: Space and Place*, in *Early Urban Societies*, Cambridge MA, Cambridge University Press, 2014.

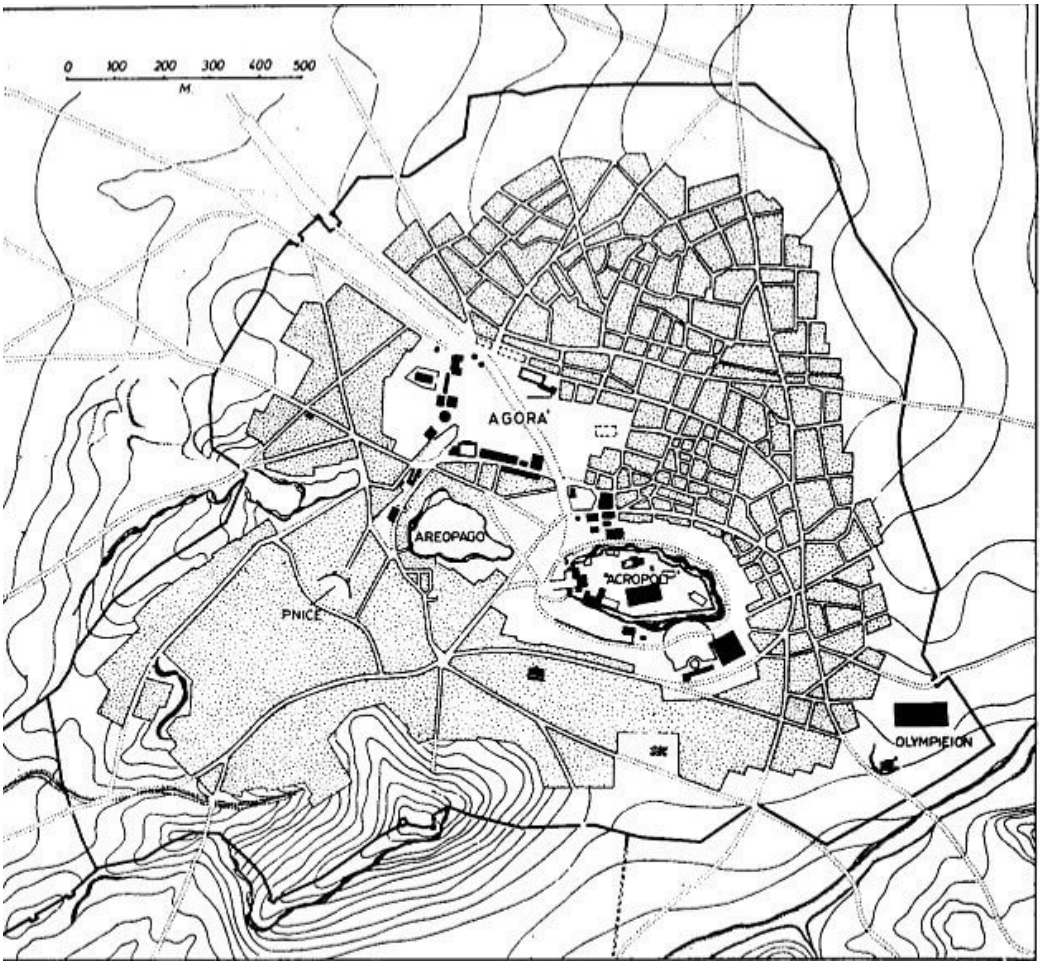

Fig. 2.1 *The disordered street grid geometry of Athens, 5th century BC.*

(323 BC). Its major creator was the great Greek architect Hippodamus of Miletus (498 BC – 408 BC), perhaps a follower of Pythagoras (570 BC – 495 BC). By Aristotle's time (384 BC – 322 BC), Hippodamus had become so famous that he was already celebrated as the father of European urban planning.[8]

According to Aristotle, orthogonal urban architecture had the downside of increasing the city's vulnerability to armed assault because linear route geometries would have aided an enemy army that managed to break through its doors or walls. In contrast, complicated road geometries would have the advantage of disorienting invaders and facilitating urban guerilla.

[8] Luigi Mazza, *Plan and constitution - Aristotle's Hippodamus: toward an 'ostensive' definition of spatial planning*, «The Town Planning Review», 80 (2009), n. 2, pp. 113–141.

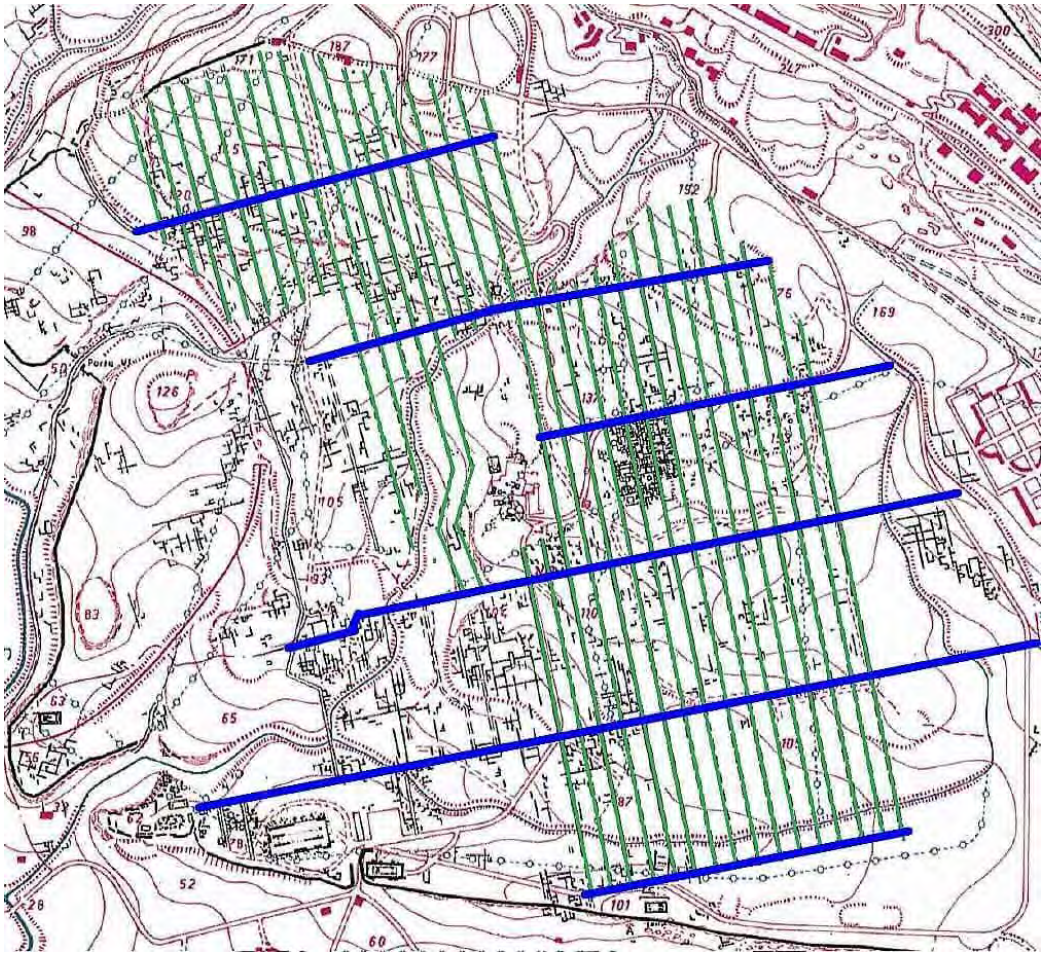

Fig. 2.2 *Decumans (blue) and cardines (green) on the orthogonal road layout of the Greek colony of Akragas (Agrigento).*

Despite such a negative aspect, the orthogonal street plan met with remarkable success. It helped to make the organisation of the city more functional and gave the city a precise orientation by correlating it with the surrounding landscape.

The orthogonal street plans of Miletus (re-founded in 475 BC on the Mediterranean shore of Asia Minor, Figure 2.3) and Piraeus in Greece (which served as the port of Athens, Figure 2.4) – designed by Hippodamus in 451 BC – became so famous as to serve as models for other cities.[9] The orthogonal street grid was well accepted throughout the Greek world; subsequently, it was adopted by the

[9] David W. J. Gill, *Hippodamus and the Piraeus*, «Historia: Zeitschrift für Alte Geschichte», 55 (2006), n. 1, pp. 1–15.

Fig. 2.3 *The Hippodamian orthogonal road layout of Miletus.*

Romans as well.[10] Since then, this urban design has come to characterise several urban centres, including many modern cities around the world.

The Hippodamian orthogonal street grids consisted of some major parallel streets that the Greeks called *platêiai* and the Romans *decumani*. The secondary roads were perpendicular to them and were called *stenopói* by the Greeks and *cardines* by the Romans.

In the rest of our discussion, I will adopt the Latinized terminologies of 'decumans' and 'cardines', as they are still used today to indicate the streets of the historic centre of Naples.

[10] Francis J. Haverfield, *Ancient Town-Planning*, Hamburg, Clarendon Press, 1913.

Fig. 2.4 *The Hippodamian orthogonal road layout of Piraeus.*

The specific orientation that the decumans assigned to each inhabited centre was determined by certain parameters, many of which were related to the site's topography. At Miletus and Piraeus, they were parallel to the coastlines, whereas other locations employed solar and astronomical references. Examples included the direction of sunlight at sunrise or sunset on specific days of the year, such as summer or winter solstices, or the spring and fall equinoxes, when the street grid was oriented as the cardinal points with roadways running from north to south or from east to west.[11]

Among 38 ancient urban sites of Italy, 14 sites had their ancient decumans oriented approximately towards the east-west line; nine sites had the roads following the light source as the Sun rose during the winter solstice; Verona and Vicenza

[11] Amelia Carolina Sparavigna, *Roman towns oriented to sunrise and sunset on solstices*, «SSRN», (2016), n. 2777118, pp. 1–6. See also: Demeter Sztanko, *On Solstices and City Planning* at https://sztanko.github.io/solsticestreets/ (accessed on 21/05/2024).

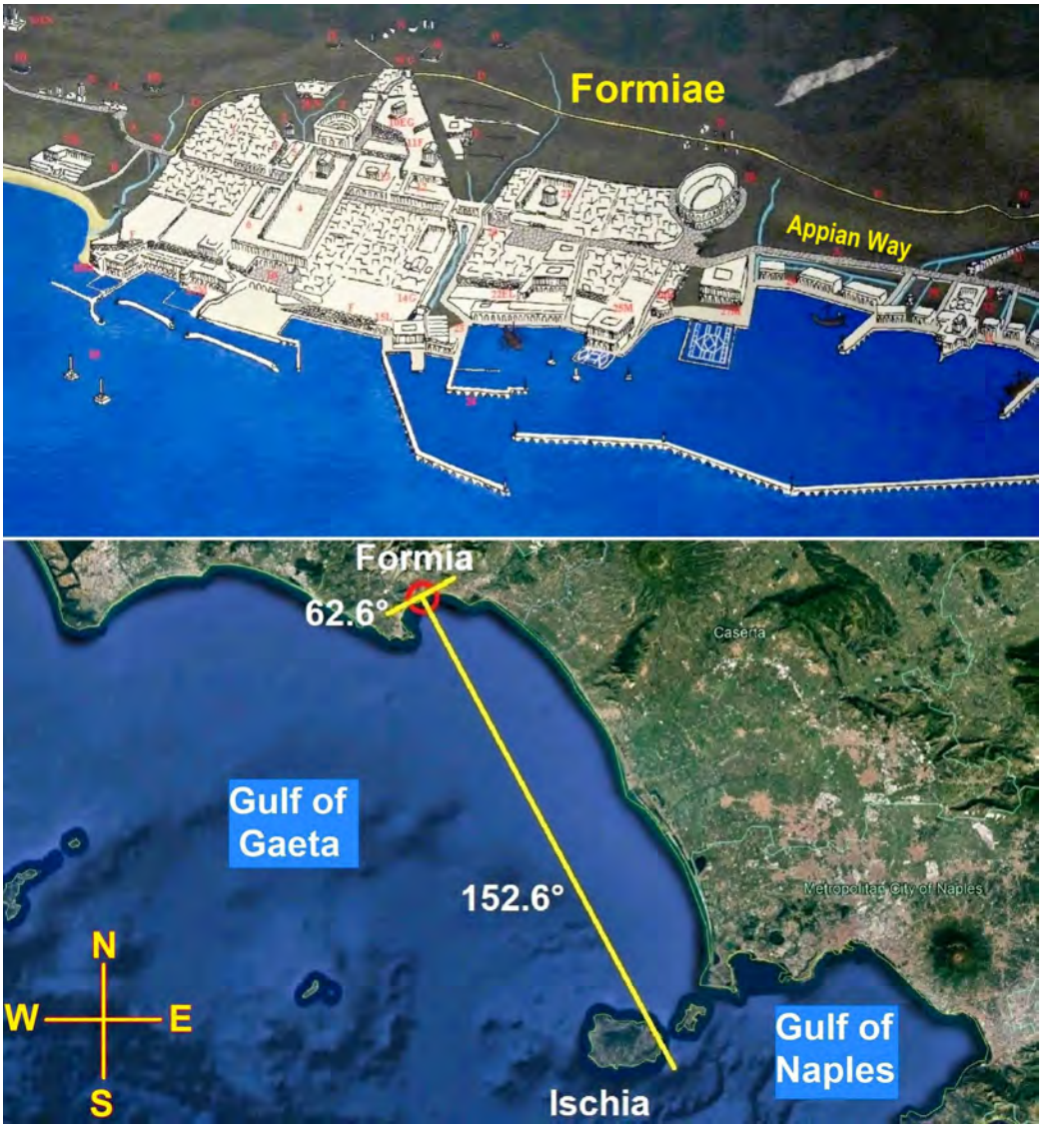

Fig. 2.5 *A view of ancient Formia crossed by the Appian Way parallel to the coastline and its optimal orientation in the Gulf of Gaeta.*

had their roads aligned with the light of dawn on the summer solstice; finally, three cities (Pesaro, Rimini and Senigallia) display a north-south orientation.[12]

In other cases, the recourse to a geographical element is evident. One example is the Roman city of Formiae (today's Formia, located in the province of Latina,

[12] Giulio Magli, *On the orientation of Roman towns in Italy*, «Oxford Journal of Archaeology», 27 (2008), pp. 63–71.

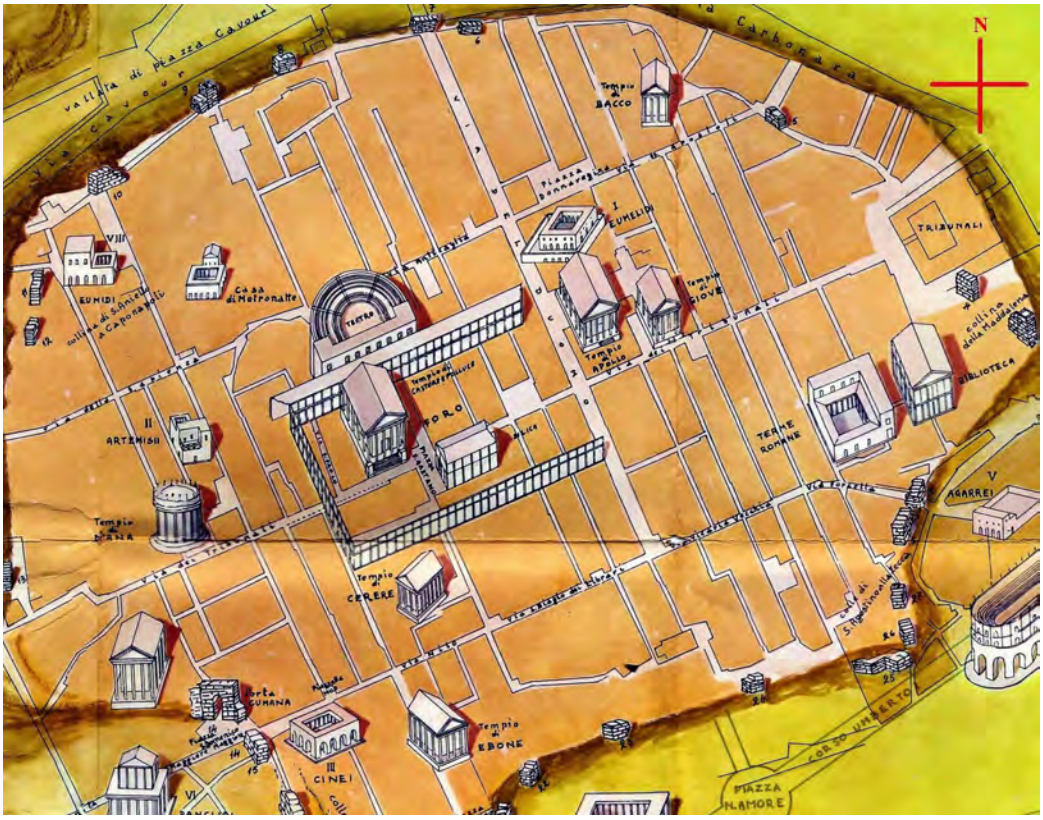

Fig. 2.6 *The Hippodamian orthogonal road layout of Neapolis. Details of the plan and axonometric view of the city of Neapolis. (Ferdinando Ferrajoli, 1981).*

north of Naples, Figure 2.5). Its main decuman (formed by the modern *Via Rubino* and *Via Lavanga*) is part of *Via Appia* (the 'Appian Way') and runs parallel to the coast (62.6° azimuth). At the same time, the direction perpendicular to it (152.6° azimuth) runs parallel to the coastline of the Gulf of Gaeta from Formiae to the island of Ischia. Thus, Formiae was built by the Romans in a strategic position to optimise the monitoring of this strip of sea.

In the next chapters, we shall analyse the orthogonally structured street grid of Neapolis shown in Figures 2.6 and 2.7, and how it was optimally centred according to golden ratio proportions within a quasi-perfectly round circle of walls. The depicted layout of the city also includes some temples, most notably the Temple of the Dioscuri (in the Agora) and the Temple of Apollo, whose site is today occupied by the Cathedral of Naples.

Fig. 2.7 *3D reconstructions of Neapolis seen from different angles (Marco Mellace, 2023).*

Chapter 3
The role of religion and cosmology in ancient urban planning

In ancient times, significant sites could be created with cosmological and theological objectives in mind.[13] In his *Laws* (book 5, sec. 747) Plato emphasised that, when determining where to create a new city, '*those areas of the territory in which a certain divine breath blows*' should be preferred once all other practical and environmental criteria were fulfilled. This meant that the site itself had to inspire a certain religious feeling.

Thus, a newly created city could be the outcome of the mythologies of its own community; its planning could represent important aspects of their religious and cosmological systems. This is why the *arùspici* ('haruspices') celebrated the city's foundation as a sacred ceremony. Builders traced the perimeter limits and the main roadways of a new city only after consulting with religious authorities. The street orientation usually also determined the orientation of the city temples (Figure 3.1).

As a result, the founding of a city was its most significant historical event, to the point that it had to be commemorated and honoured annually with grand religious festivities. For example, Rome was founded on 21st April 753 BC, and, to this day, the '*Dies Romana*' (which means the 'Day of Rome') is still celebrated.

The ancient Greeks worshipped the numerous gods of Olympus, their offspring, and the different demigods of their vast mythology. Such figures were often represented by celestial bodies such as the Sun, Moon, planets, stars, and the constellations they formed. The astronomy of ancient times was infused with mythical and religious ideas and was actively present in various aspects of life. For example, a city had to mimic the cosmic order in the design of its borders and walls, as well as in the geometry and orientation of its road axes.

Archaeoastronomy – a sub-discipline of cultural astronomy – is currently focused on the study of these links in order to reconstruct ancient people's minds and

[13] Michele Cornieti, *Urban space as sacred space: observations on city and necropolis design in Populonia*, in *Disegnare il Tempo e l'Armonia*, edited by Mandelli Emma, Lavoratti Gaia, Boston MA, Alinea, 2010, pp. 17–19.

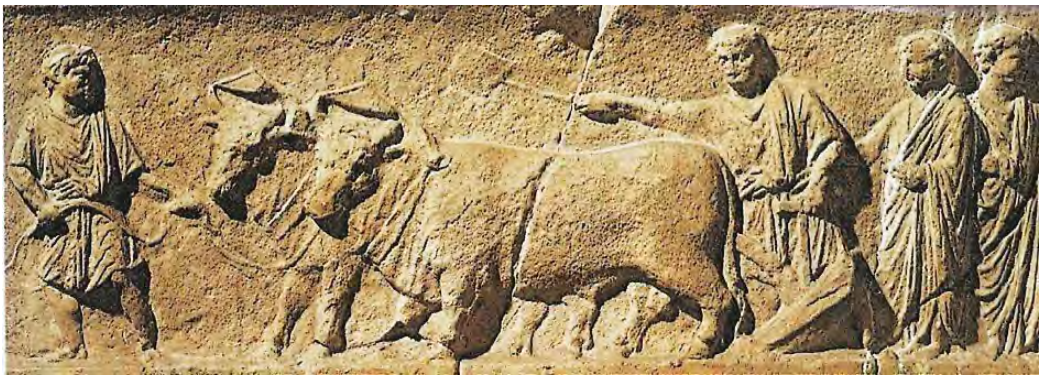

Fig. 3.1 *Rite of a city foundation in central Italy (8th century BC) under the guidance of arùspici.*

understandings of celestial phenomena, as well as how such knowledge took concrete form within their respective cultures. For example, the Egyptians, Mayans, Greeks, and other civilisations commonly integrated astronomical and cosmological concepts into the complex architectural and urban projects of their pyramids and temples.[14]

Typical geometric shapes rich in religious and cosmological meanings were:

1. the *circle*, which, having no beginning and no end, represented the divine or the cosmos and, therefore, was a manifestation of eternity;
2. the *square*, which symbolised the Earth with its four elements (earth, water, air, and fire) and the rational human order that allows orientation in space;
3. the *centre*, which was the area from which the city evolved and, therefore, was always characterised by a temple or an altar;
4. the *perimeter*, which was the sacred and inviolable limit that served as a clear symbolic border between the internal order of the city and the chaos of the external areas.

These geometric shapes – in harmony with one another and with their surroundings – created a microcosm that reproduced the *cosmic order*.

In several Roman towns, the decuman orientation is aligned with the sunlight direction at dawn on important holidays, demonstrating a purposeful design by their builders.[15] For example, the decumans of *Bononia* (Bologna) were aligned

[14] Juan Antonio Belmonte and M. A. Mosalam Shaltout, *In Search of Cosmic Order: Selected Essays on Egyptian Archaeoastronomy*, Cairo, American University in Cairo Press, 2009; Giulio Magli, *Archaeoastronomy: Introduction to the Science of Stars and Stones*, Switzerland, Springer, 2015.

[15] Giulio Magli, *On the orientation of Roman towns in Italy*, «Oxford Journal of Archaeology», 27 (2008), pp. 63–71.

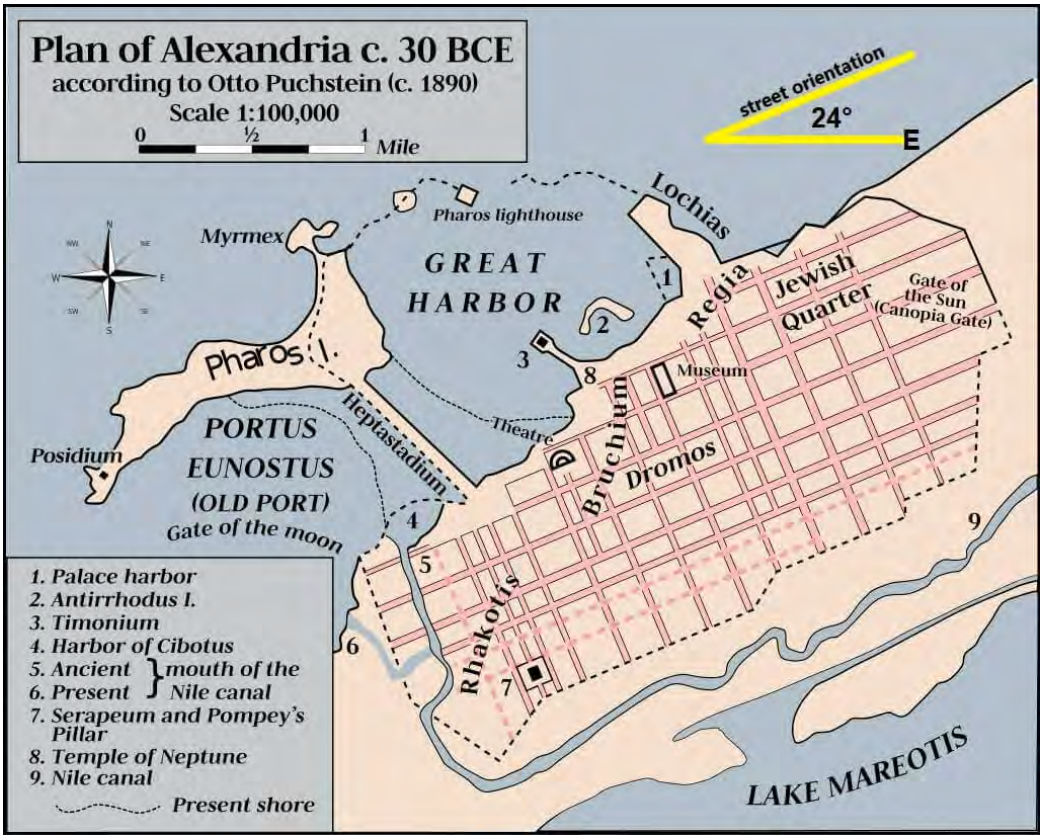

Fig. 3.2 *Hippodamian diagram of Alexandria in Egypt (circa 30 BC). The road orientation (24°) is identical to that of Neapolis.*

with the sunrise light-line on the day of *Terminalia* (the second half of February), the day when the god *Terminus* – the city protector – was celebrated.[16]

Another important case is the Greek city of Alexandria, founded in Egypt in 331 BC by Alexander the Great (356 BC – 323 BC).[17] Luisa Ferro and Giulio Magli (2012) report that the orientation of its main decuman, the *Canopic* or *Sun Road* (now called *Abou Quer* Street), was about 65° azimuth (or $24°45' \pm 30'$ north from the east). My estimate based on the map provided by Google Earth

[16] Manuela Incerti, *The urban fabric of Bologna: orientation problems*, in *Transformations of Urban Form: From Interpretations to Methodologies in Practice, the Sixth International Seminar on Urban Form*, Florence, 1999, pp. 3–12.

[17] Luisa Ferro and Giulio Magli, *The astronomical orientation of the urban plan of Alexandria*, «Oxford Journal of Archaeology», 31 (2012), n. 4, pp. 381–389.

Fig. 3.3 *Alexander the Great is depicted as the Sun-god with his head encircled by a radiate crown (4th century BC).*

Pro gives an orientation of about 66° azimuth (or 24° north from the east).[18] The orientation of the decumans of Alexandria deviated significantly from the coastline and by about 3-4° from the light line of the rising Sun at the dawn of the summer solstice of 331 BC (Figure 3.2). It would have been nearly impossible for Egyptian and Greek mathematicians of the time to be so inaccurate; they were likely able to astronomically orient a city or even a building with a margin of error of less than 1°, as demonstrated by the fact that some Egyptian pyramids are aligned with the cardinal points with an even smaller error.[19] Consequently, Luisa Ferro and Giulio Magli (2012) conjectured that the orientation of the *Canopic* road was inspired by the local culture. More specifically, they determined that the street was aligned with the sunrise light-line on Alexander the Great's birthday (20th July 356 BC, in Pella, Macedonia). His birthday was celebrated as one of the two major local holidays; the other being the city's founding day. On that day, the people welcomed Alexander as a living god.

[18] This is the same orientation as the decumans of Neapolis. Was the planning of Alexandria inspired by Neapolis?

[19] Steven C. Haack, *The Astronomical Orientation of the Egyptian Pyramids*, «Journal for the History of Astronomy», 15 (1984), n. 7, pp. 119–125.

The significance of Alexander's birthday was enhanced by a peculiar astronomical phenomenon. The star *Regulus* – the brightest star in the constellation of the Lion known as the 'Star of the King' since Babylonian times – became visible around 26th July, just before sunrise. Heliacal rising of a star occurs when the celestial body rises shortly before dawn.[20] Among ancient people, these astronomical configurations gave origin to important religious celebrations.[21]

In the case of Alexandria, on 29th July, in the 4th century BC, the Sun rose at about 66° azimuth (or 24° north from the east); its light, along with the King's star Regulus, passed through the city's *Gate of the Sun* for the previous nine days, that is, since the birthday of Alexander. It was as if Alexander himself, while passing through the city gate, had the Sun shining behind him. Figure 3.3 seems to reproduce this scenography in a golden representation of Alexander the Great depicted with the Sun shining behind and crowning his head. Thus, it is very conceivable that the orientation of the *Road of the Sun* of Alexandria was planned to honour and exalt Alexander himself. From this, we can conjecture that a similar symbolism could have been adopted for orienting other important urban centres.

Interestingly, the decumans of Neapolis and Alexandria have almost the same azimuth orientation, roughly 24° north from the equinoctial line.[22] Was Dinocrates of Rhodes, the architect of Alexandria, also inspired by Neapolis? If so, may it have been because Neapolis was renowned in Greek communities as a city built with precise geometries to glorify the Sun-god?

Moreover, in Pompeii – approximately 23 km south-east of Naples – also the Temple of Apollo, the forum featured by the Temple of Jupiter, and their nearby streets have the same orientation as the Temple of the Dioscuri and the Temple of Apollo in Neapolis: both temples are rotated by about 24° north from the equinoctial line. This is so even though in Pompeii such directions differ from those of its decumans buried by the Vesuvian eruption of 79 AD (Figures 2.6, 3.4 and A.4). Could this peculiar orientation of about 66° azimuth, which also corresponds to the orientation of the decumans of Neapolis and Alexandria, have a specific religious meaning linked to the cult of the Sun?

[20] The Egyptians are also known to have used the heliacal rising day of Sirius in July to structure their solar calendar, which is made of 360 days plus 5 epagomenal days. Julius Caesar expanded their calendar in the 1st century BC by adding leap years formed by 366 days (one every four years). Finally, Pope Gregory XIII perfected and stabilised the calendar in 1582. The Gregorian calendar is still in effect in most parts of the world.

[21] Efrosyni Boutsikas and Clive Ruggles, *Temples, stars, and ritual landscapes: the potential for archaeoastronomy in ancient Greece*, «American Journal of Archaeology», 115 (2011), n. 1, pp. 55–68.

[22] Gustaf Hamberg, *Vitruvius, Fra' Giocondo and the city plan of Naples: a commentary on some principles of ancient urbanism and their rediscovery in the Renaissance*, «Acta Archaelogica», 36 (1965), pp. 105–125.

Fig. 3.4 *Temple of Apollo in Pompeii. The two panels below show the identical orientation of the Temple of the Dioscuri in Neapolis (right) and of the Temple of Apollo in Pompeii (left). The facades of the two sacred buildings are both about 24° north of the equinoctial line.*

To answer these questions, we must first consider Cumae, the Greek colony that founded Neapolis. Cumae was home to the legendary Sibyl, the high priestess in charge of Apollo's most important Oracle in Magna Graecia. In the following chapter, we will review the religion of the Cumaeans and examine the astronomical orientation of Cumae's Temples of Jupiter and Apollo, which were renowned in the Greek world.

Chapter 4
The temples of Cumae and the amphitheatres of Pozzuoli

During the early half of the 1st millennium BC, the Greeks colonised the whole of southern Italy, an area they called Magna Graecia or *Megálē Hellás* (Figure 4.1). Having settled on the coast of the Tyrrhenian Sea up to Campania, they founded several colonies, beginning with Pithecusae (Ischia) and then Cumae, Elea, Poseidonia (Paestum), Capua, Dicearchia (Pozzuoli), and Parthenope-Neapolis.[23]

Cumae was the first (8th century BC) to be established on the Italic continental territory known as *Opicia* by people who, in their dialect, called themselves *Graikoi*. This was the distinctive name of the maritime populations coming from the coasts of the Island of Euboea and of neighbouring Boeotia. The Romans erroneously assumed *Graikoi* to be the appellative of all the Hellenic peoples: this accounts for why the Western denomination of Hellas is Greece and all its inhabitants are called Greeks.

As we will explain more in depth later, according to ancient legends, the founders of Cumae were mainly the Euboics of Chalcis, who explored and colonised the West with the probable support of the Oracle of Delphi.[24] The coasts of Campania had particularly fertile land, an optimal climate, and it was an ideal location for trade. The new colony grew politically and economically to the point of surpassing the neighbouring peoples and began to play a prominent role in spreading Greek culture on the Italian peninsula. Assimilated and adopted by the Etruscans and the Latins, the Chalcidian alphabet became the means through which the language and literature of Rome and, subsequently, all Western culture were handed down to our day.

The Greeks gave Cumae the name of *Kýmē*, which means *Wave*, perhaps due to the shape of the hill on which its acropolis was erected, which in antiquity

[23] Luca Cerchiai, Lorena Jannelli and Fausto Longo, *The Greek Cities of Magna Graecia and Sicily*, Los Angeles, The J. Paul Getty Museum, 2004.

[24] Andrea Debiasi, *L'Epica Perduta: Eumelo, il Ciclo e l'Occidente*, Roma, L'Erma di Bretschneider, 2004.

Fig. 4.1 *Magna Graecia and Greek Sicily.*

extended into the sea (Figure 4.2). The acropolis was the highest-standing section of each Greek city and was usually located on a hilltop that also housed the main temples of the city.

Two important temples stood on the Acropolis of Cumae. The temple built on the upper terrace atop the hill was presumably dedicated to Demeter (Mother Earth, the Roman Ceres, and the goddess of wheat and agriculture) or her brother Zeus (the Roman Jupiter, the god of heaven and thunder, the ruler of all gods, and

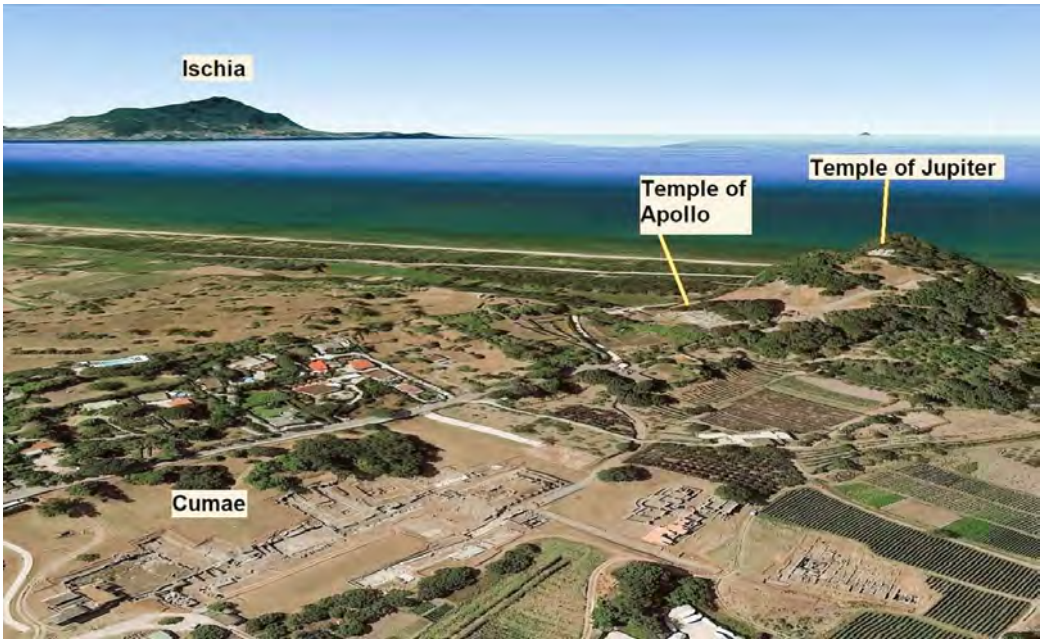

Fig. 4.2 *Overview of the ruins of Cumae.*

the authoritative guide of Olympus).[25] The other one, located on a lower terrace, was almost certainly dedicated to Apollo, Zeus' son and God of the Sun.[26]

Some scholars[27] have recently suggested a different interpretation: the temple on the upper terrace was dedicated to Apollo, and the one on the lower terrace to Zeus. The main reasoning for this interpretation was the discovery of some sacred dedications dating to the Roman era that led some to propose that the lower-terrace temple may have been dedicated to *Iuppiter Fulgurator/Flazus* (Jupiter-Zeus).[28] However, the traditional interpretation appears convincing when we examine the specific astronomical orientations of the two temples. Let us now explain why.

The temple located on the upper terrace – traditionally known as the Temple of Jupiter – is aligned from east to west along the equinoctial line. Therefore, in the spring and autumn equinoxes, sunlight shone through it at sunrise and sunset,

[25] Mario Pagano, *Una proposta di identificazione per il santuario di Demetra sull'acropoli di Cuma*, «Puteoli: studi di storia antica», 11 (1987), pp. 79–91.

[26] Giuseppe Camodeca, *Iscrizioni pubbliche nuove o riedite e monumenti di Cumae. I, Foro e tempio di Apollo*, «Annali di Archeologia e Storia Antica», 8 (2001), pp. 149–162.

[27] Carlo Rescigno, *Cuma, il Tempio di Giove e la Terrazza Superiore dell'Acropoli*, Caserta, Osanna Edizioni, 2012.

[28] Giuseppe Camodeca, *La documentazione epigrafica e i templi dell'acropoli di Cuma romana*, in *Cuma, il Tempio di Giove e la terrazza superiore dell'Acropoli*, Carlo Rescigno (Ed.), Venosa, Osanna Edizioni, 2012, pp. 67–84.

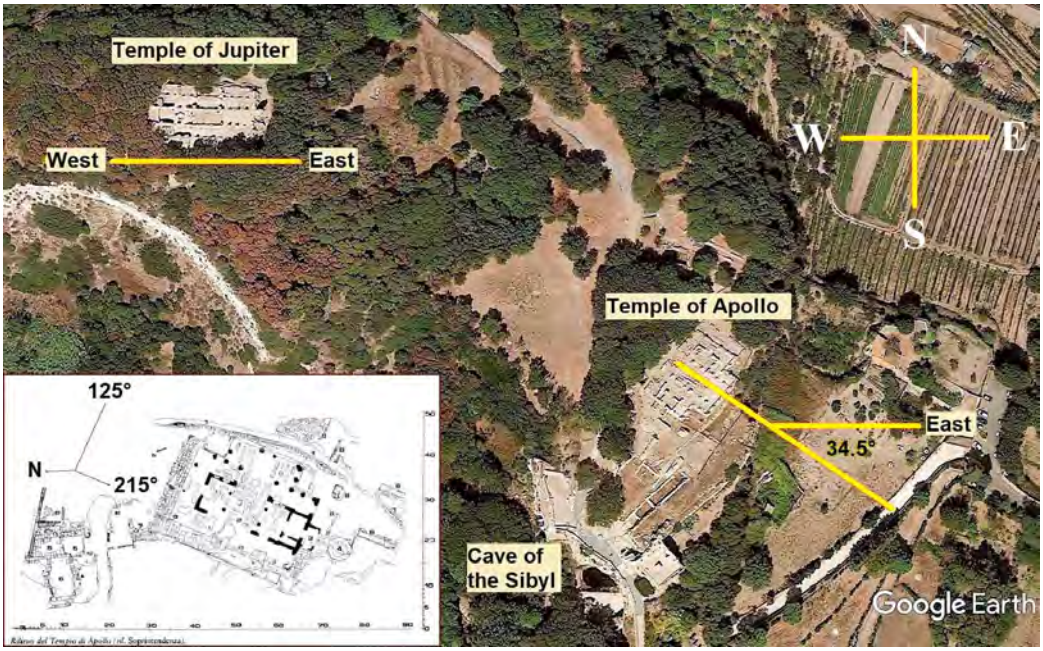

Fig. 4.3 *Satellite photo of the Acropolis of Cumae.*

following a route parallel to the religious building. During the equinox days, the Greeks celebrated the Eleusinian mysteries, in which Demetra, Zeus, Persephone, and Hades played an essential role. Thus, it seems more reasonable to assume that this temple was dedicated to Demetra and Zeus (Jupiter), as traditionally believed. In Chapters 13 and 14, I argue that Parthenope's cult in Neapolis was tied to the Eleusinian mysteries, and, therefore, she too could have been celebrated around the equinox days.

The temple located on the lower terrace – traditionally known as the Temple of Apollo – had a quite different orientation. Figure 4.3 suggests that it had a curious T-shape with its main entrance that was oriented at about 124.5° azimuth, that is, at about 34.5° south from the east. Figure 4.3 shows a satellite photograph of the Acropolis of Cumae with the ruins of the two sacred buildings. Figure 4.4 shows that this direction corresponded to the sunlight line at dawn during the winter solstice, when the Sun was about 2.2°-2.7° high and rose over the mountains southeast of Cumae. Therefore, the orientation of the building perfectly matched this event celebrated by the Greeks as the Nativity of the Sun, that is, of Apollo. This astronomical evidence could be a strong indication that this temple was dedicated to Apollo. Moreover, the place traditionally known as the *Cave of the Sibyl* is also close to this temple; the Sibyl was the high priestess who presided over the Apollonian Oracle of Cumae.

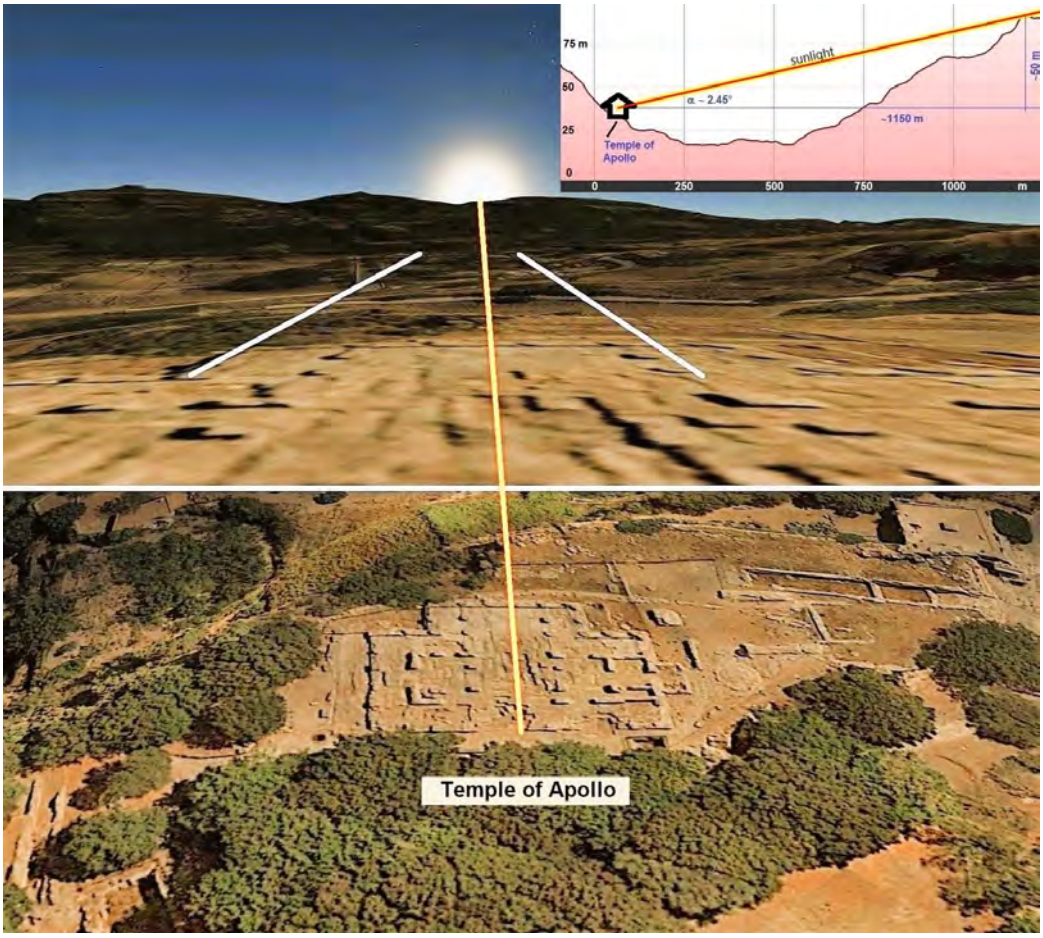

Fig. 4.4 *Reconstruction of the dawn of the winter solstice seen from the Temple of Apollo atop the Acropolis of Cumae (Google Earth Pro). Insert: present-day elevation profile.*

Apollo was the Sun and the God of all arts – music, prophecy, poetry, medical arts, and science – that enlighten intellect. His main symbols are the Sun and the lyre or cithara. The winter solstice was the universal celebration of the Sun-god (Horus), born of the great Egyptian mother goddess Isis. On the same day of the year, the Greek goddess Latona gave birth to the bright and shining Apollo while Demeter, the Great Goddess of Mother Earth, gave birth to Dionysus. Additionally, in Rome, the winter solstice – the shortest day of the year – was celebrated as the *Dies Natalis Invicti Solis* (the birthday of the *Invincible Sun*) as well as the birthday of Mithras, the Persian god of light and the protector from dark evils. Even today, on the winter solstice in Japan, the Shinto religion commemorates the exit from the cave of the great Sun-goddess *Amaterasu Omikami*, which translates

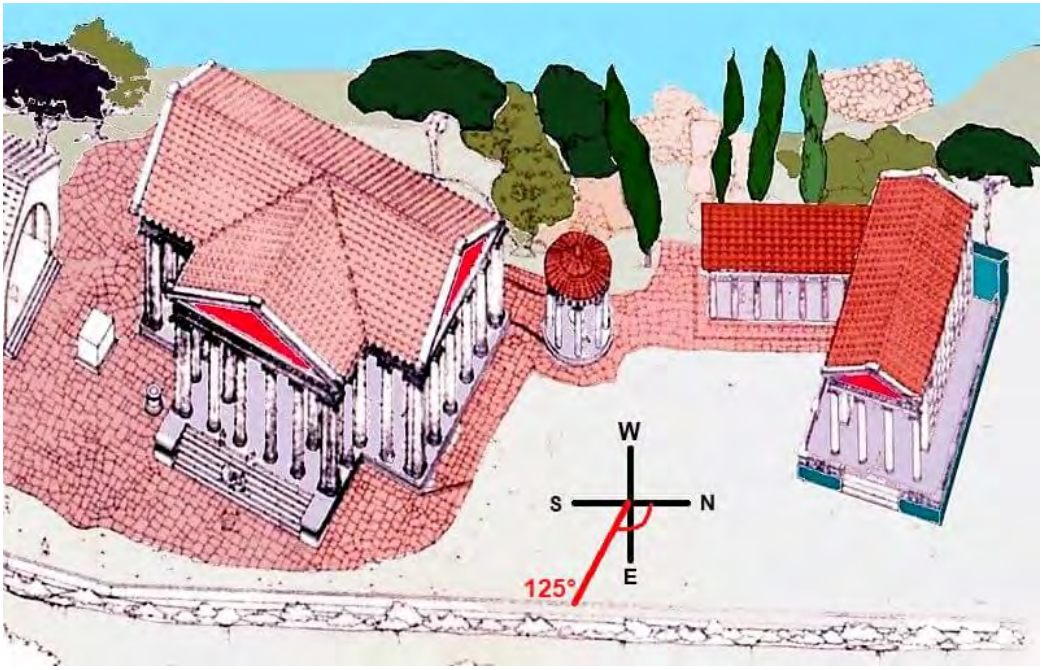

Fig. 4.5 *Artistic elaboration taken from an axonometric reconstruction of the Temple of Apollo in Cumae (Ruggero Morichi, 1992). The entrance faces sunrise during the winter solstice (cf. Figure 4.4).*

as '*the great august goddess who shines in heaven*'; this goddess is regarded as the mythical direct ancestor of the Japanese emperor.

In Magna Graecia, the Temple of Apollo in Cumae (Figure 4.5) enjoyed considerable fame as the seat of the Sibyl of Cumae, the most important Oracle of Apollo in the West and the second in importance after the Pythia of Delphi. As we will see, the angle of about 34.5° of the sacred building is considerably important because, with a small correction in the cardinal axes, whose motif will be explained in the following sections, it is equivalent to an angle of 36°, which is closely related to the Pythagorean golden ratio 'Φ'.

Another Greek colony founded in the same area after Cumae but before Neapolis was *Dicearchia*, which the Romans named *Puteoli*, the modern Pozzuoli. The city, which is between Cumae and what was to become Neapoli, is in the homonymous gulf of the still-active volcanic area of the Phlegrean Fields (*Campi Flegrei*). According to legends, some refugees from Samos founded this colony in 531 BC, a fact that could have been facilitated by the friendship between Samos and Chalcis, the Cumaeans' homeland. The city, occupied by the Samnites in 421 BC following their conquest of Cumae and its territory, passed into the hands of the Romans

Fig. 4.6 *The ancient city of Dicearchia-Puteoli (Pozzuoli) and the Flavian Amphitheatre oriented at 36° south to the east (126° azimuth, blue line).*

in 338 BC. Under the Romans, Puteoli enjoyed a notable economic development, becoming Rome's main Tyrrhenian port, at least until the creation of the large port of Trajan in Ostia (1st century AD).

Identifying the direct Greek cultural roots of ancient Dicearchia is an arduous task. However, the Samnites first and the Romans afterwards likely conserved the old religious traditions of the city. Figure 4.6 shows a model of ancient *Puteoli*. The city does not appear to have a geographical orientation. However, Dicearchia

had two large amphitheatres. The most important of the two was the the Flavian Amphitheatre (1st century AD), which was built upon an older existing structure; it was third in size after Rome's Colosseum and Capua's Campano Amphitheatre, and it remains stunning today. The Flavian Amphitheatre was nearly perfectly aligned at 126° azimuth, or 36° south from east, meaning that the structure was practically aligned with the morning light line on the winter solstice, when the birth of the Sun-god was celebrated. The other amphitheatre was smaller and was nearly perfectly aligned with the cardinal axes and the equinoctial line.

Thus, the orientation of the twoamphitheatres of Puteoli mimicked that of the two temples on the Acropolis of Cumae. As a result, it is possible that the Flavian amphitheatre in Puteoli was dedicated primarily to Apollo, and that any performances held there were also primarily offered to this deity. The other amphitheatre could have been mainly dedicated to Zeus and/or Demetra.

Dedicating such structures to a main deity could have been common among ancient communities. For example, the *Colosseum*, the great amphitheatre of Rome, is named so because of the *Colossus Solis*, the 30-37-metre-high statue of the Sun-god Apollo that was placed near its entrance in 127 AD by Emperor Hadrian.[29] Perhaps the amphitheatre in Rome was initially dedicated mostly to the Sun-god of Rome, which is why the Romans began to name the amphitheatre after the massive statue of the god.

In Italy, even in our days, modern multi-purpose sports facility stadiums, and theatres are often named after some religious figure. For example, the large sports facility stadium[30] located in *Fuorigrotta* (which is the 10th municipality of Naples) was named in 1959 the *Stadio del Sole* (which means the 'Stadium of the Sun') and was renamed in 1963 the *Stadio San Paolo* ('Saint Paul Stadium') to celebrate the tradition according to which St. Paul reached Italy by docking in *Puteoli*, whose territory likely extended up to *Bagnoli* e *Fuorigrotta*, which today are within the municipality of Naples. Similarly, the opera theatre in Naples is named after a saint: *Real Teatro di San Carlo*, that is, the 'Royal Theatre of Saint Charles'.[31]

The Flavian Amphitheatre in *Puteoli* is especially important also because this is the place where, with a spectacular miracle, Bishop Januarius (the future saint patron of Naples) showed to the populace the superiority of Jesus Christ over

[29] This gigantic statue is also known as the *Colossus Neronis* ('Colossus of Nero') because it was created to represent the Emperor Nero and was located in the vestibule of the emperor's royal palace, the *Domus Aurea* ('Golden Palace'). After the death of Nero, in 68 AD Emperor Vespasian added to the statue a radiate crown and dedicated it to Apollo.

[30] Since 2020, the stadium has been named after Diego Armando Maradona, the former Naples soccer captain.

[31] *Real Teatro di San Carlo* is the oldest opera house in Europe.

Figura 4.7 *Saint Januarius in the Amphitheatre of Puteoli (Artemisia Gentileschi, 1637). According to tradition, at the moment of the execution, a miracle happened: the beasts laid themselves down in tame submission at his feet.*

Apollo. During Diocletian's persecutions (April 305 AD), the Christians Festus, Desiderius, and Sossius, along with their bishop Januarius, were condemned to be killed by ferocious animals inside the Amphitheatre to entertain the pagan populace. According to tradition, however, the so-called 'spectacle' was suddenly suspended because the beasts bent down before Bishop Januarius in prayer. The populace, impressed by the prodigy, showed their sympathy towards the four men.

Fig. 4.8 *Apollo Citharoedus (Apollo with a cithara). National Archaeological Museum of Naples.*

However, the four prisoners, together with the Puteolans Proculus, Eutyches, and Acutius who were requesting the liberation of the four men, were beheaded on 19th September near the Solfatara. The epilogue (Chapter 17) explains how this event marked the dramatic shift of Neapolis from pagan culture to Christianity and permeated the history of Naples up to our days.

The following chapter focuses on the cosmology and mystical geometry of Pythagoras. As I will explain later, the Pythagorian doctrine, together with the Cumaean Sun-cult, may have inspired the builders of Neapolis.

Chapter 5
Pythagoras' cosmology: the numbers '10' and 'Φ'

Neapolis was founded during the early Classical Period when in *Magna Graecia* the Pythagorean school developed. Pythagoras' philosophy was founded on the Greek Sun religion, and on complex mathematical and geometric concepts.[32]

Pythagoras of Samos (580-570 BC – 495 BC), one of antiquity's most important and fascinating individuals, is regarded as one of the greatest teachers from the time of Plato and Aristotle to the present. Pythagoras' legacy around the world is immortal.

According to a legend his father Mnesarco went to Delphi to inquiry the Pythia (the most important Apollonian Oracle of Greece) about his future, and the priestess foretold he would father a wise son who would be useful to mankind.[33] The name '*Pythagoras*' derives from '*pythios*' (a term related to the oracles of Apollo, like the Pythia) and *agora* (the city square). Thus, the name could have meant '*the Oracle* (of Apollo) *in the City* Square'. In Apuleius' words (c. 124 – after 170 AD) Pythagoras was also the first to take the title of '*Philosopher*', meaning '*Lover of Wisdom*'.[34]

Known as a philosopher, mathematician, thaumaturge, astronomer, scientist, and politician, he founded the Pythagorean School in Crotone (Calabria), which, at the time, was one of the main hubs for scientific, mathematical, philosophical, and political knowledge with a focus on the art of music. This school was a religious community focused on the Sun cult and the Orphic-Dionysian rites. Pythagoras' life was enveloped in mystery and legends. What we know about him comes from the writings of some of his disciples, who were almost his contemporaries (such as Xenophanes, Heraclitus, Herodotus, and others) who wrote

[32] Charles H. Kahn, *Pythagoràs and the Pythagoreans*, Indianapolis, Hackett Publishing, 2001.

[33] Christoph Riedweg, *Pitagora: Vita, dottrina e influenza*, Vita e Pensiero, Milano, 2007.

[34] Diogenes Laertius, *Lives of Eminent Philosophers*, translated by R. D. Hicks, Cambridge (MA), Harvard University Press, 1972, book 1, sec. 12, http://data.perseus.org/citations/urn:cts:greekLit:tlg0004.tlg001.perseus-eng1:1.prologue (accessed on 21/05/2024).

Fig. 5.1 *(Left) Bust of Pythagoras' head, Capitoline Museums, Rome. (Right) Unpublished image of the philosopher and mathematician painted in the pronaos of the Greek-Orthodox church of the Major Monastery of Meteora (Kalambaka, Greece). The inscriptions read: (left) THE GREEK PYTHAGORAS, and (right) PHILOSOPHER AND MATHEMATICS. The text on the parchment reads: GOD IS MIND, SPIRIT, AND LOGOS INCARNATED BY THE FATHER. The green circle with the triangle in the centre illustrates the mathematician's famous theorem.*

primarily after his death. Politically, he inspired several Magna Graecian city-state governments that successfully attempted to blend aristocratic and democratic principles. His school promoted the growth and advancement of knowledge, notably in mathematics and geometry; one of the world's most famous theorems of geometry bears his name.

His outstanding achievements have contributed significantly to the growth of Western science. He was the first to understand the value of mathematics and geometry in describing the world, which has served as the foundation for modern physics since the time of Galileo Galilei. Not surprisingly, his motto was: «*All*

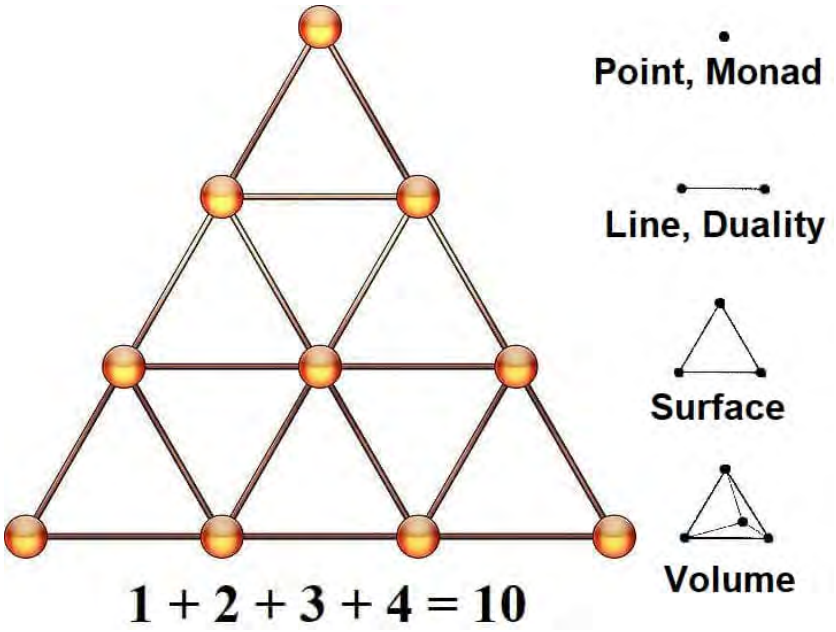

Fig. 5.2 *Pythagoras' Tetractys.*

things are number». Philolaus (470 BC – 390 BC), who helped spread the doctrine of his School, wrote: «*And indeed all things that are known have number. For it is not possible that anything whatsoever be understood or known without this*».

Pythagoras expanded his knowledge by travelling to Egypt, Babylon, and India, where he gathered and synthesised local scientific knowledge and wisdom. His beliefs marked the beginning of philosophical, ethical, and scientific reasoning founded on a love of knowledge, which influenced Greek and Western philosophy.

He was indeed one of the Greek philosophers also appreciated by the Christians.[35] The way Dante Alighieri (1265–1321) ordered and structured Inferno, Purgatory, and Paradise in his *Divine Comedy* was inspired by Pythagoras' cosmology and his metaphysics of the number '10'. Figure 5.1 also shows an image of Pythagoras in a Greek Orthodox church.

The Pythagoreans revered the divine *Tetractys*, the famous equilateral triangle made up of the numbers 1, 2, 3, and 4, whose sum is 10 (Figure 5.2). The Tetractys symbolises the harmony of the universe. Number 1 represents the point; number 2, the line; number 3, the surface; lastly, number 4 generates the space through the simplest of solids, namely the tetrahedron. Number 5, which derives from 2 plus 3 or from 4 plus 1, is the only one that is also linked to the previous two (3 and 4) through the Pythagorean theorem ($3^2 + 4^2 = 5^2$). Finally, by multiplying

[35] Paolo Vinassa de Regny, *Dante e il simbolismo Pitagorico*, Milano, Fratelli Melita, 1988.

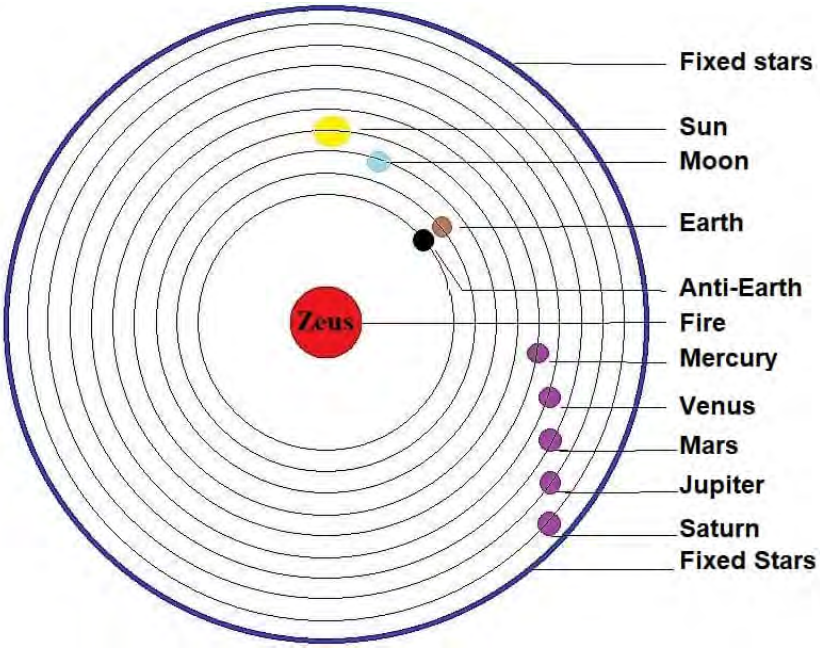

Fig. 5.3 *Pythagorean model of the cosmos; in the centre is the Cosmic Central Fire of Zeus (the Hestia of the All), which is the divine principle of the universe. The anti-Earth is always placed in front of the latter, thus preventing the direct vision of divine Fire. Together with the Moon, the physical Sun, the five known planets, and the sphere of fixed stars added to them, a cosmos is created, which is composed of ten spheres in total.*

5 by 2, we get the number 10, which is also related to the *golden angle* of 36° because 36° is one-tenth of the circle consisting of 360°. Finally, the 36° angle is related to the golden ratio Φ. In fact, $\Phi = 2\cos(36^\circ) = 2\sin(54^\circ) = (1+\sqrt{5})/2 = 1.6180339887\ldots$ The golden ratio Φ was known also as the *constant of Phidias* or as the *divine proportion*; it was considered the utmost important symbol of cosmic harmony.

The above are some of the main reasons why today we use the decimal system based on Pythagorean tables. The decimal base was also used in Egyptian mathematics and astronomy, which likely recognised the mysticism of Φ too, as the Great Pyramid of Khufu also features a golden ratio architecture. The Parthenon on the Acropolis of Athens, as well as many other ancient and modern buildings, were designed with geometries based on the proportions of Φ.[36]

The Pythagoreans thus prayed: «*Bless us, divine number, thou who generated gods and men! O holy, holy Tetractys, you that contain the root and source of*

[36] Aida Hoteit, *Standards of Classical Architecture Criticism: Between Mathematics and Philosophy*, «Journal of Architectural Research and Development», 5 (2021), n. 2, pp. 1–20.

the eternally flowing creation! For the divine number begins with the profound, pure unity until it comes to the holy four; then it begets the mother of all, the all-comprising, all-bounding, the first-born, the never-swerving, the never-tiring holy ten, the keyholder of all».[37]

In Pythagorean cosmology, the divine Fire – *Hestia of the All* or the *Hearth of Zeus* – is the fulcrum of the universe. The Earth and the planets revolve around it, forming ten concentric circular orbits. The divine Fire of Zeus is concealed from man's gaze by an anti-Earth, an invisible planet permanently placed between the Earth and the centre of the cosmos as a screen. The physical Sun, which orbits around the Fire of Zeus like the planets, represented a kind of image of the divine Fire itself, reflecting its light onto the Earth as if it were a large mirror (Figure 5.3).[38] The physical Sun was thus viewed as the visible image of the divine principle of the universe, and as a result, human worship had to be directed towards it as the visible representation of the divine principle of the cosmos, which remained unseen to the human eye.

Even in Shintoism (a polytheistic and animist religion native to Japan), the symbolism of the universe, consisting of ten concentric circles that revolve around a mystic Sun, is still used today. The principal deity of Japan is *Amaterasu Ōmikami*, the Sun goddess, from whom the imperial family is said to have descended. This also explains why Japan's national flag displays a red rising Sun. The three most important emblems of the Japanese spirit are linked to this divinity: the mirror, the jewel, and the sword, which are housed in the three largest national temples in Japan. Figure 5.4 depicts the goddess crowned by a sixteen-rayed Sun, holding the jewel on her head and the sword and sacred mirror in her hands. The latter, the *Yata no Kagami*, is preserved in the Ise Shrine in Japan. The figure depicts a model, as the three jewels are only accessible to the imperial family and not the public. The sacred mirror recalls the Pythagorean cosmos represented in Figure 5.3, which shows the central Sun-Fire with eight rays and ten circles.

Indeed, as Copernicus and Kepler later conceded, Pythagoreanism offered a heliocentric cosmology in which the Earth circled the heavenly Fire, which the heliocentric theory of the solar system identified with the Sun itself (Figure 5.3).[39]

[37] Dantzing Tobias, *Number: the Language of Science*, New York, Macmillan, 1930.

[38] Porphyry (234 AD – 305 AD), *Life of Pythagoràs, in Pythagoras Sourcebook and Library: An Anthology of Ancient Writings Which Relate to Pythagoras and Pythagorean Philosophy*, translated by. Kenneth Sylvan Guthrie, USA, Phanes Pr, 1920; Thomas Stanley, *Pythagoràs: His Life and Teachings*, Lake Worth FL, Ibis Press, 2010; Holger Thesleff, *Pythagoreanism*, in *Encyclopedia Britannica*, 12 Jan. 2024.

[39] Johannes Kepler, *Epitome Astronomiae Copernicanae* (1618–1621), in *Epitome of Copernican Astronomy and Harmonies of the World*, translated by Glenn Charles Wallis, Prometheus Books, 1995, book 4, sec. 1.2.

Fig. 5.4 *(Left) The Sun-goddess Amaterasu Ōmikami with the symbols of the mirror, the jewel, and the sword. (Right) Representation of the Sacred Mirror with the Sun in the centre, surrounded by ten concentric circles.*

The number 10 is also related to another key Pythagorean symbol: the pentagram, which is a regular five-pointed star polygon. The pentagram proportions are related to the *golden ratio* Φ, which is defined as the ratio between the diagonal and the side lengths of the pentagon, as Figure 5.5 shows. In nature, many leaves and flowers resemble the pentagram. The Greeks believed that each point of the pentagram represented one of the five elements: water, earth, air, fire, and idea. Early Christians adopted the pentagram as a symbol of Christ's five wounds. However, when the higher point of the symbol is inverted downward, it is used to represent Satan and the Devil.

Pythagoras emigrated to the Greek colony of Croton in *Magna Graecia* approximately in 532 BC, where he established a philosophical and religious community. In Croton Pythagoras' followers clashed with supporters of democracy; Pythagorean meeting houses were set on fire, and numerous Pythagoreans died. Pythagoras fled to Metapontum, on the Gulf of Taranto on the Ionian Sea coast and died there around 495 BC. Many of the members of the Pythagorean School certainly fled Croton as well and relocated to other cities in Magna Graecia. It is possible that some of them travelled to Cumae. The Cumaeans could have appreciated their Sun-centred religion, cosmological understanding, and mathematical abilities and thus entrusted them with the planning of Neapolis. If so, the Py-

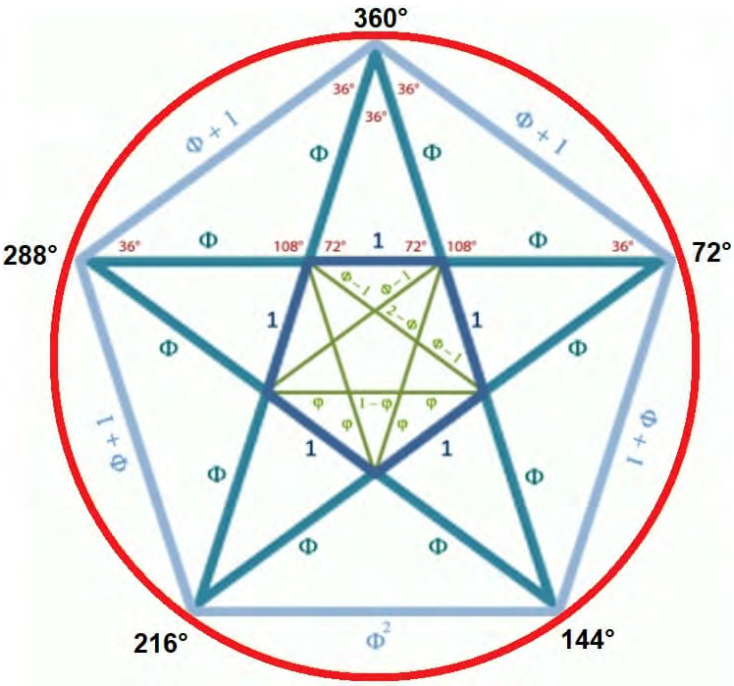

Fig. 5.5 *The Pythagorean pentagram and its proportions related to the golden ratio* Φ.

thagoreans would have included numerical and geometric elements inspired by their cosmological and religious beliefs in the planning of the New City.

Indeed, famous Renaissance architects such as Fra' Giocondo and numerous modern historians have suggested that the *ideal city* described by Roman architect Marco Vitruvio Pollione (c. 80-70 BC – after 15 BC) in *De Architectura* (30 BC – 15 BC) was specifically inspired by the geometries of the street grid of Neapolis.[40] The historic centre of Naples is known to be one of the best-preserved examples of Hippodameian cities in the Mediterranean area, and was designated a UNESCO World Heritage Site in 1995.[41] However, Neapolis precedes Hippodamus' works. Actually, I will demonstrate that Neapolis has unique architectural elements that cannot be found in Hippodamus' plain orthogonal street grid but may be drawn from Pythagorean cosmology. The next Chapters will examine the

[40] Gustaf Hamberg, *Vitruvius, Fra' Giocondo and the city plan of Naples*, «Acta Archaelogica», 36 (1965), pp. 105–125; Alexandros Lagopoulos, *The semiotics of the Vitruvian city*, «Semiotica», 2009 (2009), n. 175, pp. 193–251; Vitruvius, *De Architectura*, in *Vitruvius Ten Books on Architecture*, translated by Ingrid D. Rowland & Thomas N. Howe, Cambridge, Cambridge University Press, 2001.

[41] Osservatorio Permanente Centro Storico di Napoli, UNESCO, 2013, https://www.comune.napoli.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/24103 (accessed on 21/5/2024).

Fig. 5.6 *Artistic reconstruction of the Colossus of Rhodes (3rd century BC) located at the port (city entrance), which represented Helios, the Sun-god. The radiate crown on the head of the statue is a specific symbol of the Sun. (Coloured print, 19th century).*

cultural context of Neapolis and argue that its urban planning was likely influenced by Pythagorean cosmology and the cult of the Cumaean deities, including the Sun-god (Helios/Apollo), Parthenope (to whom the Neapolis was dedicated), and *Sebethos* (the River-god).[42]

[42] Jessica Hughes and Claudio Buongiovanni, *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, Oxford UK, Oxford University Press, 2015.

Chapter 6
The foundation of Neapolis: the new city of Parthenope

Neapolis means '*New City*'. The denomination is clearly unusual; in reality, the new urban centre was nothing but the new city of *Parthenope*. In fact, various ancient writers used the name 'Parthenope' to refer to the New City. Worth mentioning among them is *Publius Vergilius Maro* (70 BC – 19 BC) – commonly known as *Virgil* – the most illustrious Roman poet and a most beloved citizen of Neapolis, who requested to inscribe the following epitaph on his grave: «*Mantua me genuit, Calabri rapuere, tenet nunc Parthenope; cecini pascua, rura, duces*» ('Mantua begot me, Calabria kidnapped me, now Parthenope guards me; I sang the pastures, the countryside, the leaders').[43] See Figure 6.1. Thus, the real name of Neapolis was indeed *Parthenope*.[44]

Historical evidence suggests that the name '*Neapolis*' was used to distinguish the new urban centre from the pre-existing townlet of Parthenope. The latter was founded by the Cumaeans in the 8th century BC on Mount Echia (today also called *Pizzofalcone Hill* or *Monte di Dio*), about 2 kilometres south-west of the walls of Neapolis (Figure 6.2).[45] The area was likely drawing Greek colonists due to its warm coastal environment, natural harbours, and fertile volcanic soil.

Between 525 and 474 BC, the old city of Parthenope declined for unknown reasons. Some of the causes could have been its destruction or abandonment by the Cumaeans, possibly due to raids by Etruscan enemies or an epidemic. Eventually, with the support of the Syracusans and the Athenians, the Cumaeans de-

[43] Virgil (70 BC – 19 BC), *Georgics*, translated by A. S. Kline, Poetry in Translation, 2002, book 4, v. 559–566.

[44] The name '*Parthenope*' derives from '*parthenos*' (meaning '*virgin*'), and '*ops*' (meaning '*eye*', '*face*', '*look*' or '*appearance*'). Thus, '*Parthenope*' could mean '*the one who has the appearance of a virgin*' or '*the one who looks like Parthenos*', that is, like the goddess represented by the constellation of the Virgin. See Chapter 13.

[45] Daniela Giampaola and Francesca Longobardo, *Napoli greca e romana: tra Museo archeologico nazionale e centro antico*, Napoli, Electa Napoli, 2000.

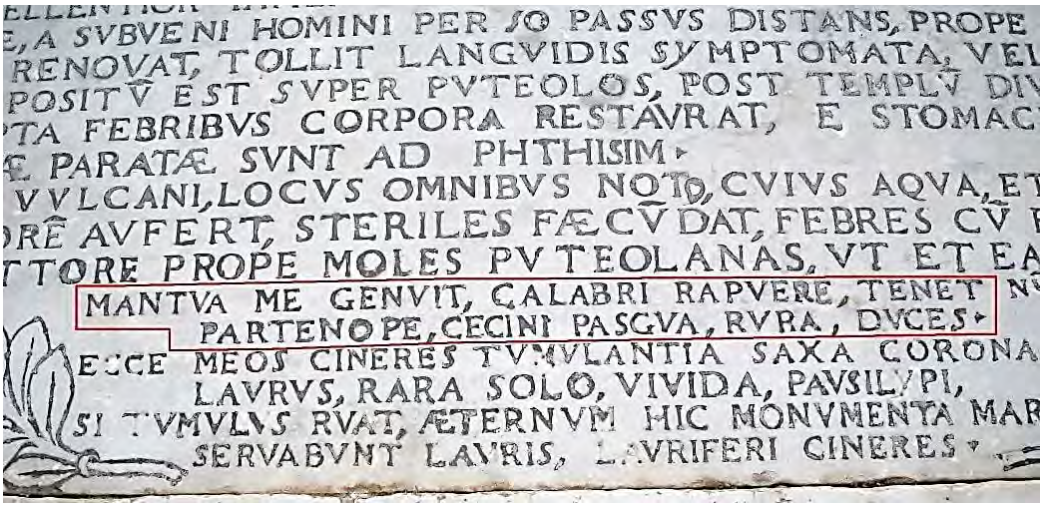

Fig. 6.1 *The epigraph on Virgil's grave, near the Crypta Neapolitana.*

Fig. 6.2 *Overview of Neapolis (left) and Palaepolis (right).*

feated the Etruscans in the historic naval battle of Cumae in 474 BC, establishing full Greek rule over the whole region.

Following such an important victory, Hieron I of Syracuse donated some helmets to the Zeus sanctuary in Olympia. Two of the three that remain are kept in the Olympia Museum, and one is in the British Museum. The latter has the dedicatory inscription: '*Hieron son of the Dinomenidi and the Syracusans to Zeus from the Tyrrhenian to Cumae*'.

It is believed that a few years later, about 470 BC, the Cumaeans founded Neapolis with the assistance of the Syracusans and the Athenians. The dating of the first tombs and coins coined in the city appears to support the above traditional time period for the foundation of Neapolis.[46] However, some recent dating of the city walls suggests that the construction of the city could have begun between the end of the 6th and early 5th century BC.[47] The initiator of the project could have been *Aristodemus* (c. 550 BC – c. 490 BC), the tyrant of Cumae. In any case, the foundation of Neapolis surely followed and served to commemorate a series of significant Greek victories over the Etruscans, which occurred in 524 BC (the land battle of Cumae), in 506 BC (the battle of Aricia), and in 474 BC (the naval battle of Cumae). Only after the naval battle of Cumae in 474 BC, the area could have been safe enough to support the construction and development of a new city. Moreover, it is likely that the founding of Neapolis was also meant to thank Zeus, Apollo, and all the other deities the Greeks believed to have made such victories possible. Figure 6.3 shows a reconstruction of the Greek-Roman Neapolis.

According to the historian *Quintus Lutatius Catulus* (150 BC – 87 BC), an Oracle (from Cumae or Delphi) directed the Cumaeans to establish a new city that would replace the fallen village of Parthenope and thus serve as the site for the rites and festivities dedicated to Parthenope.[48] This information highlights the presence of a very important cult of Parthenope among the local Greek communities. If the Oracle in question was the Pithia of Delphi, the decision to establish the new city of Partenope must have had global significance within the Greek world.[49]

The new city was erected on a tuff hill overlooking the sea to the south. For the other three directions, the city was surrounded by tributaries of the river *Sepeithos* ('Sebethos' or 'Rushing Flow'), which ran around the city, transforming it into a type of islet surrounded by water in all directions, as shown in Figure 6.3 (cf. Figure 9.6).[50] By land, it was accessible only via several bridges; *Porta Capuana* to the east served as the major city entrance. Because of the presence of two adja-

[46] The year 472 BC shall be taken as the foundation year of Neapolis in the ensuing chapters.

[47] Daniela Giampaola and Bruno d'Agostino, *Osservazioni storiche e archeologiche sulla fondazione di Neapolis*, in *Noctes Campanae. Studi di storia antica ed archeologia dell'Italia preromana e romana in memoria di Martin W. Frederiksen*, edited by William V. Harris & Elio Lo Cascio, Napoli, Luciano, 2005, pp. 49–80; Emanuele Greco and Mario Torelli, *Storia dell'Urbanistica. Il Mondo Greco*, Roma-Bari, Laterza, 1983.

[48] Lorenzo Miletti, *The image of the classical Naples in Strabo's Geography and other ancient literary sources*, in *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 19–38; Giovanni Antonio Summonte, *Historia della Città e Regno di Napoli*, Antonio Bulifon, Napoli, 1601, book 1, c. 2–3, pp. 3–32.

[49] The Pithia was the highest Greek authority to speak in the name of the Sun-god Apollo.

[50] Today, these tributaries of the Sebethos are not visible, having been deviated or covered.

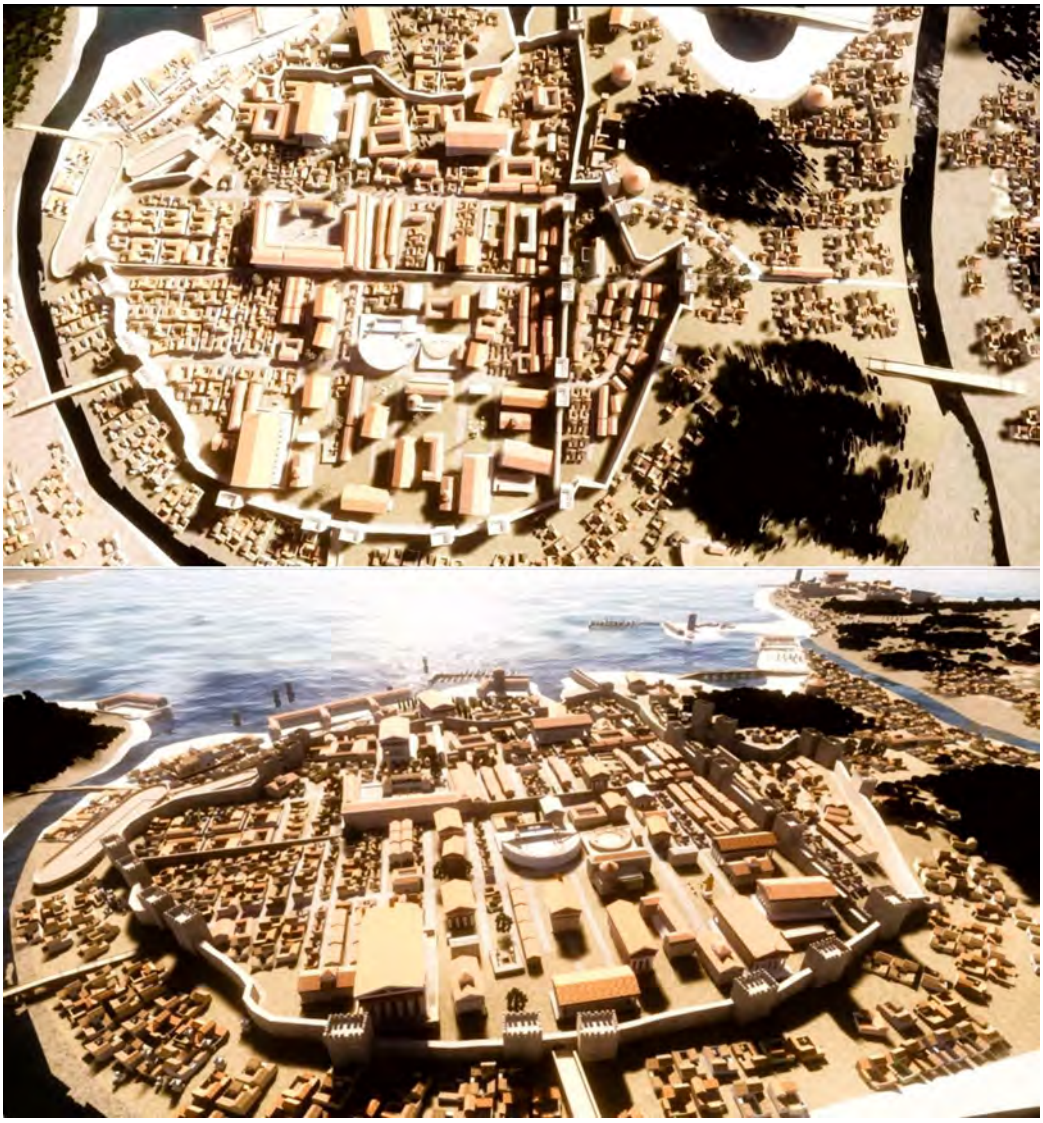

Fig. 6.3 *3D reconstruction of Neapolis (Marco Mellace, 2023).*

cent and homonymous urban centres, the new city of Parthenope was immediately named (or nicknamed) *Neapolis*, while the former townlet was renamed (or nicknamed) *Palaepolis*, which means the 'Old City'.

Unlike Palaepolis, Neapolis was fortified with massive defensive walls. The new city was basically impregnable thanks to the two defensive circles formed by the walls and the water ring. Chapters 10 and 11 demonstrate how these ideal circles, which indicate the city's inner and outer boundaries, are critical in reconstructing the golden-ratio geometric proportions of its decumans and cardines as

Fig. 6.4 *Foundation of the city of Naples by Parthenope. Late 18th century print, Milan, Castello Sforzesco, Bertarelli prints collection. (Digitally coloured).*

well as their orientation to the surrounding area. An important event that took place in 216 BC provides evidence for the impregnability of the city. Hannibal's Carthaginian army stormed into Italy, destroying, and subduing several cities, including Capua (second in importance to Rome). They also besieged Neapolis. Despite this advance, Hannibal was forced to retreat because the conquest of the city proved impossible. During the time of the Roman expansion, even Roman armies were unable to seize Neapolis. With Rome, Neapolis only engaged in a loyal and long-lasting relationship, ensuring that its Greek culture would be preserved for generations. Neapolis was always proud of its Greek heritage, even throughout Roman imperial times.

Since 450 BC, the new city of Parthenope has grown to be one of the major maritime hubs of the Tyrrhenian Sea, as well as one of the most well-known cultural and economic locations in Magna Graecia. Even today, residents of Naples, which encompasses both Neapolis and Palaepolis, are referred to as *Partenopei*, that is, citizens of Parthenope after the city's ancient name.

Figure 6.4 shows an 18th-century print representing the founding of Neapolis. On the left, Apollo's priests, identified by the laurel wreaths on their heads, are

Fig. 6.5 *(Top) Ancient cardo of Neapolis visible to tourists inside the 'Naples Sotterrata' (Naples buried) site, an archaeological area of the complex of San Lorenzo Maggiore near the agora of the ancient Graeco-Roman city. (Bottom) Greek walls in Piazza Bellini.*

presenting sacrifices to Parthenope. Parthenope wears a rayed crown, which represents her relationship with the Sun-god Apollo (cf. Figures 3.3 and 5.6). Finally, in the lower right, the River-god Sebethos is lying on the river, attending the ritual; alongside him is a cornucopia full of food. This last image represents the wealth and abundance that accompanied numerous deities considered to be the dispensers of the products most needed by humans.

Chapter 7
The orientation of the decumans and cardines of Neapolis

Let us now examine the street layout of Neapolis. To begin with, the geometry of the city appears to be significantly more complex than a simple regular orthogonal street grid, such as those found in ancient Agrigento, Miletus, and Pireus. The first impression is that the positions and lengths of the internal roadways of Neapolis appear to be proportional to the size of the circular boundary of the city.

Figure 7.1 shows an archaeological map of Neapolis and Palaepolis with the ancient coastline and harbour, superimposed on a modern map of Naples.[51] Figure 7.2 is a reconstruction of the Graeco-Roman city drawn inside the defensive walls and entrance doors (Figure 2.6 and Figure 6.3).[52]

The street grid is made of three decumans: the *upper* (or *northern*) decuman, currently *Via Sapienza*, *Via Pisanelli*, and *Via Anticaglia*; the *central* (or *main* or *maximum*) decuman, today's *Via dei Tribunali*; and the *lower* (or *southern*) decuman, which includes *Via Benedetto Croce* and *Via San Biagio dei Librai*. The original width of the main decuman was probably about 12 metres, while that of the upper and southern ones was at least 6 metres.[53] Their length measures less than 1 kilometre, that is, about five Greek *stadia*, and the distance between two adjacent decumans is about 190 metres, that is assumed to be one Greek *stadium*.[54]

The upper decuman included the theatres; the central one (with the agora) was the religious and political centre; the lower decuman included the merchant and

[51] Daniela Giampaola, *Archaeology and the city: the waterfront redevelopment*, «Journal of Land Use, Mobility and Environment», 2 (2009), n. 3, pp. 37–46.

[52] Renato Quaranta, *Atlante-Guida della Napoli Greco-Romana*, Napoli, Intra Moenia, 2010.

[53] The distance between the decumans of Neapolis was measured with Google Earth Pro.

[54] The *stadium/stadion* was a unit of length, which in Athens corresponded to about 185 metres, but it varied among the Greek communities; Edward Gulbekian, *The origin and value of the stadion unit used by Eratosthenes in the third century BC*, «Archive for History of Exact Sciences», 37 (1987), n. 4, pp. 359–363.

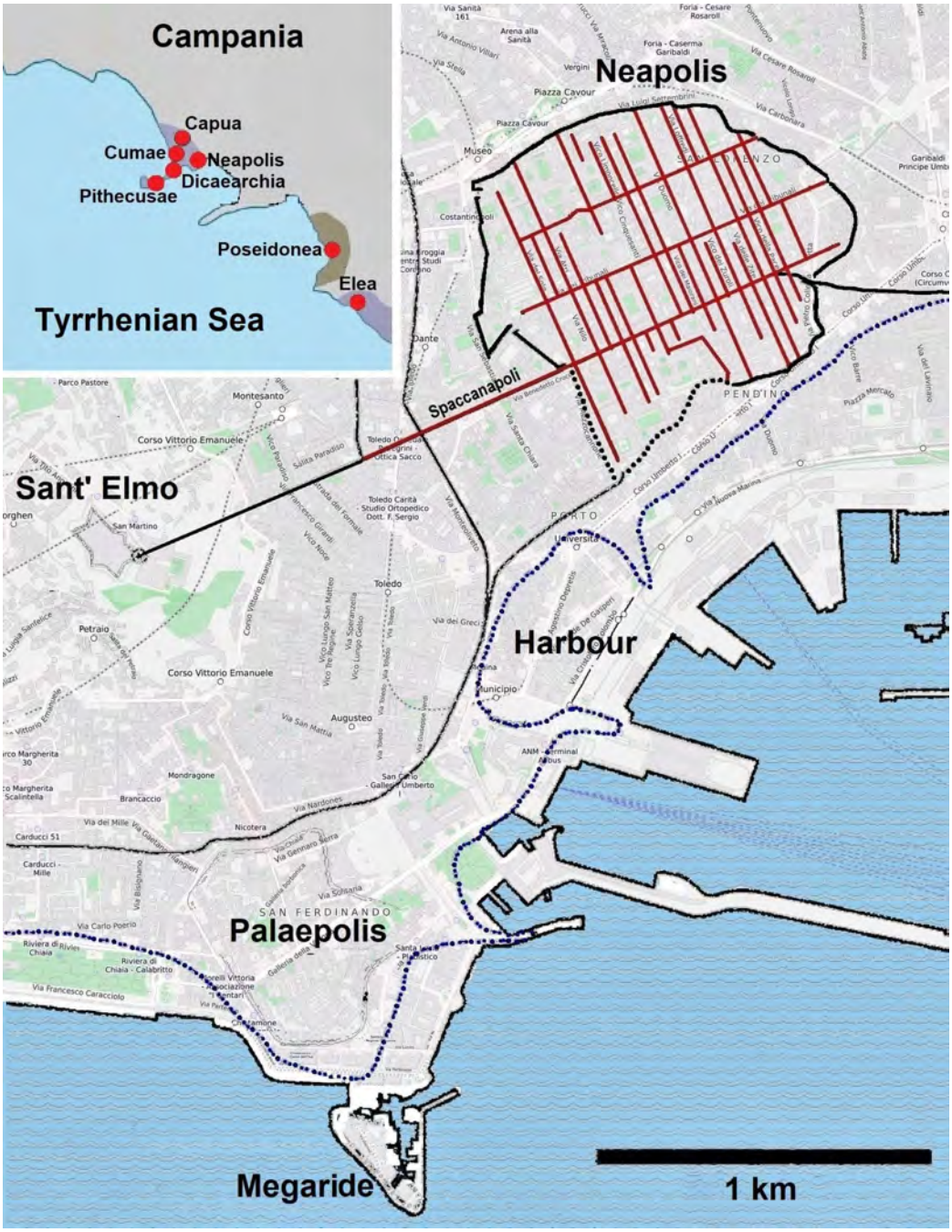

Fig. 7.1 *Archaeological map of Neapolis and Palaepolis with the ancient coastline (blue dots). The lower decuman (Spaccanapoli) points directly towards Sant'Elmo Hill.*

commercial areas, probably because of the proximity to the port. In more recent times, the latter, together with its extension towards Sant'Elmo Hill, has taken on the nickname of *Spaccanapoli* at least since the 16th century AD because it divides Naples into two almost equal sections (Figure 1.2).

The archaeological map in Figure 7.1 illustrates that the other structural elements of the urban plan were the twenty-one cardines. These small streets are strictly orthogonal to the decumans and connect them; they are spaced from each other by about 38 metres, or one-fifth of a *stadium*; and their width measures approximately 3 metres. Today, they include *Via San Gregorio Armeno* (the central cardo), *Via del Sole*, *Via Duomo*, and several other streets and alleys. Although the Romans restored the agora and enlarged the city in the 1st century AD, archaeological excavations suggest that the new Roman buildings – such as the Temple of the Dioscuri and the Theatre – simply replaced or expanded the original Greek ones.[55]

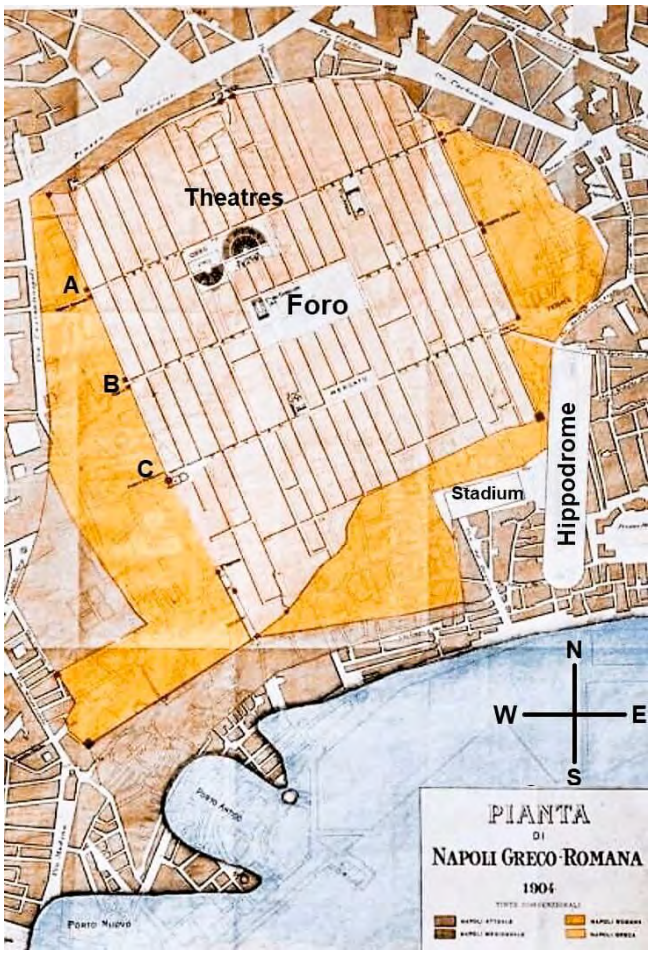

Figura 7.2 *Map of the Graeco-Roman city of Neapolis (B. Capasso, 1904).*

A satellite photograph of Naples (Figure 7.3) shows that the decumans form an angle of about 24° anticlockwise rotated with respect to the east-west equinoctial line. Thus, their northern orientation is approximately 66° azimuth.[56] *Corso Umberto I* – indicated by letter D – is at about 50° azimuth or 40° north from east.

[55] Paolo Carafa, *Culti e Santuari della Campania Antica*, Roma, Istituto Poligrafico dello Stato, 2007.

[56] The azimuth is the horizontal clockwise angle from North, that is, the angle measured by a compass.

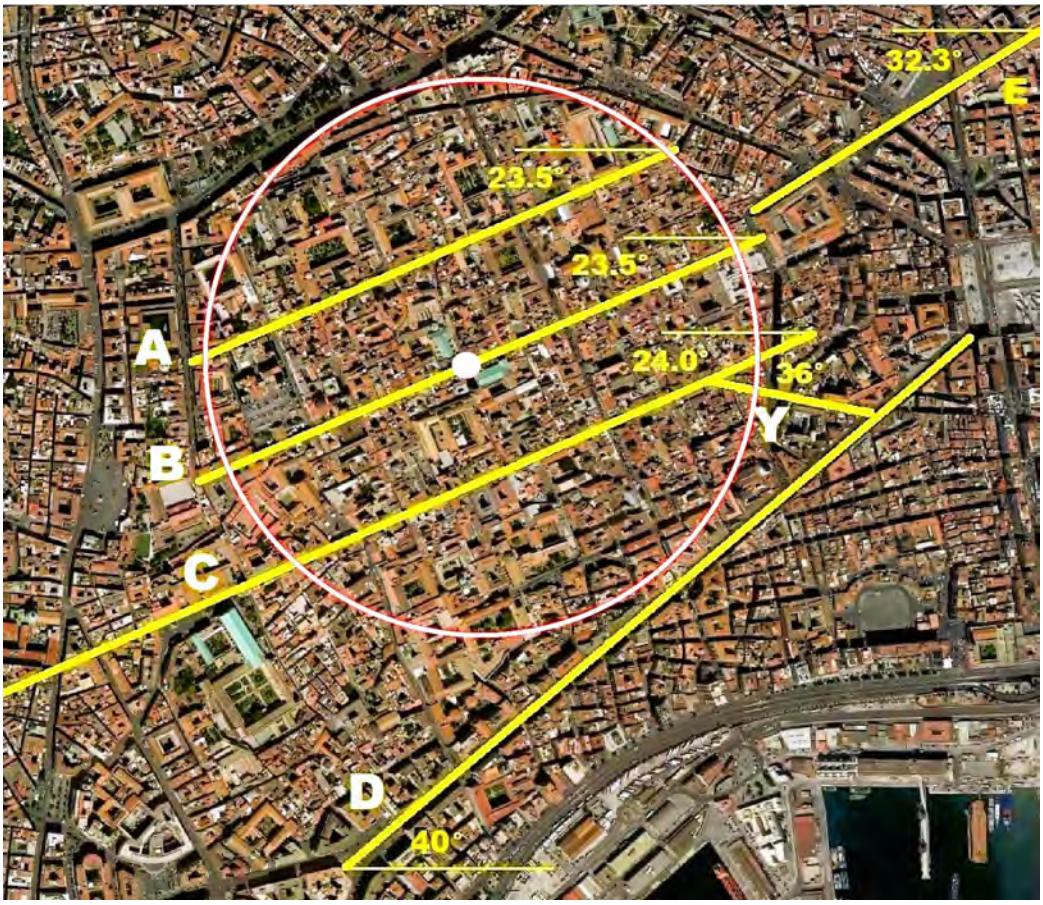

Fig. 7.3 *Satellite photograph of Naples with the three decumans (A, B, C), Via Forcella (Y), Corso Umberto I or Rettifilo (D), and Via Nuova Poggioreale (E).*

This road corresponds to the ancient coastline parallel to the tuff cliff on which Neapolis was built (compare with Figures 7.1 and 7.2).

The orientation of the segments shown in Figure 7.3 – the city's ancient decumans and other streets – was estimated with Google Earth Pro and Photographer's Ephemeris.[57] Photoephemeris is particularly useful as it provides the solar direction on a map at every moment. Both tools yield the same results. The accuracy of

[57] Photographer's Ephemeris, available at https://app.photoephemeris.com (accessed on 21/05/2024).

Google Earth images in Italian cities is about one metre, which, for our research perspective, is a negligible error.[58]

The land on which Neapolis was built goes down seawards from its north-west point (the location of the acropolis and its temples) to the south-east one. Letter E indicates *Via Nuova Poggioreale*, built by the kings of Naples in the 18th century and oriented towards the direction of sunlight at the dawn of the summer solstice or the sunset of the winter solstice, which now occurs at about 32° north from the equinoctial line. Another long street oriented towards the direction of sunlight at the dawn of the summer solstice is *Via Argine* to the east of Naples.

Figure 7.4 shows a polar histogram of the street orientations in the historic centre. The diagram is produced by software that calculates the direction of each road segment between two intersections within a chosen area and plots the statistical angular distribution in azimuth with a resolution of 1°.[59]

The diagram shows the orthogonal geometry of the streets of Neapolis clearly and elegantly. The orientation of the segments that form the decumans (green) and the cardines (purple) is between 22° and 25° anticlockwise rotated with respect to the cardinal points. The most common figure is close to 24°, with a maximum deviation of approximately ±2°. Each decuman is composed of twenty road segments that connect the twenty-one cardines; hence, its orientation is $24° \pm 0.5°$, where the statistical error is calculated as $2°/\sqrt{20}$. The letters D and Y in the insert correspond to the orientation of *Corso Umberto I* (50° azimuth) and *Via Forcella* (102° azimuth). This last road deviates exactly by 36° with respect to the lower decuman (66° azimuth).

Figure 7.5 depicts the orientation of Neapolis in the Gulf of Naples. The Somma-Vesuvius volcanic complex and the island of Capri are to the east and south of the city, respectively. The indicated azimuth of 156° is that of the principal cardo (*Via San Gregorio Armeno*), which points directly towards the Sorrentine peninsula. In comparison, the angle of 124.5° azimuth corresponds roughly to the direction of sunlight visible from Neapolis at dawn on the winter solstice, when the Sun rises above the Lattari mountains (Figure 7.5, yellow lines). This is the same orientation as the Temple of Apollo of Cumae (Figure 4.4). The angle also matches the Gulf of Naples' shoreline, as seen from Neapolis.

[58] Giuseppe Pulighe, Valerio Baiocchi and Flavio Lupia, *Horizontal accuracy assessment of very high-resolution Google Earth images in the city of Rome, Italy*, «International Journal of Digital Earth», 9 (2015), n. 4, pp. 342–362.

[59] Geoff Boeing, *Urban spatial order: street network orientation, configuration, and entropy*, «Applied Network Science», 4 (2019), n. 67; the software was developed by Volodymir Agafonkin, *Road Orientation Map*, 2022, https://mourner.github.io/road-orientation-map/ (accessed on 21/05/2024).

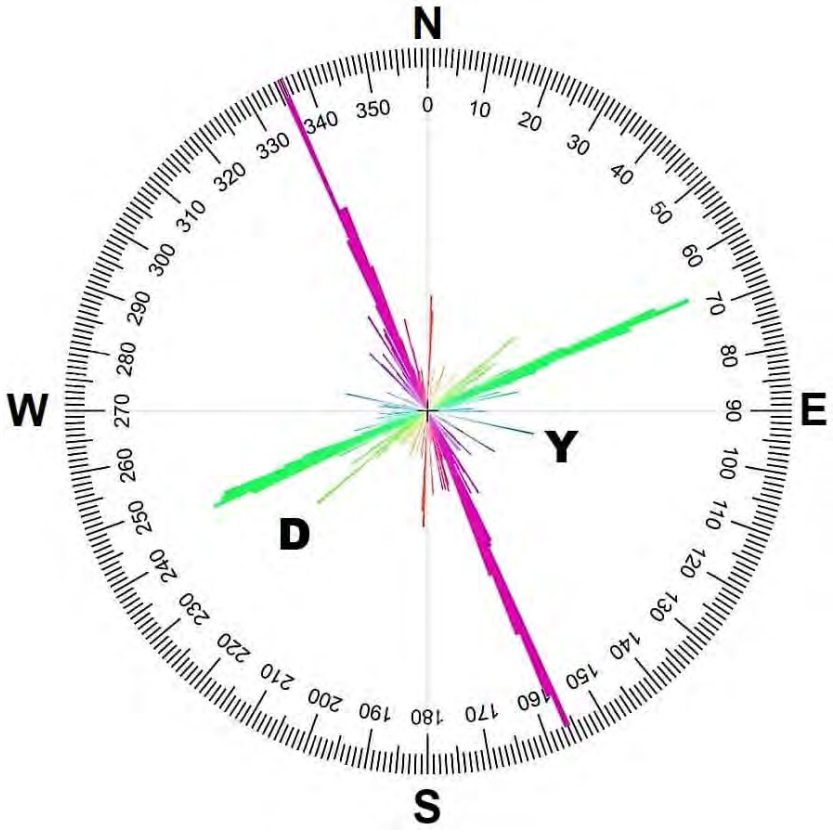

Fig. 7.4 *Polar histogram of the azimuthal orientation of the streets of Neapolis enclosed approximately within the red circle of Figure 7.3. The street axial rotation is* $-24°$.

Some important sites associated with the local siren worship are located on the Sorrentine peninsula. One of them is an antique temple at Massa Lubrese.[60] The Sirenian mountains, known as the Lattari Mountains by the Romans, comprise the Sorrentine peninsula's backbone. Another example is the small archipelago of the *Sirenuse*, which consists of three islets known as Galli off the coast of the city of Positano. According to ancient poets, this was the location where sirens lured sailors, causing them to shipwreck.

In Figure 7.5, the angle of 88.5° azimuth points towards *Monte Sant'Angelo* above *Palma Campania* to the east of Somma-Vesuvius volcanic complex, which is also visible in the background of Figure 1.2 behind the Somma slopes. The azimuth of 178.5° points towards the tip of Capri's farthest east shore (S') (see

[60] Ettore Pais, *The temple of the sirens in the Sorrentine peninsula*, «American Journal of Archaeology», 9 (1905), n. 1, pp. 1–6.

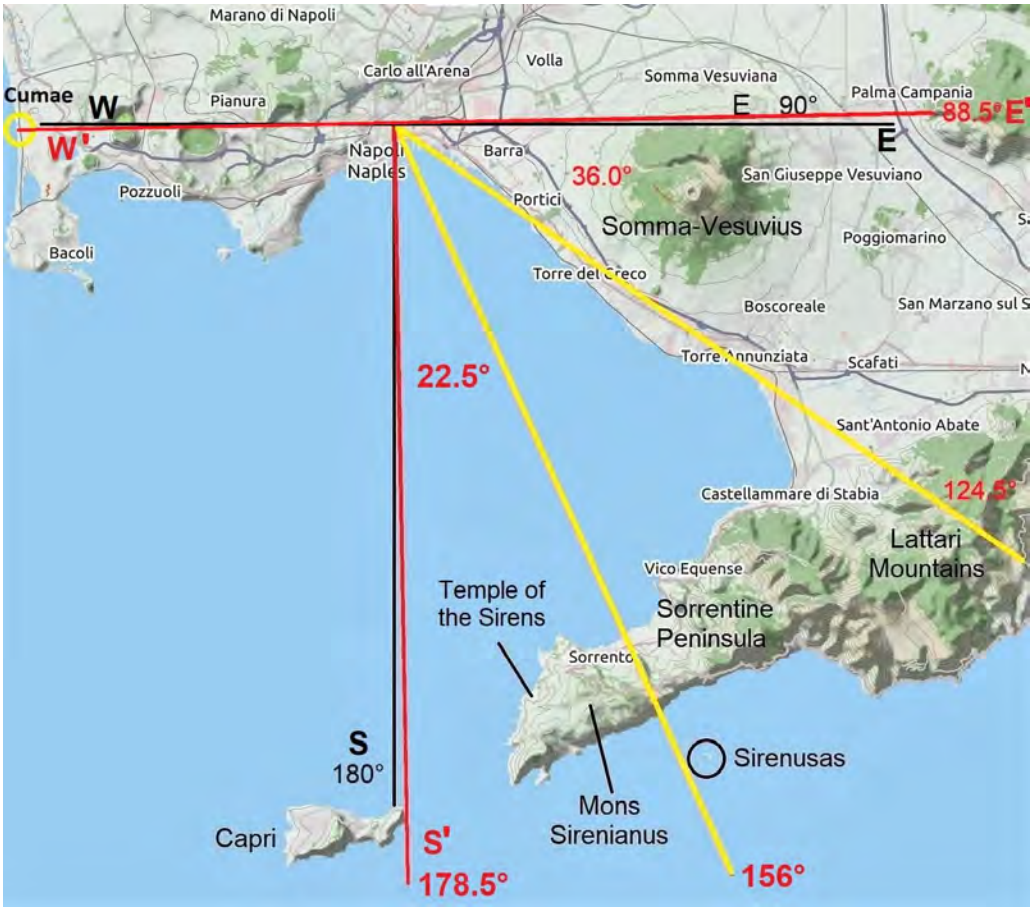

Fig. 7.5 *Geographical orientation of Neapolis according to two distinct cardinal systems. The black-line (N,E,S,W) cardinal system agrees with modern measurements; the red-line (N',E',S',W') cardinal system is rotated anticlockwise by around 1.5°. The red-line cardinal system is here proposed as the one adopted by the ancient Greeks because it is geographically practical. From the agora of Neapolis, the South (S') coincides exactly with the tip of the farthest east coast of Capri that can be precisely identified from Neapolis, as shown in Figure 7.6.*

Figures 7.5), a target that the ancient Greeks could precisely spot from the agora of Neapolis, as Figure 7.6 indicates.

The builders of Neapolis likely used S' as their south point. See also Figures 1.5 and 7.6. In fact, it is unlikely that they could precisely spot the correct south point S, as estimated by Google Earth Pro. If so, both the city streets and the solar orientations take on remarkably interesting angular values. According to the anticlockwise rotated cardinal system (N',E',S',W') on the winter solstice, the Sun

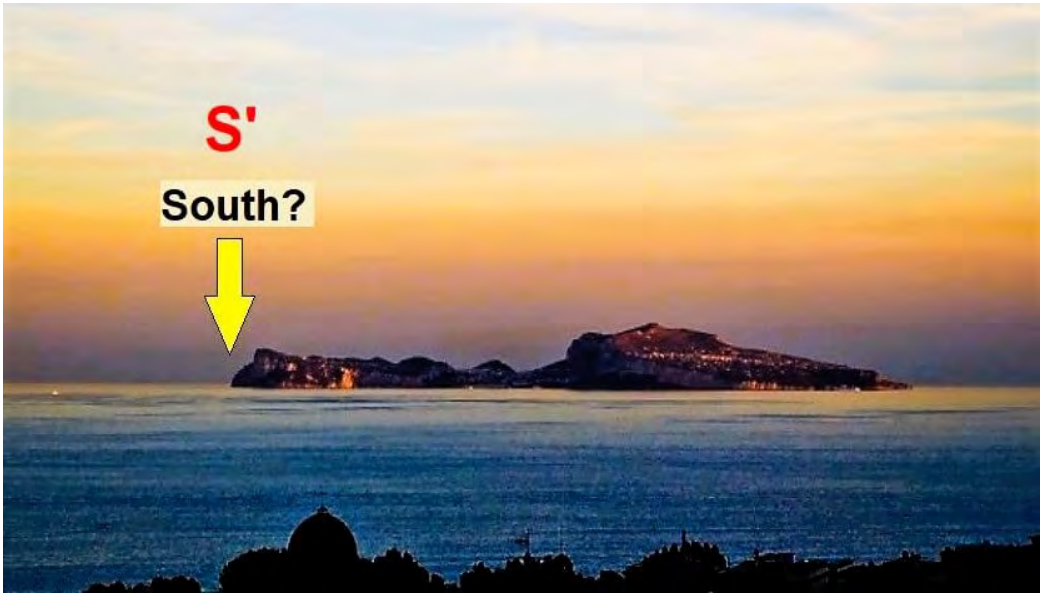

Fig. 7.6 *The island of Capri as seen from Naples with the hypothetic South point (S') according to the red cardinal system (N',E',S',W') depicted in Figure 7.5.*

rose at about 126° azimuth from N' or 36° south from E', while the decumans and central cardo are rotated about 22.5° counter-clockwise about the W'-E' equinoctial line. Furthermore, the W'-E' line perfectly links the acropolis of Cumae and Neapolis; this suggests that the equinoctial line of the rotated anticlockwise cardinal system ideally aligned the temples of the two cities with the Sun when the latter was exactly over the eastern point E'.

To summarise, the data collected so far reveals that the decumans did not follow the shoreline, nor were they oriented towards the cardinal points or the direction of sunlight at sunrise or sunset on the winter or summer solstices. What is clear is that the lower decuman orientation towards Sant'Elmo Hill was intentional. Furthermore, the Somma-Vesuvius complex, the city of Cumae, the islands of Capri and Ischia, and the Sorrentine peninsula – the home of sirens – were in all likelihood essential reference points that the builders of Neapolis could have adopted.

In the subsequent chapters, we will develop explanations for the orthogonal street grid design and orientation of Neapolis. First, we review Renato Palmieri's eclectic and inspiring proposal on the planning of Neapolis.

Chapter 8
Palmieri's neoclassical 'rêverie'

Renato Palmieri, a high school Latin and history teacher, proposed that Neapolis was planned in accordance with the Pythagorean doctrine. In 1990, he presented his model in a Neapolitan newspaper as a neoclassical 'reverie', a kind of historical fiction. He fancied to have discovered the founding document of Neapolis in a fragment of the writings by Dicaearchus of Messana (c. 370/350 – c. post 323 BC), which reported the testimony of a mysterious *Dicaearchus*, the son of *Archilaeus* the Cumaean. This ancient document outlined the cosmological and religious motivation behind the foundation of the city.[61]

According to Palmieri's imaginary story, Neapolis was created by the people of Cumae and of the old city of Parthenope. The founding took place on the winter solstice of the first year of the 77th Olympiad (26th December 472 BC), following a sacred ceremony that was held on the summit of Sant'Elmo Hill. The ritual was overseen by *Ileoty*, a wise and noble Cumaean priest with extensive knowledge on the doctrine of Pythagoras. Dicaearchus states that the street configuration of Neapolis was inspired by the peculiar direction of the sunlight as seen from the hill that day at dawn. Because the orientation of the Sun at dawn fulfilled Pythagorean cosmology, this natural spectacle was viewed as an extraordinarily auspicious omen. As a result, it was agreed that the new city's geometrical planning and orientation should serve as a reminder to future generations of the religious significance of Neapolis' founding day.

Palmieri's work is fictional but contains realistic elements. On the winter solstice the Greeks celebrated *Helioùghenna*, the birth of the Sun-god. As previously

[61] Renato Palmieri, *La chiave astronomica della fondazione di Neapolis: L'atto di fondazione di Partenope-Neapolis in una rêverie neoclassica*, «Corriere Partenopeo», 31 March 1990; also evailable in Elviro Langella, *Omaggio a Renato Palmieri*, Napoli, Istituto Italiano Studi Filosofici, 2016, https://issuu.com/elvirolangella/docs/brouchure_omaggio_palmieri, (accessed on 21/05/2024).

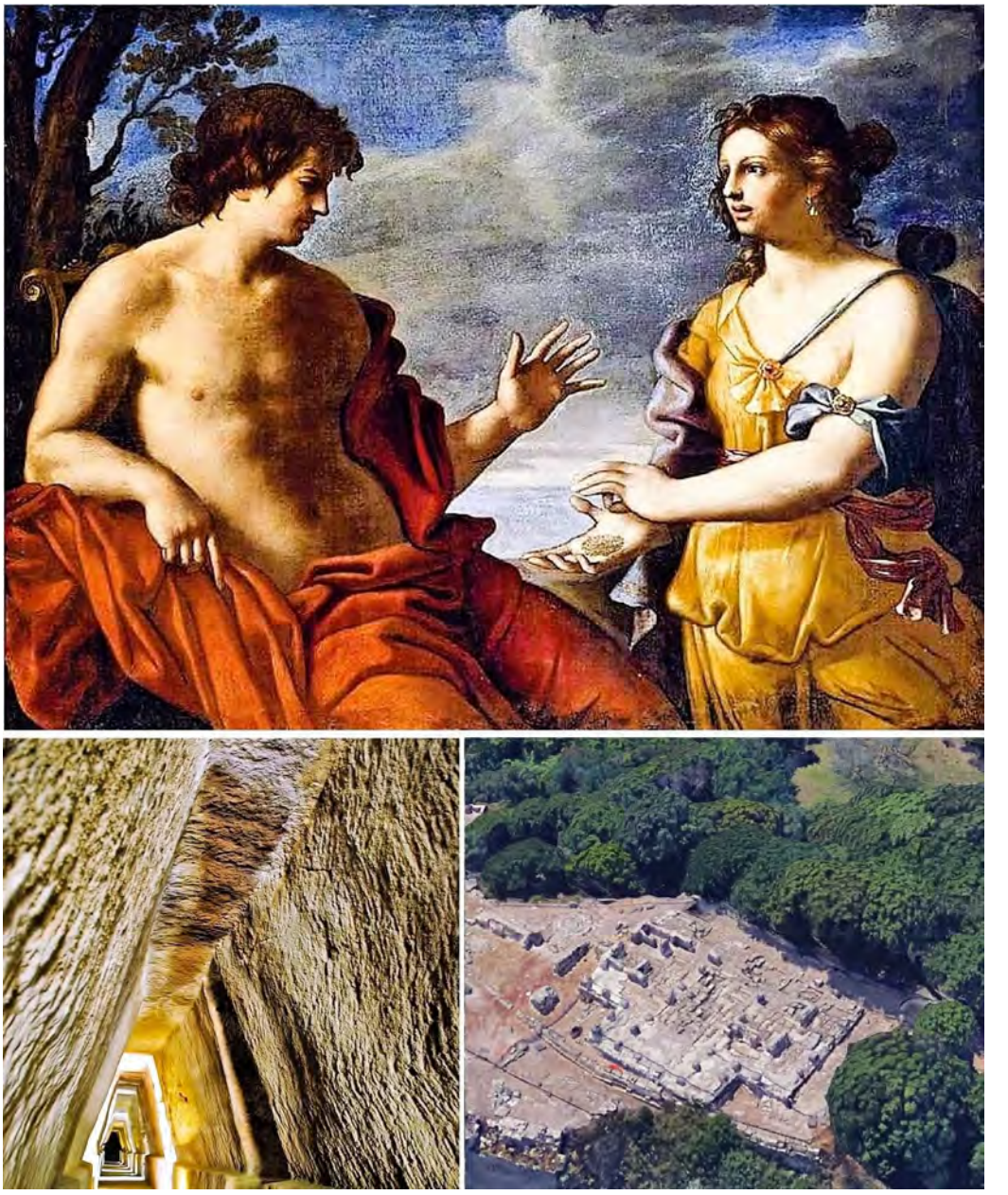

Fig. 8.1 *(Top) The Sibyl of Cumae with Apollo (by Gian Domenico Cerrini, 1609–1681). (Bottom) The atrium of the Sibyl and an overview of the ruins of the Temple of Apollo on the lower terrace of the Acropolis of Cumae.*

stated, the Cumaeans, the founders of Neapolis, had a strong devotion to Apollo, which is evidenced by their famous temple dedicated to the Sun-god (Figure 8.1).

In antiquity, the Temple of Apollo in Cumae was extremely important. Virgil narrates that the construction of the Temple of Apollo in Cumae was the work of Daedalus, the mythical Greek craftsman. At Daedalus' behest, the myth related to him was engraved on the doors of the temple. The story covers everything from the death of Androgeus to the search of the blind Theseus for Ariadne's thread. The only missing element was the story of Icarus, Daedalus' own son, who died as he was trying to reach the Sun by flying with wax wings. The narration was interrupted because Daedalus himself could no longer work due to the immense pain he felt when describing the tragic event: '*... bis patriae cecidere manus*' ('... twice the father's hands fell').[62]

Palmieri speculates that the people of Cumae were exceptionally skilled in Pythagoras' doctrine. Actually, some of the Philosopher's disciples may have been led to Cumae attracted by the local Sun-cult, which was important to both the Cumaeans and the Pythagoreans. The religious significance of Cumae was further bolstered by the presence of its renowned Sibyl, the most famous Apollonian Oracle in Magna Grecia, second only to Delfi.[63] The Sibylline Books and the oracular responses they contained have been held in the Temple of Jupiter (Capitoline Hill in Rome) since their purchase by Rome's last monarch, *Tarquinius Superbus*, who reigned from 535 to 509 BC.

Figure 8.2 illustrates Palmieri's model for the geometry and spatial orientation of Neapolis. The following references deserve particular attention: O indicates Sant'Elmo Hill; H is the centre of the agora of Neapolis, which corresponds to the intersection between the main decuman (the modern *Via dei Tribunali*) and the central cardo (the modern *Via San Gregorio Armeno*) in front of the church of *San Paolo Maggiore*, the ancient Temple of the Dioscuri; EB represents the equinoctial west-east direction; IG indicates the north-south direction; AB, CD, and EF are the three decumans. Finally, HK is the central cardo (*Via San Gregorio Armeno*), while XY is *Via Forcella*. The diagram shows that the lower decuman (the modern *Spaccanapoli*) is oriented towards Sant'Elmo Hill, an approximately 200-metre-high hill from which one can enjoy the view of Neapolis and the surrounding landscape (Figures 1.2).

On the winter solstice, as seen from point O, the Sun rises over the Lattari mountains in the direction marked by the letter R, which, according to Palmieri's calculations, is approximately 36° south of the equinoctial line. People who wor-

[62] Virgil (70 BC – 19 BC), *Aeneid*, translated by A. S. Kline, Poetry in Translation, 2002, book 6, v. 1–55.

[63] H. W. Parker, *Sibyls and Sibylline Prophecy in Classical Antiquity*, New York, Routledge, 2014.

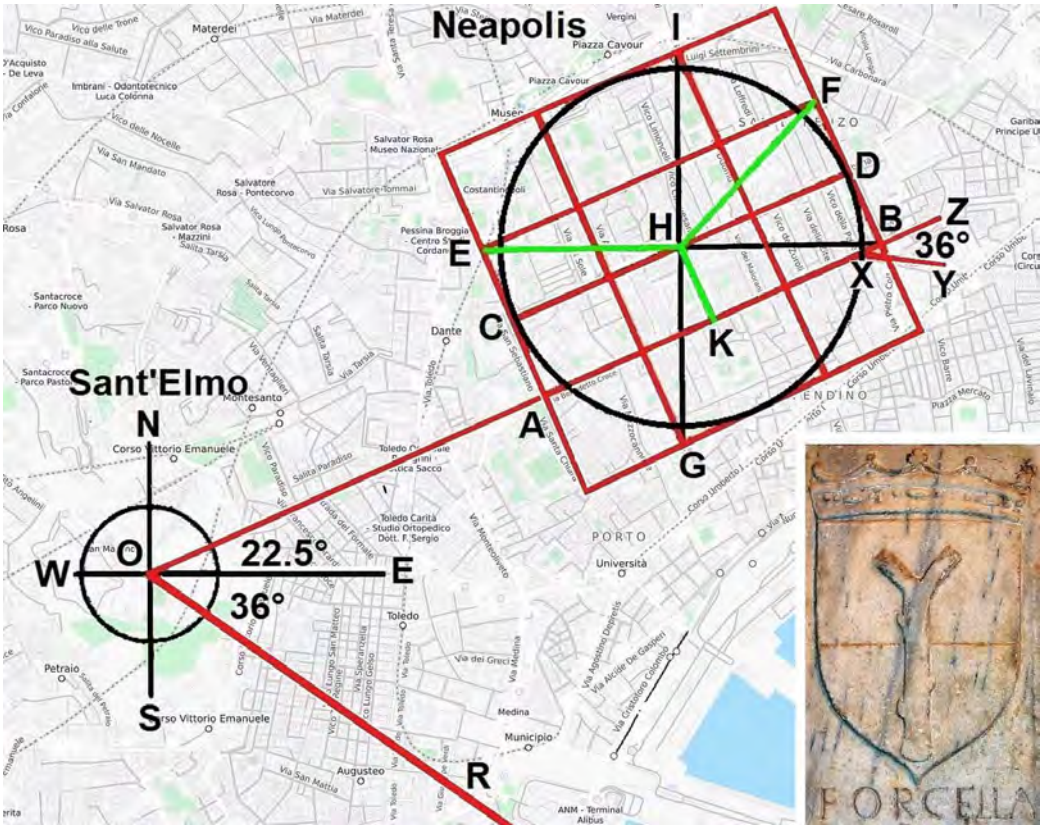

Fig. 8.2 *The urban plan of Neapolis according to Renato Palmieri. (Insert) The coat of arms of Forcella with the Pythagorean symbol Y (Diocesan Museum of Naples).*

shipped the Sun, such as the founders of Neapolis, may have regarded the direction in question as having a mystical-religious significance, and therefore the event may have been viewed as a favourable omen.

More specifically, the 36° angle – the '*golden angle*' – represents one-tenth of a circle because $36^\circ = 360^\circ/10$. The number '10' – the *Tetraktys*, or *Tetractides* – was the most sacred of the Pythagorean symbols, representing the harmony of the cosmos. The Tetraktys was chosen as the School's emblem because it signified the synthesis of the total, unity, and plurality; the entire matter, which is made up of four elements (earth, water, air, and fire) plus the spirit; and the space (point, line, surface, volume). As we discussed in Chapter 5, the number '10' denotes the mathematical sequence of the first four natural numbers ($1+2+3+4=10$) known as the theosophical sum. These figures can be arranged on four lines in the form of an equilateral triangle with side four; the ensuing geometry shapes the symbol of the sacred *tetraktys* (Figure 5.2).

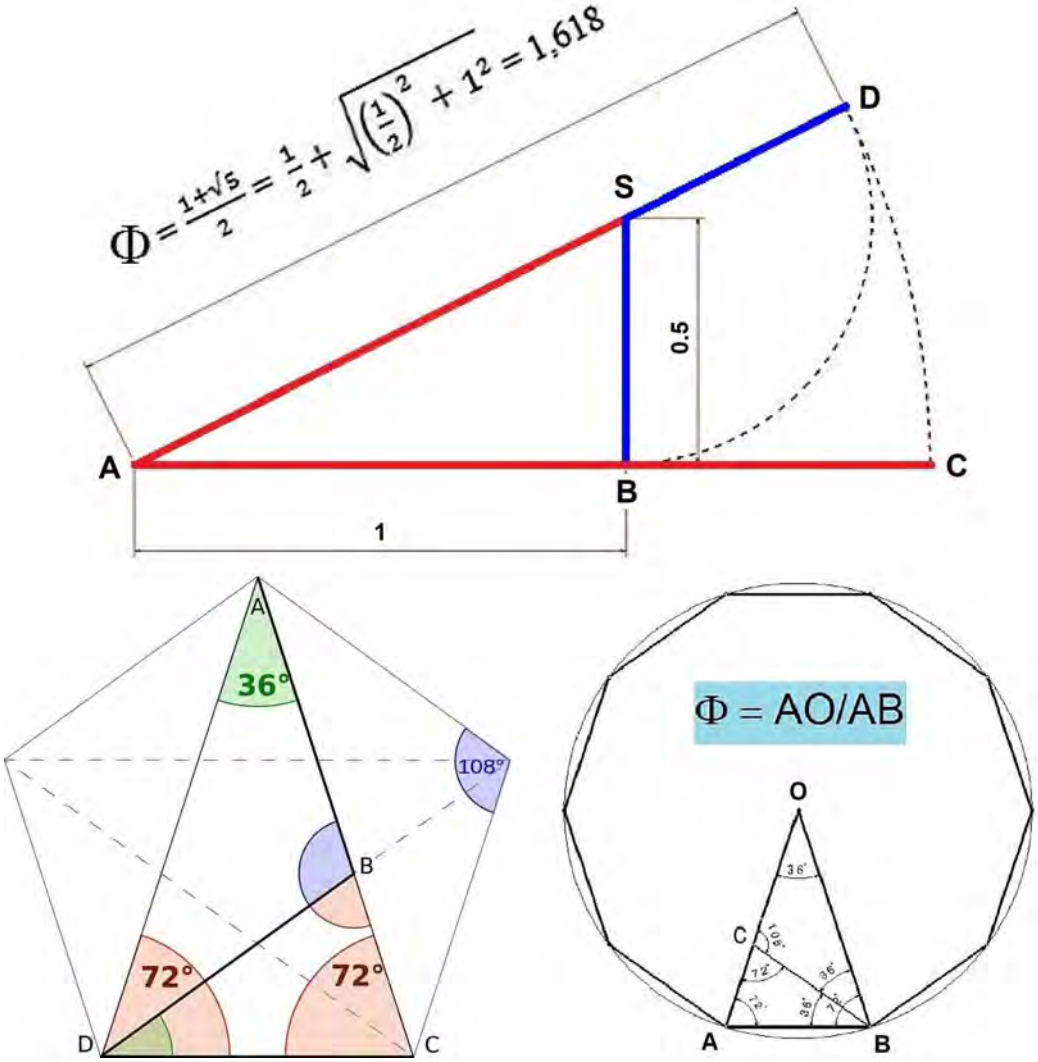

Fig. 8.3 *(Top) Geometric construction of the golden ratio Φ: AB = 1, BS = SD = 0.5, AC = AD = Φ. (Bottom) The golden triangle in the pentagon and in the decagon are characterised by an angle of 36°.*

The 36° angle defines the pentagon and decagon, which are sacred Pythagorean symbols that represent the golden ratio Φ, which is also known as the *constant of Phidias*, or *divine proportion*. In the 6th century BC, the Pythagorean School discovered that Φ refers to the division of a segment according to the mean and extreme ratio, that is, the division that divides a specific section of an AC segment

Fig. 8.4 *Church of San Paolo Maggiore in Piazza San Gaetano, the centre of the agora of Neapolis, and the location of the ancient Temple of the Dioscuri (point H in Figure 8.2).*

into two halves, AB and BC, with the result that AC/AB = AB/BC (Figure 8.3).[64] Today we can calculate the ratio as the irrational number that solves the equation $\Phi = 1 + 1/\Phi$, whose solution is the $\Phi = 2\cos(36°) = 2\sin(54°) = (1+\sqrt{5})/2 = 1.6180339887\ldots$[65] The golden ratio was well-known in ancient societies for its capacity to create harmonious geometries and was often used in religious construction.[66]

Kepler wrote: «*Geometry has two great treasures: one is the Pythagorean theorem; the other is the division of a segment according to the mean and extreme ratio. The first can be considered like a golden metre; the second like a precious jewel*».

The pentagram (a five-pointed star derived from the pentagon) was another significant Pythagorean symbol. Hygieia *Hygieia* (greek: ὑγίεια – *hugieia* = health)

[64] Steven L. Griffing, *The Golden Section: An Ancient Egyptian and Grecian Proportion*, Philadelphia, Xlibris US, 2007.

[65] Hippasus of Metapontum (c. 530 – c. 450 BC), an early follower of Pythagoras, discovered that the golden ratio was neither a whole number nor a fraction.

[66] Aida Hoteit, *Standards of Classical Architecture Criticism: Between Mathematics and Philosophy*, «Journal of Architectural Research and Development», 5 (2021), n. 2, pp. 1–20.

Fig. 8.5 *Intersection between Spaccanapoli and via Forcella (XZ and XY segments in Figure 8.2).*

symbolises the desire for good health and divine blessings.[67] The 36° angle and the golden ratio are ubiquitous in the pentagram and decagram (Figure 5.5). In the pentagram shown in Figure 8.3, Φ represents the ratio between the diagonal and the side (AB/BD), while in the decagon Φ corresponds to the ratio between the radius and the side (AO/AB). Thus, Φ is directly related to the Tetraktys. As a result, the number '10', the 36° angle, the golden ratio Φ, the pentagram, and the decagram represent the harmony of the cosmos and divine blessing according to the Pythagorean doctrine.

Parmieri's measurement of the 36° direction of the sunshine line at dawn on the winter solstice is imprecise, as I will show in Chapter 9. In any case, if such inaccuracy was deemed acceptable by the builders of Neapolis, the observed astronomical configuration could have given the day and site a special cosmic significance linked with the mysticism surrounding Pythagoras' cosmology.

Accordingly, Palmieri proposed that the city's road grid was anticlockwise rotated by 22.5° about the equinoctial line (angle AOE) in order to emphasise that the city was founded on the winter solstice. In fact, he argued that the 22.5° angle

[67] George Johnston Allman, *Greek Geometry From Thales to Euclid*, Dublin, University Press, 1877.

Fig. 8.6 *Sunrise in Naples during the winter solstice (21st–22nd December).*

was chosen to correspond to a solar rotation of 1.5 hours, allowing the city circle to be divided into two EHF arcs of $6 \times 22.5^\circ = 135^\circ$ and $10 \times 22.5^\circ = 225^\circ$. Their ratio is 3:5 or 9:15, which is the ratio of the 9 hours of daytime to the 15 hours of nighttime in Neapolis during the winter solstice, as Stellarium astronomical planetarium confirms.[68] It is interesting to notice that the ratio $15/9 = 1.6\bar{6}$ is also very close to the *golden ratio* $\Phi = 1.618\ldots$[69]

As a result, Palmieri speculated that the 22.5° road rotation could have symbolised the winter solstice as the city's construction date. Furthermore, he hypothesised that the angle of 36° was purposefully chosen to indicate the divergence of *Via Forcella* from the lower decuman, as shown in Figure 8.2. Figure 8.5 shows a photograph of the 36° crossroads fork between *Spaccanapoli* and *Via Forcella*. According to Palmieri, the decision to construct this crossroads at such a precise 36° angle was intended to remind their descendants that the winter solstice of the foundation of Neapolis was a unique day since the Sun rose at 36° from the equi-

[68] Stellarium indicates that on December 26th, 472 BC, the Sun rose at 7:35 a.m. and set at 4:40 p.m., a total of 9 hours and 5 minutes of light. However, if sunrise and sunset are defined as the Sun's altitude from the horizon being exactly 0°, the daytime becomes almost exactly 9 hours. The daytime may be somewhat shorter than 9 hours if the natural horizon formed by the mountains around Naples is taken into account.

[69] The number Φ corresponds almost exactly to the ratio between 14:50 hours and 9:10 hours.

Fig. 8.7 *Via San Gregorio Armeno, commonly known as Christmas Presepi Street. This street is the ancient central cardo of Neapolis (HK segment in Figure 8.2).*

noctial line. Thus, the 36° angle between via Forcella and the lower decuman was meant to serve as a reminder of the cosmological importance of Neapolis, the city from which the Sun could be seen rising at the 36° golden angle on the winter solstice, symbolising cosmic harmony and divine blessing.

Indeed, some Neapolitan traditions link Forcella with Pythagoras. Forcella was one of the seven mediaeval districts (or seats) that were established by King Charles I of Anjou (1226–1285) in Naples. Each district was inhabited by a spe-

cific community, replacing the ancient Greek-Roman *phratries* that had governed Neapolis, probably inheriting their ancient traditions.[70] Forcella was named as such because its fork-shaped crossways disrupt the road grid's orthogonal symmetry, generating a 'Y'. The fork – therefore the appellation of Forcella – was renowned as another symbol of Pythagoras, as 'Y' represents his ethical doctrine regarding the choice between 'good' and 'evil', that is, between 'vice' and 'virtue'.[71] Forcella's coat of arms also bears a moral motto that seems to have been inspired by Phythagoras: *'Ad bene agendum nati sumus*' ('we were born to do good'). According to some Neapolitan tradition, Pythagoras' followers had established a school in this area since the founding of the city.[72]

My preceding quick summary of Palmieri's work merits a comment: while his work lacks sufficient precision as I will explain in the next Chapter, it does suggest some interesting insights. We might ask: does it contain anything plausible, or is it simply a *rêverie*, i.e. a fantasy work, as the author put it?

Palmieri's rêverie

What follows is Palmieri's intriguing rêverie, in which the scientific-religious matrix of the foundation of Neapolis arises from the account of a fictitious man, *Dicaearchus of Cumae*, recorded in a discovered fragment of the works of the Greek historian Dicaearchus of Messana. Palmieri's text, originally written in ancient Greek, contains numerous obscure passages. This obscurity was adopted to imitate a fictitious Pythagorean crypticness that Palmieri himself explains in a series of notes, which are not included in the following text.

This is the content of Palmieri's imaginary text by Dicaearchus of Messana:[73]

...of him I happened to find this testimony:[74] *«It was the winter of the first year of the seventy-seventh Olympiad, and it was the dawning of the day on which the rising Sun radiates from the point of the horizon that is the closest to midday. The*

[70] Paolo Piccolo, *Dell'Origine e della Fondazione dei Sedili di Napoli*, Napoli, Luciano, 2005.

[71] Kenneth S. Guthrie and David R. Fideler, *The Pythagorean Sourcebook and Library: An Anthology of Ancient Writings Which Relate to Pythagoràs and Pythagorean Philosophy*, Michigan, Phanes Press, 1987.

[72] Francesco de' Pietri, *Dell'Historia Napoletana*, Napoli, Gio. Domenico Montanaro, 1634, book 1.

[73] Translated excerpt published with the author's permission.

[74] Here, 'him' refers to Dicaearchus of Cumae, and 'I' refers to Dicaearchus of Messana who reports the testimony of Dicaearchus of Cumae regarding the circumstances and the plan for the foundation of ancient Neapolis.

inhabitants of Parthenope had been subject to Cumaean rule. At dawn, we – the citizens and soldiers of Cumae – under the lead of Timanor's son – the noble and learned Ileoty, who knew much about Pythagoras – climbed the overlying hill up to its top. This..., so that we may obtain auspices for the founding of a new city on a larger and easier-to-reach site than what people call Euploia, to which the town of Parthenope is circumscribed.

At the first rays of light, the noble and wise Ileoty, high priest and archon, used his measuring rod to mark the ground, which had already been specially levelled over a wide stretch in the direction of that ray. He started from the point where the noonday line meets the perpendicular line, upon which day is equal to night. Afterwards, he made such a point the centre of a large circle, and with the measuring rod, he joined the points in which the circle intersected the direction of the Sun and that of the equinox eastward. Ten times was the same segment drawn along the circle. The ten-sided figure that Pythagoras had consecrated to the divinity who measures the universe and symbolises his doctrine thus appeared on the ground. Already in Parthenope ...

The noble and wise Ileoty, who led the people of Cumae on its journey to wisdom, proclaimed this to be a clear sign of the world-ruling divinity's benign disposition towards the dawning city. Having decreed this to be viewed as a good omen, he made upon the land an impression of the soon-to-be-created city with the sacred ploughshare of its founders. To this end, by using the two solar lines, he divided the circle into four parts, then into eight, and lastly into sixteen. He deviated the course of the measuring rod from the sixteenth part of the equinoctial line towards the north on the eastern side, as he wished this to be the specific site upon which, as its own foundations, the new city would be measured. This – namely, diverting the course of the measuring rod of a sixteenth of a turn from the equinoctial line – he said should be done, so that posterity would acknowledge that the event had taken place on the very day of the year in which it had occurred.

He then decreed that the wall of the new city should be built, regarding the position, at a distance of six stadia on a plane on the baseline, and that the city should have a square perimeter orthogonal to the baseline, assigning to each side the length of five stadia. The portion of the baseline between the walls would mark, as he prescribed, the 'plateia' towards Noto. A matching line would be drawn towards Borea so that the equinoctial line may run precisely from the end of one to the farthest end of the other. In the middle of these lines, a central one would be drawn, which would be at the same distance from the wall of Borea and that of Noto.

The 'stenopoulosoi' would stretch from the northern to the southern side; there would be two of them, distant from the walls like the two 'plateiai' at the two far ends. In this manner, there would be a square space in the middle: in the absence

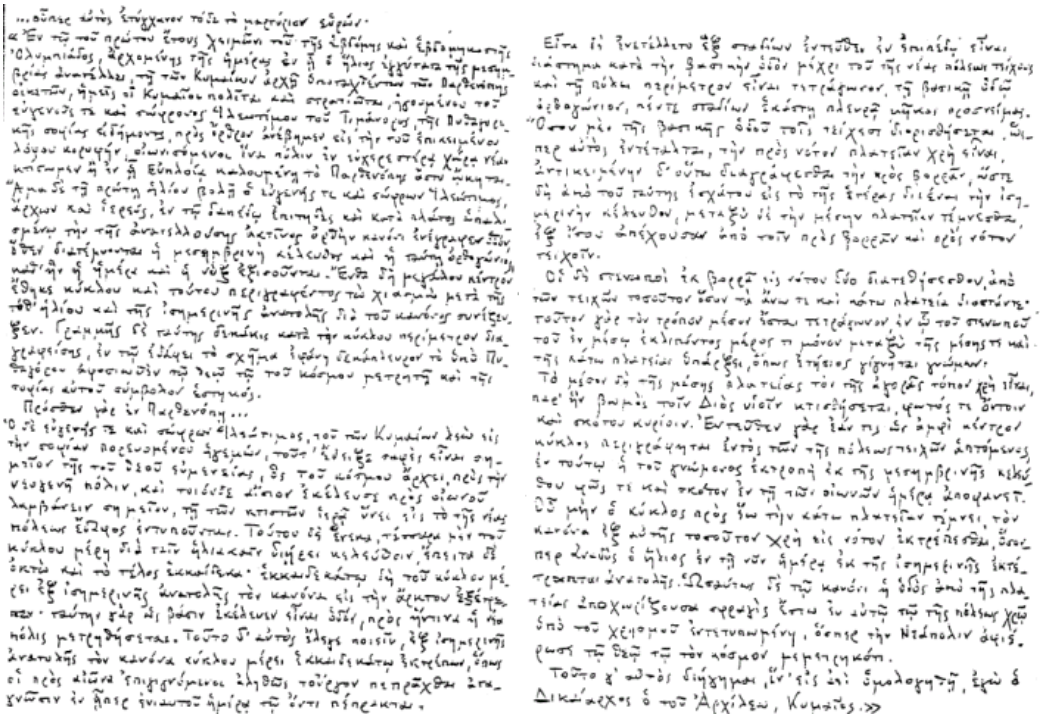

Fig. 8.8 *Palmieri's rêverie written in ancient Greek.*

of a 'stenopos' in the centre, only one stretch of this space would be comprised between the 'plateia' in the centre and the 'plateia' of noonday, in order for it to be an annual gnomon.

The middle of the central 'plateia' would be the place for the 'agora', in whose proximity an altar would be erected in honour of the sons of Zeus, lords of light and darkness. Indeed, starting from this central point, if one drew a circle touching from the inside the four sides of the city, the deviation of the gnomon from the noonday line would mark light and darkness on the day of the auspices. Besides, at the point where the circle would cut the 'plateia' of noonday on the eastern side, the measuring rod would deviate from it in the direction of Noto to an extent equal to the distance at which today's rising Sun deviated from the equinoctial line. May the road that, much the same as the measuring rod, be disjointed from the 'plateia' be a seal embedded in the body itself of the city by the oracle who consecrated Neapolis to the divinity who measures the cosmos.

This, I, Dicaearchus, the son of Archileus the Cumaean, told, so that it be forever known».

Chapter 9
The 36° mystical solstices and 22.5° anticlockwise orientation of Neapolis

Unfortunately, a careful examination of the actual geographical orientation of Neapolis' streets rapidly undermines Palmieri's model: the decumans are oriented at around 24° (66° azimuth) rather than 22.5° with respect to the equinoctial line (Figure 7.3). Furthermore, the Stellarium astronomy software reveals that during the first half of the 5th century BC,[75] on the winter solstice, the Sun rose about 7:35 a.m. at 122° azimuth, rather than 8:00 a.m. at 126° azimuth (36° south from east), as Palmieri assumed. Thus, Palmieri's concept, while intriguing, may be deemed inadequate and arbitrary; the ancient Greeks could have been more precise.

In this chapter I present a possible solution. I delve deeper into the Sun's movements during the 5th century BC and, furthermore, consider how the builders of Neapolis may have determined the cardinal reference system in a challenging astronomical and geographical context to project and initiate the construction of Neapolis. The underlying assumption is that the city architects used a different cardinal reference system than the one used by us today.

Ancient people often relied on easily identifiable landmarks to orient themselves in a complex environment. This is also what we do today, when we use Polaris – the Pole Star – to indicate the north direction, even though it deviates by about 0.7° from the North Celestial Pole. Also a magnetic compass does not point precisely to the Geographic North Pole, but rather to the Magnetic Pole, which is a different and changing point.

In antiquity, correctly identifying the orientation of the cardinal axes (for example, at equinoxes) was a difficult task because nearby mountains could obscure the observer's view of the exact moment when the Sun crossed the horizon, and, of course, ancient people lacked today's accurate satellite-based tools such as Google

[75] The year chosen for the the simulations is 472 BC, the city's foundation year according to Renato Palmieri's suggestion.

Earth Pro to determine the geographical orientation on a map with great precision, as done in this work.

Thus, the builders of Neapolis may have used a cardinal reference system that was both accurate (within a 2° error) and practical; they could have easily used the one illustrated in Figure 7.5 with the red axes. This is the cardinal coordinate system (N',E',S',W'), with the south point S' plainly visible from the agora of Neapolis as the farthest eastern edge of the Island of Capri (Figure 7.6). This method will resolve the aforementioned inaccuracies in Palmieri's model and reveal a novel Pythagorean project with rich cosmological implications.

The ancient Greeks could have learned how to measure the Sun's path and geographical orientation independently or from other populations, such as the Babylonians or Egyptians, who were particularly skilled in these sciences. Ancient societies employed the *gnomon* (a sundial) and the *dioptra* (a traditional astronomical and topographical device) to measure both horizontal or azimuthal angles and vertical or zenith angles of star positions. Both techniques were available as early as the 5th century BC. See Appendix A.5.

Let us now reconstruct the topographical model of Neapolis as it may have been in the minds of its builders. Stellarium astronomical planetarium shows that on the summer solstice of 28th June 472 BC, the Sun was exactly 36° from the astronomical horizon in both Cumae and Neapolis above the point E' at approximately 88.3° azimuth according to our coordinate system (Figure 9.1). Let us speculate that the Cumaeans and founders of Neapolis may have chosen this point as their east, as illustrated in Figure 9.1 due to religious reasons that will be explained below. Let us denote this point as E' to distinguish it from the actual east E, which might have been unknown to the Cumaeans.

This E' point is about 1.7° anticlockwise from the actual east E, as determined by Google Earth Pro. Perhaps such a point was visible from the agora in Naples because it corresponded almost exactly to the direction of *Monte Sant'Angelo* (about 800 m high) near the *Castle of Palma Campania* (Figure 7.5), which could have been seen from Naples behind the northern slope of the Somma-Vesuvius volcano complex. If this point E' was the Cumaeans' east, their south, indicated as S', must have been around 178.3° azimuth, according to our coordinates. From the agora of Neapolis anyone could recognise this south direction as the line leading to eastern coast of the Island of Capri (cf. Figure 7.6). As a result, we assume that the cardinal axes utilised by the builders of Neapolis were rotated anticlockwise by about 1.5° (or 1.7°) compared to ours, as proposed in Figure 7.5.

Let us now review the implications of utilising the hypothesised coordinate system (N',E',S',W'). On the summer solstice, the Sun was seen exactly at 36° above E'; on the winter solstice, the Sun was seen rising at 36° south of E' at our $88.3° + 36° = 124.3°$ azimuth (Figure 9.1). This angle is critical since the

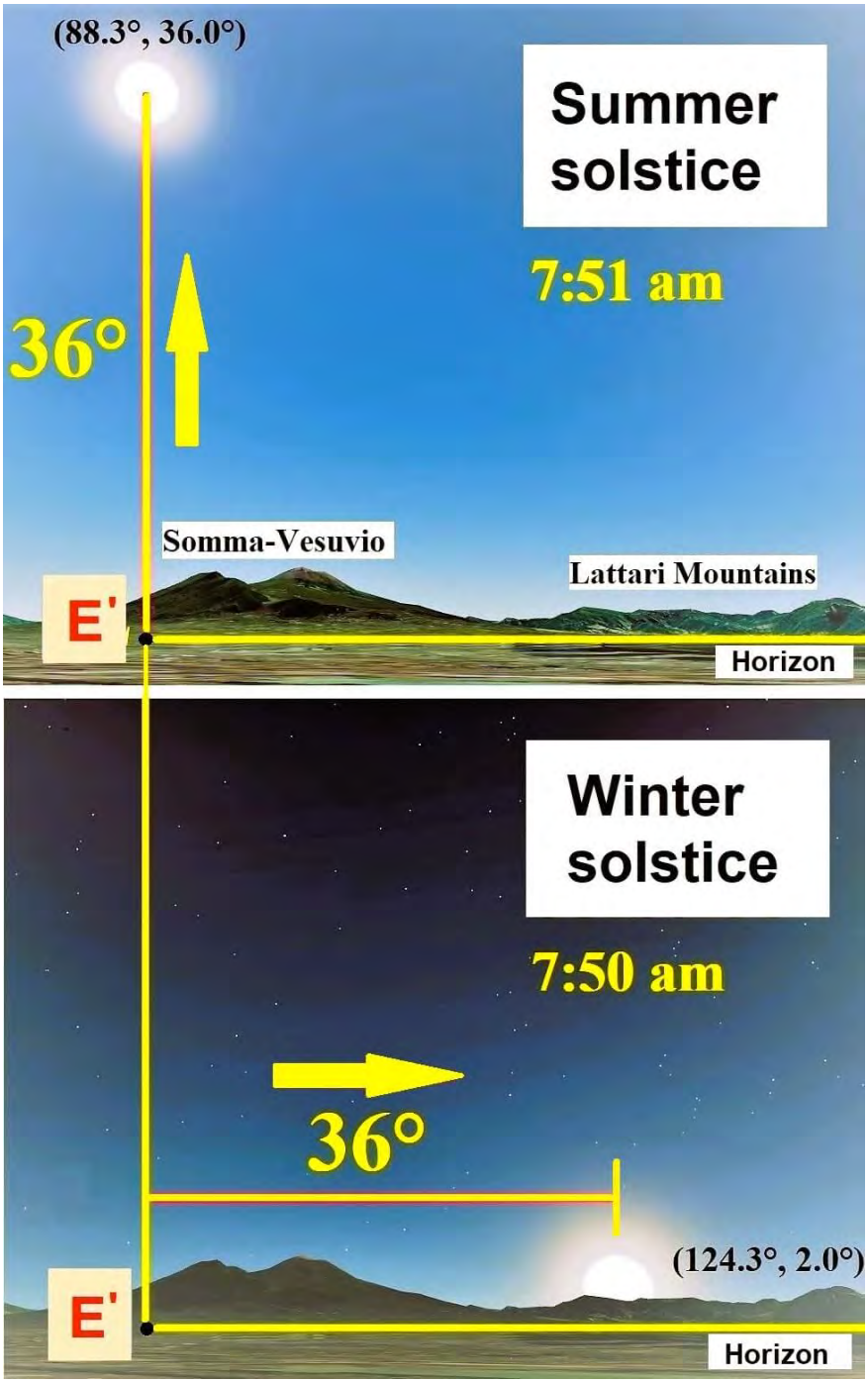

Fig. 9.1 *Reconstruction of the position of the Sun as seen from Sant'Elmo Hill during the summer (above) and winter (below) solstices during the 5th century BC. Time: approximately 7:50 a.m. The ideal east point (E') refers to the 1.7° anticlockwise rotated coordinate system like the red-axes system (N',E',S',W') depicted in Figure* 7.5.

dawn during the winter solstice can only be viewed from Neapolis over the Lattari mountains, which are approximately 33 km south-east of Neapolis. Because these mountains are at least 1100 metres higher than the city, the Sun must have been around 2° above the astronomical horizon before it could be seen from Neapolis. With the aid of Stellarium astronomical planetarium, it is simple to confirm that on the winter solstice of 26th December 472 BC, when the solar azimuth was at 124.3°, or exactly 36° south of the point E', the Sun overhung the horizon by about 2° when it became visible from Neapolis (Figure 9.1).

The Temple of Apollo in Cumae was similarly oriented about 34.5° south from the equinoctial line (Figures 4.3 and 4.4). Thus, if the Cumaeans had used a coordinate system that was about 1.5° anticlockwise rotated relative to ours, they would have seen the Sun at a height of 36° above E' during the summer solstice, and, furthermore, they would have seen the Sun rising on the mountains around Cumae (i.e., on the natural horizon) at 36° south of E' during the winter solstice. The Sun-worshipping priests of Cumae may have observed such peculiar positions of the Sun during the two solstices, as the 36° angle is closely tied to the mystical golden ratio (Figure 8.3), which represents cosmic harmony.

This peculiar astronomical configuration may have convinced the Cumaeans that the location of Neapolis was cosmologically unique in the whole Greek world. Thus, during the winter solstice, the residents may have observed sunrise at 36° south from the geographical point E', which they could have identified as east. During the summer solstice, the Sun was visible from 36° above the same E' eastward-leaning point. Both events occurred at approximately 7:50 a.m. Both events, with similar angles and times, could be seen from the Cumaean temples of Jupiter and Apollo. Finally, from the temples of Cumae, Neapolis was placed exactly in the direction of E' (Figure 7.5), and the Cumaeans could have regarded the site of Neapolis as blessed by the Sun-god, who appeared shining exactly above the city on the summer solstice with a height of 36°.

These coincidences could have been particularly fascinating for people who worshipped the Sun and held the 36° angle sacred. The site where Neapolis was founded was unique in Greek history, both cosmologically and religiously. Indeed, to observe sunrise or sunset on the horizon at 36° from the equinoctial line, one must travel far further north, to the latitude of Paris (48°51′24″N).

Furthermore, by using the hypothesised reference system (N', E', S', W'), the builders of Neapolis may have meant to draw its decumans with an orientation of 22.5° north from their W'-E' equinoctial line. In fact, $22.5° + 1.5° = 24.0°$, which closely matches the decuman orientation of Neapolis in relation to our W-E equinoctial line, as it is measured in Figure 7.3.

This geometry is crucial because the angle of 22.5° is simple to draw and indicates a Sun with 16 rays. This symbol represents the panhellenic Sun, which is

Fig. 9.2 *Apollo, with a sixteen-rayed crown on his head, is depicted in the act of driving the Sun's chariot (detail from an Attic vase).*

associated with the god Helium or Apollo, as demonstrated by numerous ancient artefacts. For example, Figure 9.2 shows the divinity in the *Chariot of the Sun* wearing a sixteen-rayed crown on his head (Figure 9.2). The same was true for the crown on the heads of the Colossus of Rhodes (Figure 5.6) and the *Colossus Solis* of Rome, both of which depicted Helios. Deities who represented the Sun were frequently identified by their rayed crowns. Sixteen-rayed suns appeared frequently also on Greek armour, shields and coins like the ones shown in Figure 9.3; this symbol could be practically found everywhere and on everything.

The sixteen-rayed Sun was extensively used by Macedonian kings, especially Alexander the Great, throughout the 6th and 2nd centuries BC (Figure 9.3), hence the name *Stella Argeade* ('Argeade Star').[76] Figure 9.3 shows a local coin dedicated to Apollo, featuring a sixteen-rayed Sun rising above a deified Androprosop Bull, which has a human male face. Several coins from the area (Aesernia, Compulteria, Cales, Nola, Suessa, and Teanum) depicting Apollo, the Bull, and a Winged Goddess (Neapolis symbols that we will examine later) appear similar because they were likely minted in Neapolis.[77]

[76] Adams W. Lindsay and Eugene N. Borza, *Philip II, Alexander the Great and the Macedonian Heritage*, Washington, University Press of America, 1982.

[77] Mario Nassa, *Cubulteria: Ragguagli sulla moneta attribuitagli e sul controverso simbolo del toro androprosopo*, 2010, https://online.fliphtml5.com/zochf/ufyk/ (accessed on 21/05/2024).

Fig. 9.3 *(Above) 3rd century BC coin from Cales (near Neapolis) with Apollo, the Androprosop Bull surmounted by the sixteen-rayed Sun. (Below) Macedonian shield and gold casket from Philip II's tomb in Verghina; both depict the Panhellenic Sun with sixteen rays.*

The orientation of the orthogonal grid based on a sixteen-rayed star could have helped determine the timing of rituals dedicated to the Sun-god during both the summer and winter solstices. Figure 9.4A depicts the proposed model by displaying Neapolis as a sixteen-rayed star aligned with the cardinal reference system (N',E',S',W'). Figure 9.4B depicts the Sun's trajectories during the summer and winter solstices. Local noon is defined as the time when the Sun's apparent azimuth is exactly 180° (S'). The curves are adjusted by a few minutes to accommod-

ate the solar analemma's deviation,[78] as ancient sundials calculated actual time by following the direction of light.[79]

At 7:50 a.m. on the winter solstice (26th December 472 BC), when the Sun rose over the Lattari mountains, the light came from the R direction (approximately 126° azimuth from N', or 36° south from E'), and, at 10:30 a.m., the sunlight aligned with the central cardo. Later, around midday, the sunlight came from the south (S'), specifically from the location above the easternmost edge of the island of Capri. At 7:50 a.m. on the summer solstice (28th June 472 BC), the Sun was 36° above the horizon at the east (E') of the city. At 10:30 a.m., its light was aligned with the R direction (126° apparent azimuth from N' or 36° south from E'), and at 11:30 a.m., with the central cardo (K); at 12:00 p.m., the Sun was once again heading southward over Capri's easternmost edge (S').

As a result, on both solstices the direction of sunlight had similar timings and orientations at 7:50 a.m., 10:30 a.m., 11:30 a.m., and 12:00 p.m. These temporal patterns are also linked to the 36° angle that defines the Pythagorean decagon, as well as the lengths of day and night on the same day.

Indeed, multiplying the 1.5-hour period between 10:30 a.m. and 12:00 p.m. by 10 results in 15 hours, which is approximately the nighttime duration of the winter solstice and the diurnal duration of the summer solstice. Similarly, the 22.5° angle GHK multiplied by ten equals 225°. This geometric split divided the city into a 3:5 (= 135°:225°) or 9:15 ratio, which equals the ratio of day/night length during the winter solstice and night/day duration during the summer solstice.

It is also worth noting that the decuman direction does not correspond to the direction of the rising Sun on the summer solstice. Such a direction coincides with *Via Nuova Poggioreale* (Figure 7.3). Despite this, one hour after dawn, the Sun ascended to a height of roughly 10°, illuminating the entire decuman and demonstrating the gods' benevolence. Thus, both solstices may have been considered, but in a mystical, concealed way. Indeed, the Greeks celebrated the Sun at both the winter solstice (as Phoebus/Apollo) and the summer solstice (as represented by the local god Hebon/Dionysus).

A link between Neapolis and the Sun-cult would be supported by the hypothesis that the androprosop Bull (a bull with a human head) shown on the coins from Neapolis represented the Sun-god Hebon (the Greek version of the son of

[78] In astronomy, an analemma is a diagram showing the position of the Sun in the sky as seen from a fixed location on Earth at the same mean solar time, as that position varies over a year.

[79] Due to the ellipticity of its orbit, the Earth moves faster when it is closer to the Sun and slower when it is further away. When the Earth's orbital speed is greater, the length of the day is slightly shorter, and vice versa.

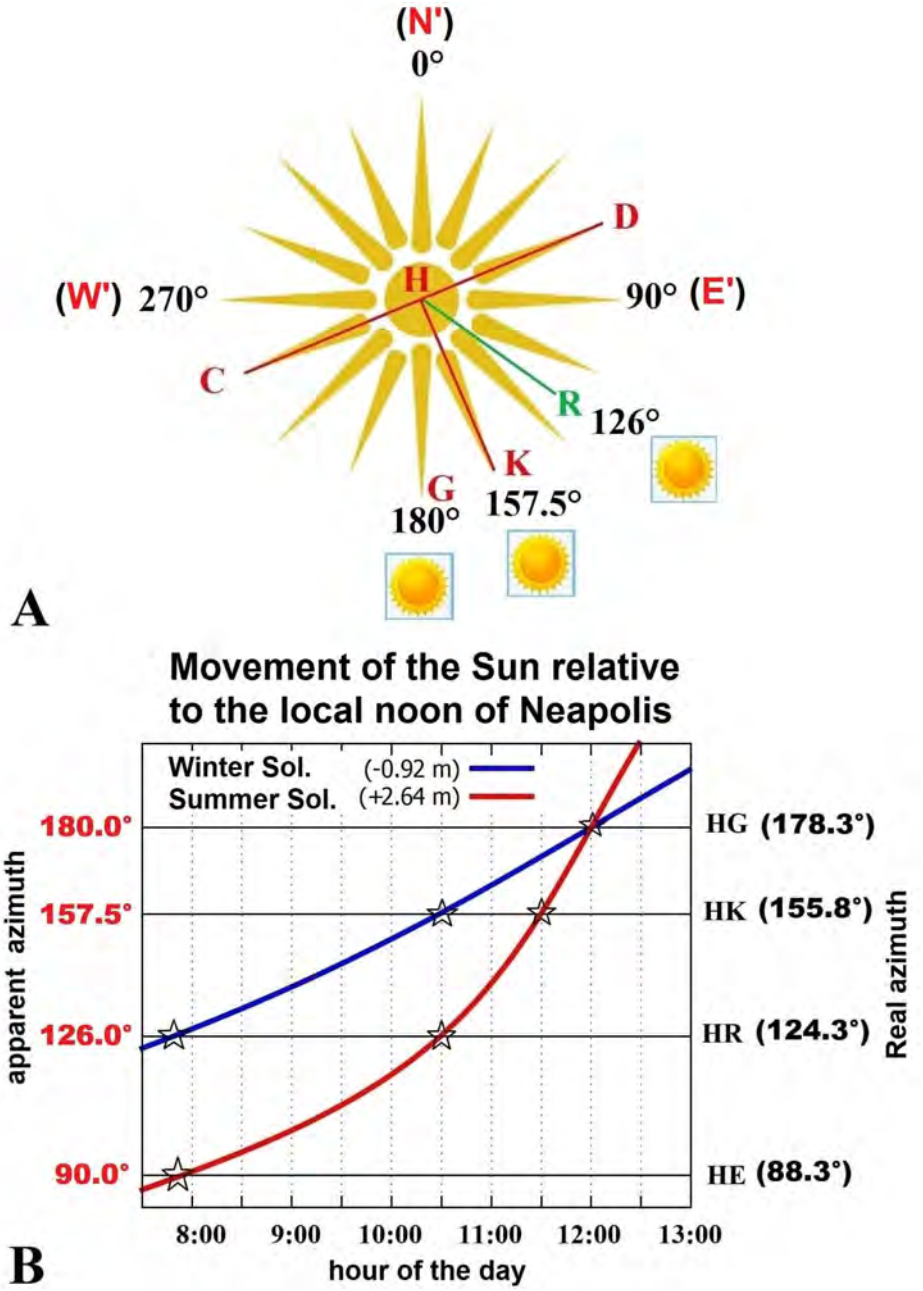

Fig. 9.4 *A: Diagram of Neapolis orientation elaborated using the sixteen-rayed Argeade Sun: the city centre (H); the main decuman (CD); the central cardo (HK); the south (HG); the sunrise line of the winter solstice (HR). B: Solar azimuth paths during solstices relative to local noon obtained with Stellarium (0.18.2). The stars represent simultaneous events. The apparent azimuth is relative to the red-axes cardinal system (N',E',S',W') depicted in Figure 7.5.*

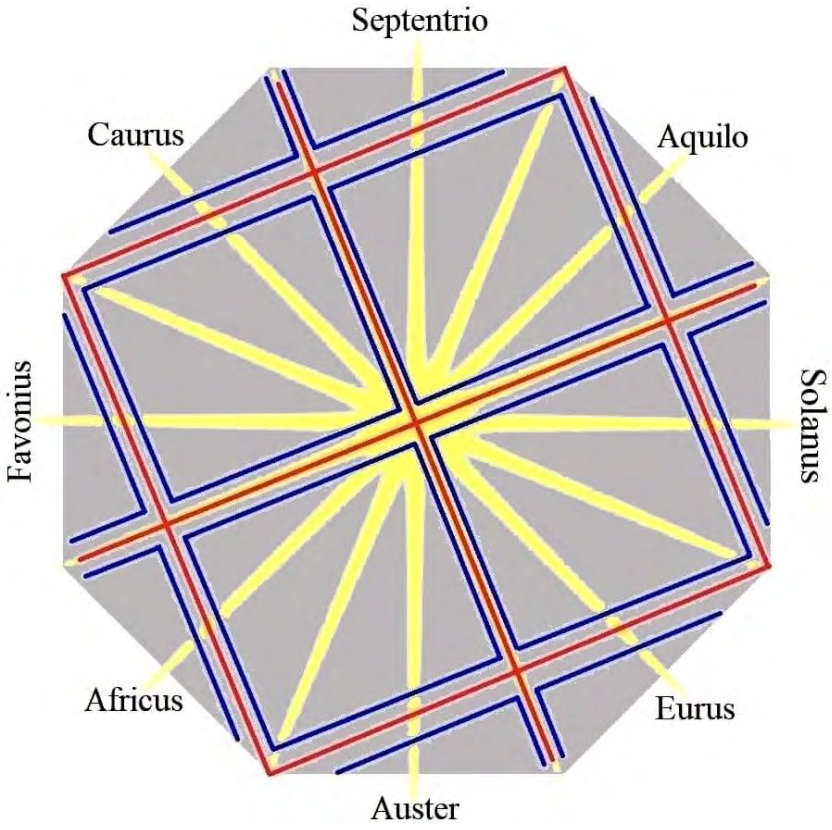

Fig. 9.5 *Schematic representation of Vitruvius' plan of the 'Ideal City' (from 'De Architectura'), consisting of three decumans and four blocks counterclockwise by 22.5° with respect to the cardinal coordinates. The names of the winds in Latin indicate directions.*

the Egyptian Osiris),[80] although some modern academics suggest that such a figure more likely represented the River-god *Achelòos*. In Neapolis, the River-god was called *Sepeithos* ('Sebethos')[81] and its tributaries encircled Neapolis (Figure 9.6).[82]

The orientation of 22.5° is inspired by the symbolism of the sixteen-rayed Sun (Figure 9.8) and can be simply sketched with the diagonals of a regular octagon (seen as a cosmic compass rose) aligned with the cardinal points. This geometry divided the space and the sky into sixteen sectors, and was crucial to the history

[80] Giovanni Antonio Summonte, *Historia della Città e Regno di Napoli*, Antonio Bulifon, Napoli, 1601, book 1, c. 2–3, pp. 3–32.

[81] Hans Isler, *Achelôos, Eine Monographie*, Bern, Verlag, 1970; See also *Achelôos*, in *Lexicon Iconographicum Mythologiae Classicae*, Artemis Verlag Zürich und München, 1981, pp. 12–36.

[82] Lucio Amato, Carmela Guastaferro, Aldo Cinque, Valentino di Donato, et al., *Morphoevolutionary reconstructions in the territory of Naples*, «Méditerranee», 112 (2009), pp. 23–31.

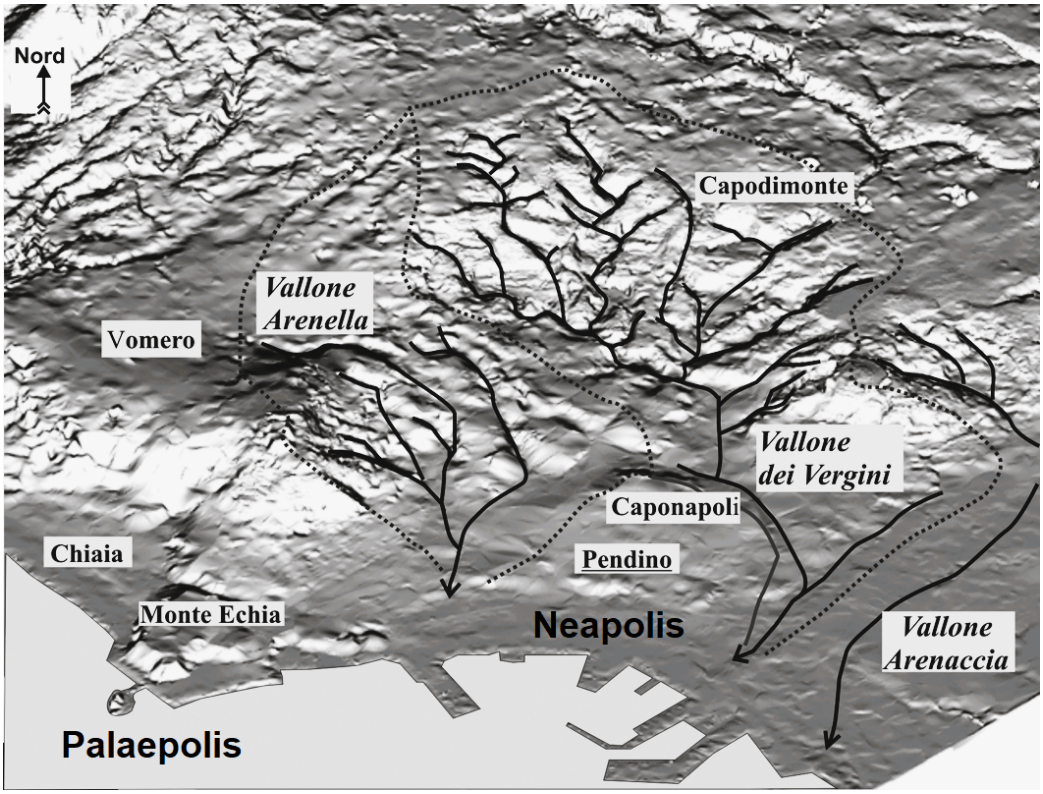

Fig. 9.6 *Reconstruction of the tributaries of Sebethos in the territory of Naples likely active up to historical times. Caponapoli was the Acropolis of Neapolis. (From Lucio Amato, Carmela Guastaferro, Aldo Cinque, Valentino di Donato, et al., 2009).*

of urban design, as evidenced by the fact that centuries later, Roman architect Vitruvius (c. 80-70 BC – after c. 15 BC) advocated it as the fundamental design of the '*Ideal City*' (Figure 9.5). Similar geometries were later adopted by Renaissance architects, including the renowned scholar and architect *Fra' Giovanni Giocondo da Verona* (1433–1515). Having lived in Naples from 1489 to 1495 in the service of Alfonso Duca di Calabria and Ferrante d'Aragona as a designer of fortifications and being a profound connoisseur of Vitruvius' *De Architectura*, Giovanni Giocondo had no difficulty recognising Neapolis as the model that inspired the great Roman architect.[83] Consequently, Neapolis may have served as a prototype for the Greek and Roman centres that were in a way inspired by the cosmos and by some solar cult, as in Alexandria (Figure 3.2).

[83] Gustaf Hamberg, *Vitruvius, Fra' Giocondo and the city plan of Naples*, «Acta Archaelogica», 36 (1965), pp. 105–125.

Fig. 9.7 *The Etruscan highly decorated bronze lamp of Cortona with sixteen deities and bull-horned androprosop figures, possibly associated with the god Acheloos or with Hebon/Dionysus, which were conceived in the form of a bull with a human head (c. 480 BC). (Ronak Alburz and Gijs Willem Tol, 2024). The same Bull with a human head appears on the coins of Neapolis. The central image appears to be a flaming Sun.*

The Appendix discusses an alternative interpretation of the 22.5° anticlockwise orientation of Neapolis as an element derived from Etruscan cosmology. According to this cosmology, the sky – the celestial temple – is divided into sixteen zones, each of which was inhabited by a deity. Such a hypothesis would supplement and, in any event, confirm the goal of founding Neapolis as a temple city dedicated to a celestial god like Apollo or Jupiter. Figure 9.7 shows an Etruscan lamp dated around 480 BC (which is approximately when Neapolis was founded) showing a flaming Sun surrounded by sixteen deities and bull-horned figures. The artefact recalls a cosmological concept common to both Etruscan and Greek cultures.[84] The same Bull with a human face also appears on the coins of Neapolis (Figures 9.3 and 14.2).

[84] Ronak Alburz and Gijs Willem Tol, *A Re-Evaluation of the Iconography of the Etruscan Bronze Lamp of Cortona*, «Etruscan and Italic Studies», 2024.

Fig. 9.8 *(Top) Helios (Sun) on his chariot with the sixteen-rayed suns. Image from a 330 BC vase from Canossa. (Bottom) Coinage of Lokris with the 16-rayed Sun, 375-350 BC.*

Chapter 10
The decagonal and golden-ratio geometry of Neapolis

The orthogonal street grid of Neapolis is elegant, distinctive, and richer than those of other cities such as Agrigento and Miletus, whose simple design was later adopted by Hippodamus for the planning of the city of Piraeus (Figures 2.2, 2.3 and 2.4). In the case of Neapolis, the street-grid design shows proportions obtained from the number 10 and the golden ratio Φ.

The number 10 is ubiquitous in the street geometry of Neapolis. For example, Figure 7.1 shows that the ancient city had three decumans and 21 cardines, of which 7 are to the west of San Gregorio Armeno's central cardo, all the way to *Via del Sole*. The number 21 is triangular, as the number 10, because $1+2+3+4+5+6=21$, $3\times 7=21$, and $3+7=10$. Number 3, the triad, represented the harmony between unity (number 1) and diversity (number 2). Number 7 was equally sacred because it represented the seven heavenly bodies known in antiquity as referring to seven deities (the Sun, Mercury, Venus, Moon, Mars, Jupiter, and Saturn; see Figure 5.3).[85]

The internal and external areas of Neapolis are mathematically interconnected. The basic model of its urban streets can be constructed from either the core or the perimeter. However, the street orientation becomes more intelligible if the analysis begins at the periphery. Figure 10.1 indicates that the design could have been based on a ten-pointed star (decagram) or a decagon (light grey) with sides equal to two Greek stadia, which correspond to the distance between the lower and the upper decumans. The model entirely recreates the street grid, including its internal and external spaces. This pattern further corroborates the hypothesis that the planning of Neapolis was inspired by Pythagorean cosmology.

The model requires only two fixed points, O and A, which suffice to draw the outer circle and orient the inscribed great decagram or decagon represented in the figure by the points A to J. The fulcrum of the structure is the point O, which

[85] Manly P. Hall, *The Secret Teachings of All Ages*, USA, Manly P. Hall Book, 2012.

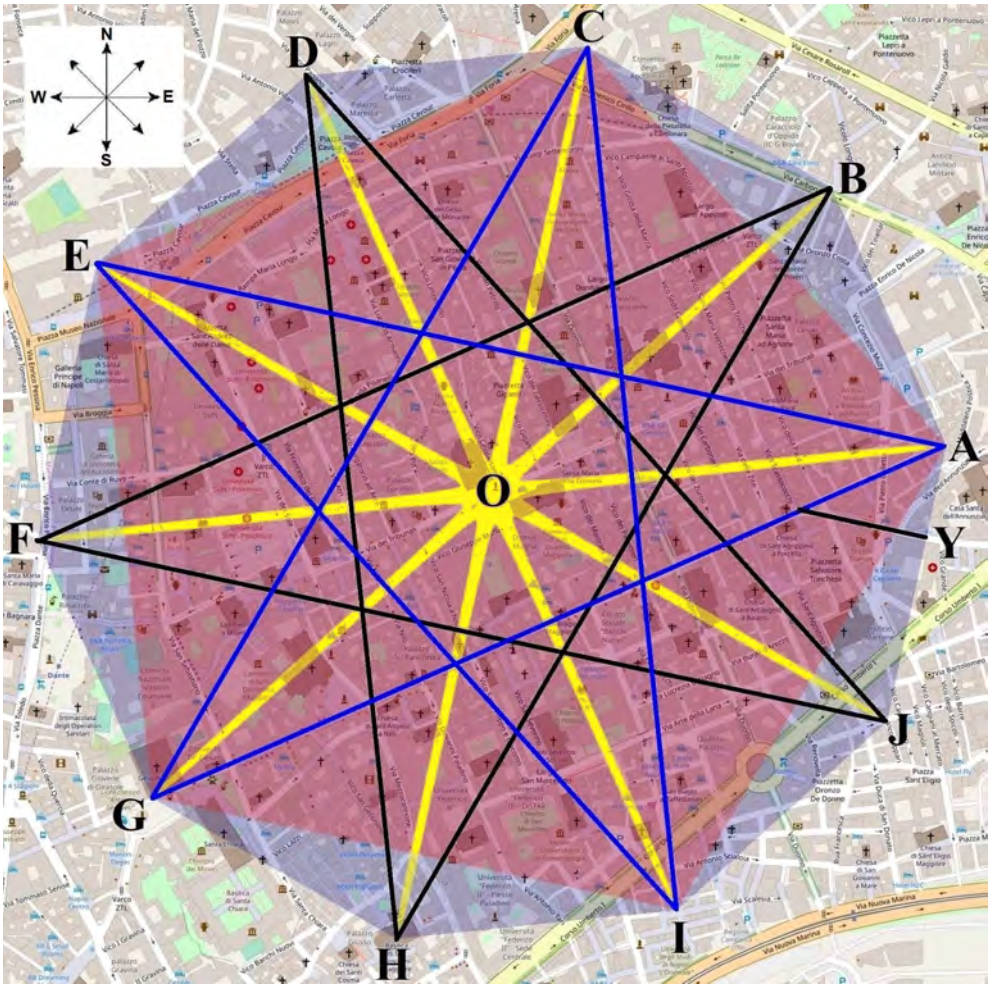

Fig. 10.1 *Pythagorean model of Neapolis based on the superposition of two pentagons/pentagrams or a decagon/decagram which are alternately superimposed on a current map of Naples and centred in the agora (O). Each of the 10 sectors is 36° wide.*

corresponds to the agora (the city centre); point A indicates the eastern end of the lower decuman. The side length of the decagon is equal to the distance between the lower and upper decumans (AG and BF). The isosceles triangles AOB, FOG, AGC, BFH, and so on are *golden* due to their internal angles of 36° and 72° (Figure 8.3).[86] The OI direction represents the central cardo (the modern *Via San Gregorio Armeno*, today more commonly known as *Strada dei Presepi*).

[86] Mario Livio, *The Golden Ratio: The Story of Phi, the World's Most Astonishing Number*, New York, Crown, 2003.

The geometry of the *golden ratio* generated by intersecting decagram lines determines the location of the city's main cardines. *Via del Sole*, the first cardo to the west, and *Via Loffredi* are part of it. Together with the upper and lower decuman, these two streets form a rectangle of $2 \times 2\cot(36^\circ)$ Greek stadia, which appears to be perfectly inscribed in the decagram (Figure 10.2A). The rectangle comprises 15 cardines spaced around 0.2 stadia apart. The one represented by the number 15 is another Pythagorean triangular number, as $1+2+3+4+5=15$. The side of the IJ decagon parallels *Corso Umberto I* and matches closely to the ancient city coastline (Figure 10.1).

A decagram is formed by arranging two symmetrical pentagrams upside down, as seen in the illustration with blue and black lines. The pentagram model reveals additional geometric properties. Figure 10.1 shows that the northern (CE) and western (EG) sides of the pentagon (light red) go along the ancient city walls (Figure 7.1) and are parallel to *Via Foria* and *Via Santa Maria di Costantinopoli*, while *Via Forcella* (Y) runs parallel to the diagonal of the pentagram AE. It is worth noting that eight major churches, some of which are built on ancient temples or other significant classical structures, are long to the BG diagonal. These churches are *Gesù Nuovo*, *Santa Chiara*, *San Domenico Maggiore*, the *Sansevero Chapel* (the Temple of Isis), *San Paolo Maggiore* (the Temple of the Dioscuri), *San Lorenzo Maggiore* (the Greek-Roman slaughterhouse), the Church of the Girolamini, and the Cathedral of the Assumption of Mary (the former Temple of Apollo).

The OH direction refers to *San Giovanni Maggiore*, which was established by Emperor Constantine the Great in the 4^{th} century AD atop of an existing Greek temple near the ancient port. Finally, the OE direction points to the *Regio Marmorat*a, the Acropolis of Neapolis. Several notable religious buildings were located here, including the Temples of the Sun, Demeter, Apollo, and Diana (which correspond to the present churches of *Sant'Aniello in Caponapoli*, *Sant'Andrea delle Dame*, and *Santa Maria della Pietrasanta*) and *Santa Maria delle Grazie Maggiore*.

Figures 10.2B–D reveal further geometric aspects of the street-grid model. Figure 10.2B shows that the sixteen-rayed Sun centred on the agora represents the major urban square, which measures 2×2 Greek stadia and is bounded by the upper and lower decuman and the cardines of *Via Atri* and *Via Duomo*. This is the same square structure that Vitruvius proposed for his *ideal city* (Figure 9.5). The enormous central square is made up of four blocks of 1×1 Greek stadia, commonly known as *insulae*. Each of them is divided into five rectangular strips or *strigae* that measure approximately 0.2×1 stadia and denote the position of

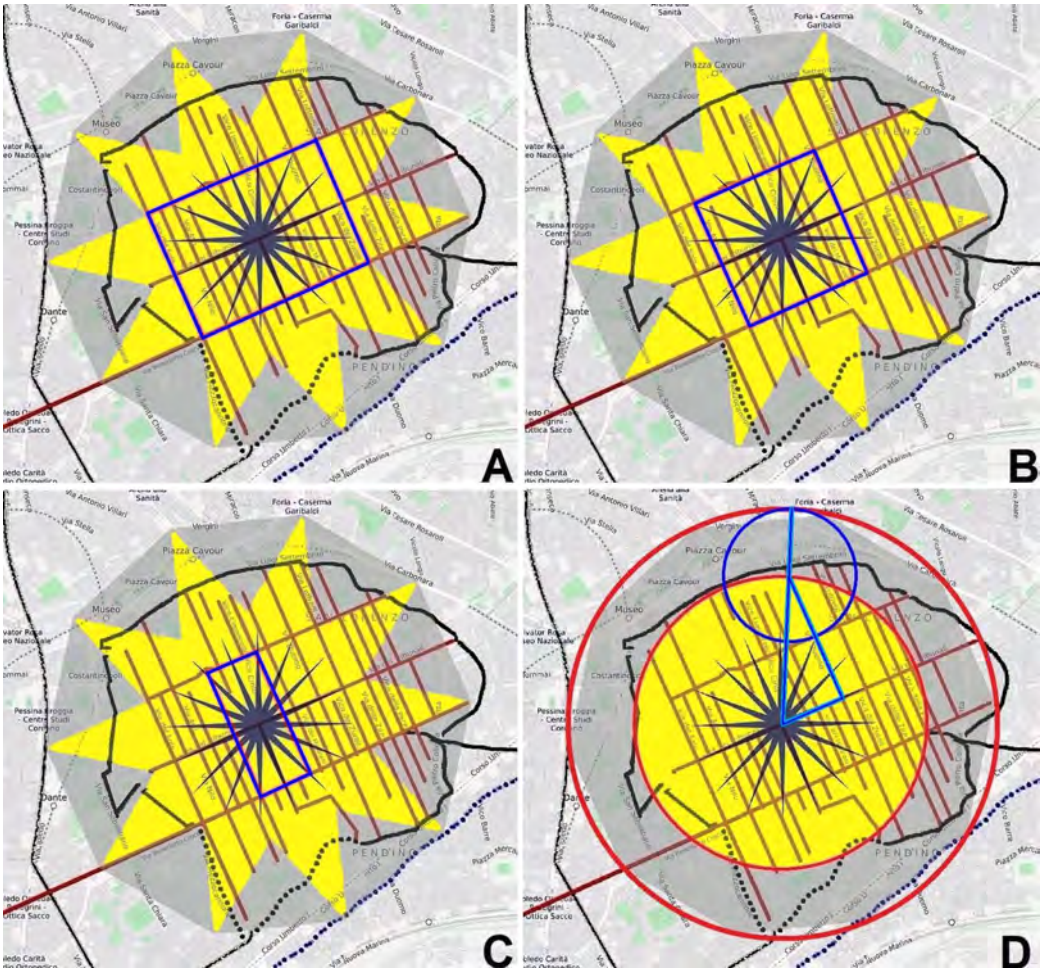

Fig. 10.2 *A, B, and C show the Pythagorean model superimposed on the archaeological maps of Neapolis, with the hexadecagram centred in the agora. The rectangular and square symmetries are highlighted in red. In D, the inner and outer circles of the city are connected by a geometric construction with a golden section (blue and light blue).*

the cardines.[87] Thus, the subdivision of the city square into 10 long strips relates it, once again, to the Pythagorean *Tetraktys*. All these geometries seem to be not mere coincidences but the result of careful planning.

[87] Fausto Longo and Teresa Tauro, *Costruire la città: riflessioni sull'impianto urbano di Neapolis*, in *Dromoi: Studi del Mondo Antico Offerti a Emanuele Greco dai Suoi Allievi della Scuola Archeologica Italiana di Atene*, edited by Fausto Longo, Riccardo Di Cesare & Santo Privitera, Paestum, Pandemos - Paestum, 2016, pp. 189–212.

The sixteen-pointed star defines a central rectangle equal to $2 \times 2\tan(22.5^\circ)$ Greek stadia, perhaps the original area of the agora, bounded by the cardines of *vico San Nicola a Nilo* and *vico Giganti* (Figure 10.2C).

Figure 10.2D depicts the inner-city space as part of a circle that extends from the centre of the agora to precisely where *Via Forcella* crosses the lower decuman (point X in Figure 8.2) at the intersection with *Via Scassacocchi*. This is the tenth cardo from *via San Gregorio Armeno* (HK in Figure 8.2), and the number '10' of this cardo brings us back to the Pythagorean *Tetraktys*. As it reaches the intersection of *Via Forcella* with the lower decuman to the east at the height of *Vico Scassacocchi*, the circle determines the inner-city area by precisely including two rectangles with sides of 4×2 stadia arranged in a cross.

The radius of the above inner circle is the diagonal of a 1×2 Greek stadia rectangle; hence, its length is $\sqrt{5}$ stadia. Figure 10.2D shows that this circle perfectly matches the city walls to the north and west, as well as those facing south and the sea. In the same figure the outer circle containing the decagon or decagram has a radius of $2\Phi = 1 + \sqrt{5} = 1/\sin(18^\circ)$ Greek stadia, where Φ represents the *golden ratio*, which once again recalls the number '10' and the Pythagorean *Tetraktys*. This outer circle represents the ring of water that surrounded the city, which can be seen in Figures 6.3 and 9.6.

The sides of the decagon and pentagon inscribed in the outer circle represent the external lines of the walls that Sebethos passed through and the coastline. More specifically, *Via Foria* and *Via Santa Maria di Costantinopoli* run parallel to the sites where the ancient tributaries of Sebethos to the north and west of Neapolis were located. In particular, the point F in Figure 10.1 should have touched the river, which was likely running where today *Via Enrico Pessina* is to the north of *Piazza Dante* (cf. Figure 9.6). The circle intersects the furthermost edges of the central decuman and the lower one to the east.

Finally, as previously stated, the side of the inscribed decagon measures 2 Greek stadia, just like the side of the inner square. The *golden ratio* can thus be defined as the radius of the outer circle divided by the side of the inner square of the city. The proportions derived from the *golden* ratio between the external space and the internal road structure of the city, and the partitions of the cardines based on the numbers '5' and '10' finally give Neapolis its flawlessly harmonic and balanced beauty.

The proposed Pythagorean interpretation of the street-grid geometry of Neapolis is supported also by some coins from the same area. One example is a coin (265 BC – 240 BC) unearthed in Teano near Naples (Figure 10.3).[88] We see Apollo on

[88] Campania, Teanum Sidicinum AE Obol. ca 265-240 BC, SNG ANS 617-618; BMC 11. http://www.wildwinds.com/coins/greece/campania/teanum/t.html (accessed on 21/05/2024).

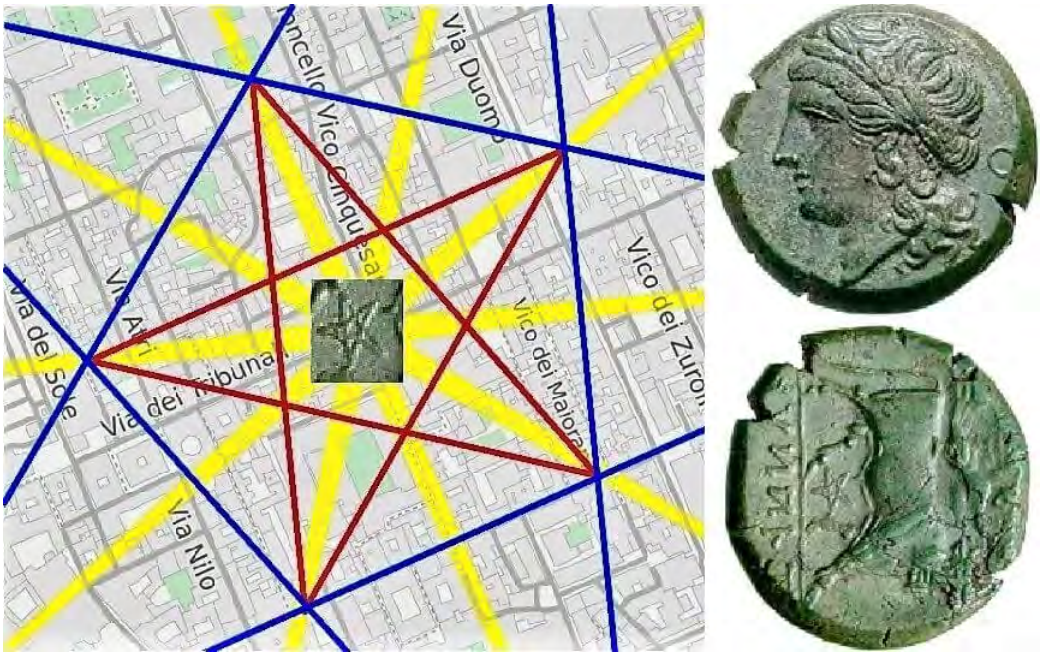

Fig. 10.3 *Detail of Figure 10.1 showing the star orientation of the pentagram (image from the 3rd century BC). The coin, which was discovered in Teano (near Neapolis), depicts Apollo, the Androprosop Bull with a winged goddess hovering above, and a Pythagorean pentagram.*

one side and, on the other, a distinct representation of a Pythagorean pentagram surmounted by the Androprosop Bull. The Bull has a human face and is crowned by a winged deity. The pentagram can be found on certain local coins, and the five-pointed star appears to represent Neapolis. In Chapter 14, we argue that the Androprosop Bull represented Sebethos, the River-god of Neapolis. This river was likely linked to the Somma-Vesuvius volcano complex located to the east of Neapolis, from which Sebethos was believed to spring. The geometric pentagram that generates the urban street layout appears to have the same orientation as the five-pointed star on the coin shown in Figure 10.3.

A final curiosity: a sceptic could argue that the orientation of the decuman was determined by a pentadecagram (a fifteen-pointed star), which divides the space into 15 equal parts with an angle of $360^\circ/15 = 24^\circ$. This angle would represent the exact rotation of Neapolis' streets about the present-day cardinal axes (Figure 7.4). However, this view is unlikely because it would imply the adoption of an unnecessarily complicated and poorly motivated geometry. Moreover, it would also imply that the ancient Greeks should have determined the orientation of the cardinal axes very precisely, which is rather unlikely.

Chapter 11
Neapolis' street grid: a Pythagorean cosmological jewel

Pythagoras was the first to call the universe a *cosmos*, which means *order*. According to this idea, every work that represents the *cosmos*, even an entire city, must reveal a pre-established order, that is, a structure defined by precise numerical and geometric relations that could manifest an inner harmony and beauty. The schematized pattern of the road grid of Neapolis is depicted in Figure 11.1. It reveals the order and harmony as well as the beauty and splendour of a city that appears like a jewel and as radiant as the Sun in its universe.

The harmonious interconnection between the dimensions, orientation, and structure of the internal grid of Neapolis is due to geometries characterised by proportions related to the golden ratio Φ and by an internal subdivision of the cardines based on groups of 10 streets. These geometries recall Pythagoras' *Tetraktys*. The solar and cosmological interpretation of the urban plan is highlighted by the central sixteen-pointed Sun, which produces the 22.5° rotation of the street grid. The central city square of 2×2 Greek stadia represents the Earth since the four sides symbolise the four elements (fire, air, water, and earth). The square's orientation represents the human intellect that chooses the direction.

The square opens up in four directions, forming two orthogonal rectangles of 4×2 Greek stadia inscribed in an inner circle with a radius equal to $\sqrt{5}$ Greek stadia. The design identifies three decumans and ideally 21 cardines because each square by 1×1 stadia is divided by five cardines; each square also contains $5 \times 5 = 25$ boxes. Starting from the central star, it is like having ten concentric spheres (or ten concentric squares), which reproduces the Pythagorean cosmos shown in Figure 5.3. The red inner circle, which touches the city wall at many points, is centred within a second outer blue circle with radius of $1 + \sqrt{5}$ Greek stadia. This outer blue circle roughly symbolises the ring of water that surrounded Neapolis (cf. Figure 6.3) and inscribes the large decagon or decagram (the Tetraktys), which represents the cosmos. Thus, the radius of the outer blue circle divided by the distance between the upper and lower decuman is $(1 + \sqrt{5})/2 = \Phi$.

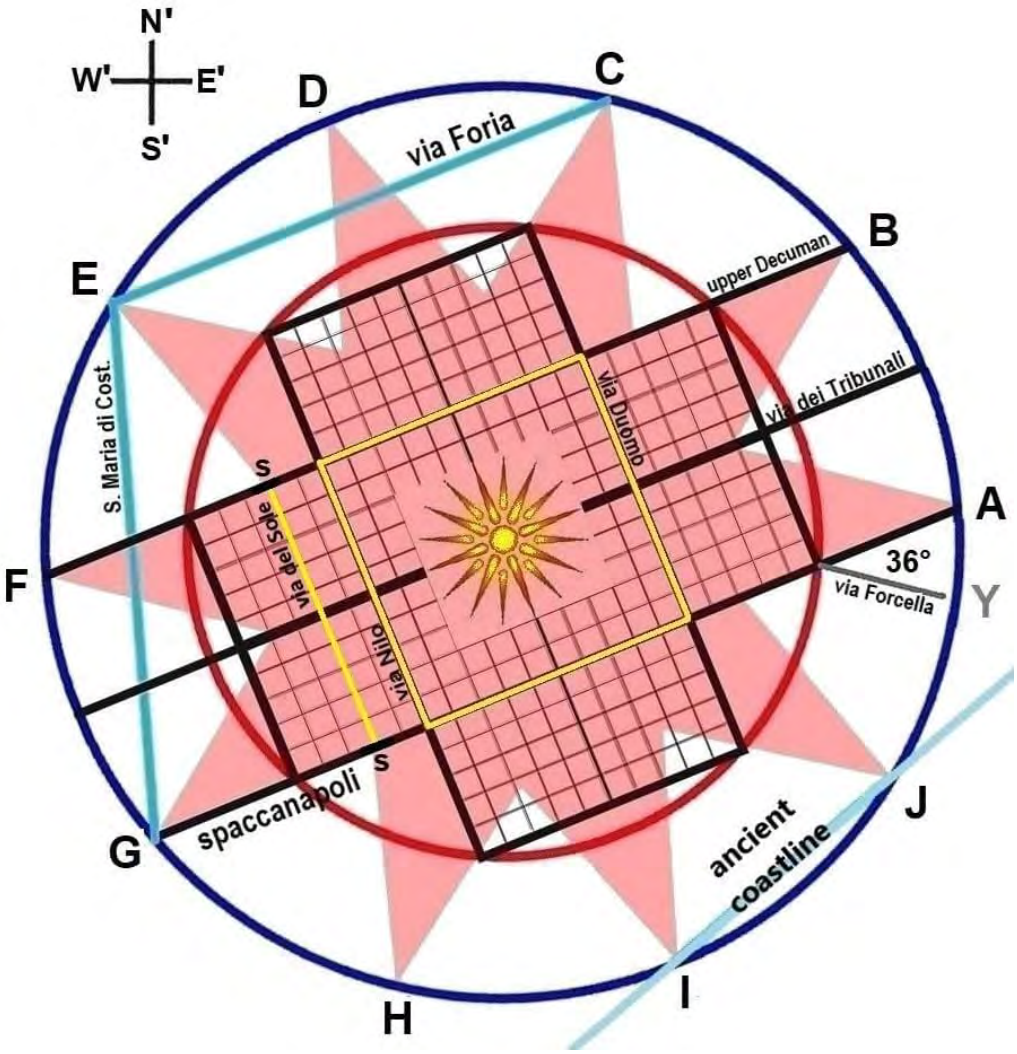

Fig. 11.1 *Schematic model of the road grid of Neapolis based on a decimal/decagram subdivision representing the Pythagorean cosmos; the central 16-rayed Sun (Zeus' Fire) is in the agora. The external blue circle is the city outer geographical boundary delimited by the sea and the ancient tributaries of Sebethos. AB (the decagon side) measures 2 Greek stadia, which is the distance between the lower and upper Decuman. The pentagonal sides CE and EG represent two tributaries of Sebethos and run parallel to today's Via Foria and Via Santa Maria di Costantinopoli. IJ corresponds to the ancient coast, now parallel to Corso Umberto I. The inner red circle contacts the city walls at several points. AG is the lower Decuman, which corresponds to today's Spaccanapoli; BF is the upper Decuman; and Via dei Tribunali is the central Decuman. SS is Via del Sole, the first cardo. Y indicates Via Forcella with its 36° intersection with Spaccanapoli. The road grid is rotated counter-clockwise by 22.5° using the 16-rayed star relative to the rotated cardinal system (N',E',S',W') of Figure 7.5. (Cf. Figures 10.1, 10.2, 11.2 and 11.3).*

The schematic plan of Neapolis, shown in Figure 11.1, is particularly fascinating. The concentric geometries and street grid order described by the city design are all interconnected by the proportions of the *golden ratio*. It embodies Pythagoras' cosmology, which envisions a universe consisting of ten concentric spheres revolving around the Hearth of Zeus (the central Fire) invisible to human eyes. The Earth itself (the great central city square) revolves around this great divine fire. The ten spheres of the Pythagorean universe are represented by as many cardines placed to the right and left of the central Sun symbolised by the agora. The golden ratios ensure that all inner streets and the boundaries of the city are harmonious with each other, thus generating a geometry that recalls the Pythagorean music of the spheres.[89]

The street-grid design of Figure 11.1 is thus certainly richer and more harmonious than the chaotic one of Athens (Figure 2.1) and the monotonous orthogonal one of other Greek centres such as Akragas/Agrigento (Figure 2.2), Miletus (Figure 2.3), Piraeus (Figure 2.4). These other cities, while adopting an orthogonal road grid, did not exhibit any complex geometry corresponding to some metaphysical or higher order. The uniqueness of Neapolis results from the harmonious geometric balance given by the subdivisions made based on the number '10' and by *golden ratio* proportions relating the street-grid geometry with the two (inner and outer) circular city boundaries.

Figures 11.2 and 11.3 illustrate the proposed model superimposed onto the city map, one with the decagram and the other with the pentagram bases. The IJ side of the decagon coincides with the ancient coastline, while the CE and EG sides of the pentagon correspond to the outer walls to the west and north of the city where today *Via Foria* and *Via Santa Maria di Costantinopoli* are found, which are parallel to where the ancient tributaries of Sebethos to the north and west of Neapolis were likely located. More specifically, the point F in Figure 11.2 should have touched the river, which was likely running parallel to the dark line in the figure approximately where today *Via Enrico Pessina* is, to the north of *Piazza Dante* (cf. Figure 9.6). Furthermore, as discussed in Chapter 10, the model ideally matches the city's inner street layout. The intersecting diagonals of the decagram accurately determine the position of the decumans while also determining the position of several cardines. The first cardo to be identified is *Via del Sole*, which led to the city's acropolis. This result suggests that Neapolis was designed as a jewel depicting the divine Fire of Zeus and its surrounding cosmos, as shown in Figure 5.3.

If the above interpretations are correct, Neapolis symbolised the harmony of the cosmos as envisioned by Pythagoras' cosmology, where the agora forms its

[89] Carl Huffman, *Philolaus*, in the *Stanford Encyclopedia of Philosophy*, Stanford, 2020.

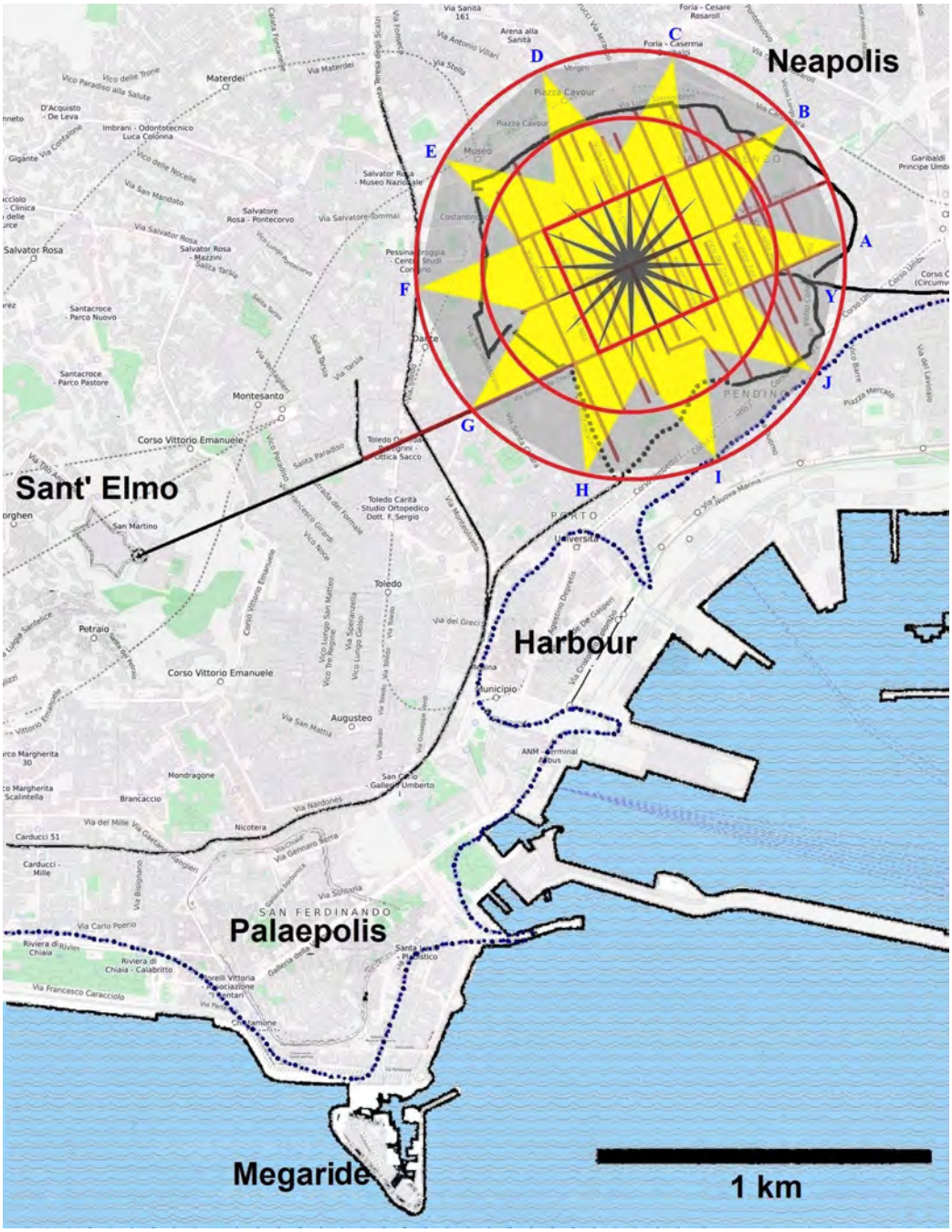

Fig. 11.2 *Structure of the Pythagorean model of Neapolis based on the decagon and the decagram. The two circles represent the water ring and the walls that protected the city.*

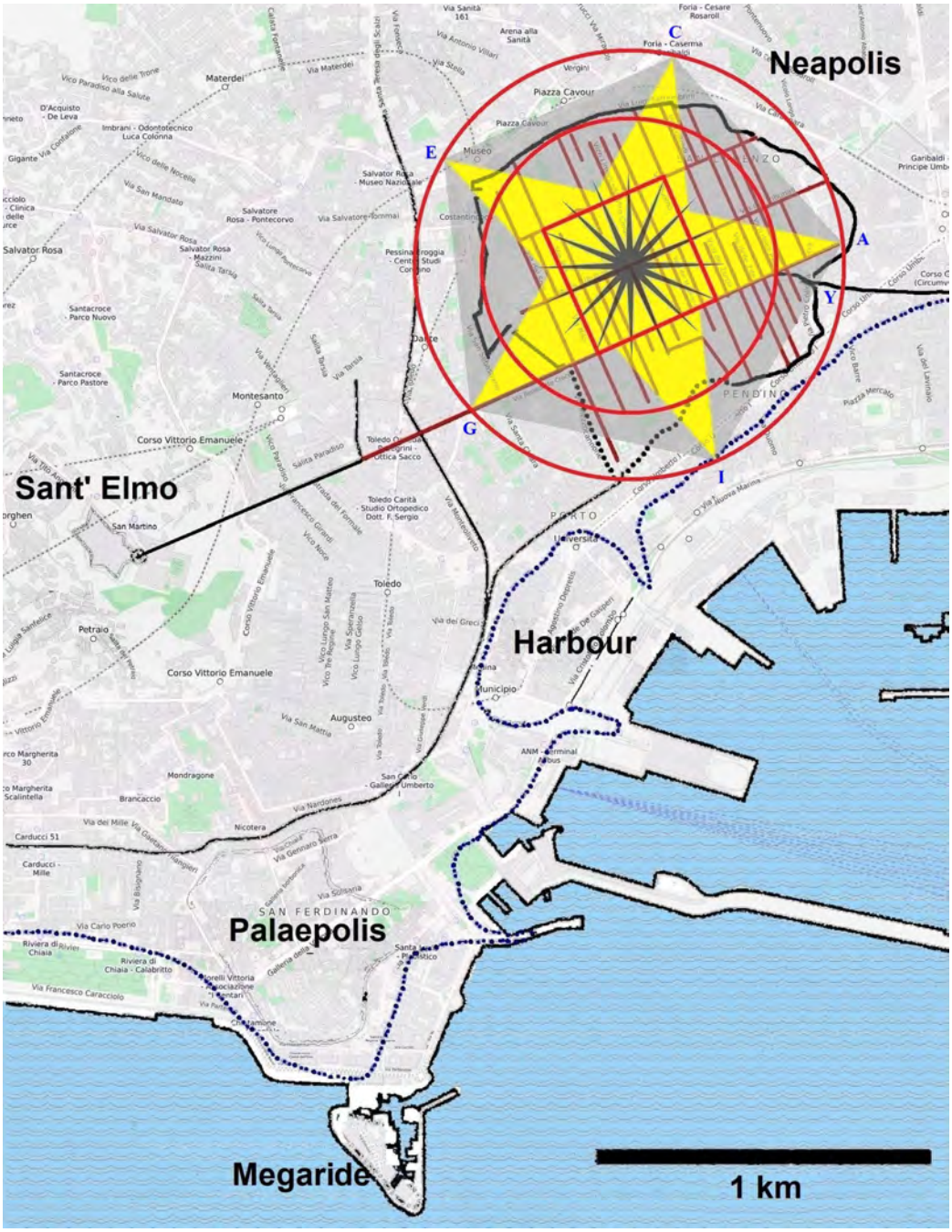

Fig. 11.3 *Structure of the Pythagorean model of Neapolis based on the pentagon and the pentagram. The two circles represent the water ring and the walls that protected the city.*

centre of radiation. His School did, in fact, assert the existence of an identity bond between macrocosm and microcosm that could be discovered through numbers, arithmetic, and geometry; these, when combined, would be capable of unifying the universe. Hence, the city was imagined as a microcosm, representing the harmony of the macrocosm in which the Greek man lived. This same ideal was further developed by Plato, spread throughout the West and was later adopted by various other civilizations. The golden ratio relating the outer ring of water, the city walls, and the inner street grid geometry is the ultimate explanation for the exceptional sense of harmony and beauty that an observer perceives by looking at the urban plan design of Neapolis. The street-grid model proposed above suggests that the city – the humans' abode – was conceived as a large temple, that is, as an image of the cosmos and of the gods' abode.

I argued that the above proposed model for the street grid and orientation of Neapolis is compatible with a wide range of cultural, astronomical, geographical, and geometric facts. Yet, it might be possible that the actual planning of Neapolis was based on entirely different ideas. For example, if the creators of Neapolis intended to orient the decuman at an angle of 24° from the actual equinoctial line rather than 22.5°, one could still derive some geometric properties of the city from the pentadecagram, which is another Pythagorean polygon. It might also be possible that the original street grid layout of Neapolis was based on a simple rectangular plan with a size of 5×4 Greek stadia that was just drawn on a terrain characterised by an irregular topography. Then, by coincidence, such an operation could have produced an apparent regular pattern compatible with the decagonal geometry shown in Figures 11.1, 11.2 and 11.3. However, these alternative hypotheses do not appear to be able to explain all of the data described above and are based on a series of coincidences. It is true that any observed pattern in human construction (including city and building orientation) may be unintentional; but, denying the claim that observed patterns reflect the builders' genuine intentions without providing a reasonable critique is also erroneous. If the designers of Neapolis had a cultural goal other than building a city with a simple orthogonal street grid, the interpretation proposed in this essay appears more explanatory reasonable.

The next chapters will examine Parthenope's role in the cosmic symbolism of Neapolis.

Chapter 12
The celestial vault in the life of the ancient city

The celestial vault is made up of the Sun, Moon, planets, stars, and their constellations, which, as it is well known, were understood as divinities or celestial creatures by practically every ancient civilisation, apart from the Hebrews. Thus, the Greeks meticulously examined the sky day and night for religious and practical reasons such as creating calendars.

Every Greek city-state had its own calendar, and sometimes even more than just one. It was typical to use lunar cycles, solar events such as solstices and equinoxes, and certain stars or constellations to mark dates. The calendars could also begin on different dates. For example, in Athens and Delphi, the year began with the first New Moon after the summer solstice; in Athens, this was the 1st day of the month of *Hekatombaion*. In Boeotia and Delos, the year began with the winter solstice; in Chios, it began with the vernal equinox; and in Sparta, Rhodes, Crete, and Miletos, it began with the autumnal equinox. Regardless, all Greek city-states initially based their calendars on the Moon, but then solar calendars or a combination of lunar and solar calendars were developed. There was the Olympiad calendar that did provide a common frame of reference among the various Greek city-states, but it just counted the years, not the days or the months.[90]

When it comes to properly coordinating interactions between autonomous city-states, calendar system differences were significant and difficult to overcome. The sole objective strategy was to use the celestial configuration shared by everyone living in the same area. As a result, the movement of celestial bodies, including stars and constellations, defined months, weeks, and even days.[91] Zodiac signs were little more than a traditional way to represent months, which were usually but not always twelve. Finally, hours and seasons could only be determined by

[90] Christopher Planeaux, *The Athenian Calendar*, in the *World History Encyclopedia*, 2015, https://www.worldhistory.org/article/833/the-athenian-calendar/ (accessed on 21/05/2024).

[91] Tomislav Bilić, *Apollo, Helios, and the solstices in the Athenian, Delphian, and Delian calendars*, «Numen», 59 (2012), n. 5-6, pp. 509–532.

Fig. 12.1 *The tablet of Niinnione found in the Sanctuary of Eleusis (circa 370 BC). It portrays a nocturnal rite and Demeter welcoming a group of initiates to the sacred place (National Archaeological Museum of Athens).*

observing the path of the Sun through the sky. The courses of various stars, such as their heliacal rising day or other comparable events involving the rising or setting of constellations and stars, also dictated the days of numerous religious festivals, hence regulating people's lives, as evidenced by the 3rd-century BC Hibeh Papyri discovered in Egypt. [92] For example, most holidays in Athens, Sparta, and

[92] Bernard P. Grenfell and Arthu S. Hunt, *The Hibeh Papyri*, London, Oxford University Press, 1906..

other towns were based on the movement of specific constellations as viewed from the acropolises significant to each city.[93] The *Eleusinian Mysteries*, the *Thesmophorias*, and other celebrations were often performed outside at night to better see the movement of stars and constellations at any given time, and torch processions (Figure 12.1) could be included in the ceremonies.

Thus, in antiquity the celestial vault enriched the religious experiences of the people with its lights representing various deities,[94] and the same must have been true for the people of Neapolis. In those days, the stars must have appeared considerably brighter than they do today, thanks to clean and pollution-free air, while today's powerful streetlights and pollution dim the light of the stars.

It is unknown whose calendar was used in Neapolis, or which religious festivals were celebrated and when, although equinoxes and solstices were most certainly observed, as they were in all Greek cities. This must be especially true for the Cumaeans, who worship the Sun. Furthermore, in Neapolis, local deities such as Parthenope and Sebethos were celebrated as well.

The previous chapters investigated the significance of the solstices in the religious life of Neapolis and how the position of the Sun in those days might have inspired the urban planning of the city. We now turn to discuss the possible religious and cultural significance of equinoxes. Could also the sky configurations during the equinoxes have inspired the planning of Neapolis? For example, Figures 1.2 and 1.4 show that the lower decuman of Neapolis, that is, *Spaccanapoli*, is exactly oriented towards Sant'Elmo Hill. Could this choice also have had a religious significance related to the sky?

In general, equinoxes were associated with the Eleusinian Mysteries, which revered Demetra and Persephone. They were separated into *Greater Mysteries* and *Lesser Mysteries*. The Greater Mysteries lasted nine days and took place throughout the month of *Boidromion* that corresponded to late September to early October, that is, just after the autumnal equinox. These Mysteries hinted at Persephone's abduction into the underworld and, therefore, the beginning of plant hibernation. These celebrations usually started on the fourteenth day of the month, which was just before the autumnal equinox. The Lesser Mysteries occurred during the month of *Anthesterion*, which corresponded to February–March, and foreshadowed Persephone's return to the upper realm. The celebration date preceded the spring equinox, and thus, the reference was used to mark the spring re-awakening of plants.

[93] Efrosyni Boutsikas and Clive Ruggles, *Temples, stars, and ritual landscapes: the potential for archaeoastronomy in ancient Greece*, «American Journal of Archaeology», 115 (2011), n. 1, pp. 55–68.

[94] Walter Burkert, *Greek Religion*, Cambridge MA, Harvard University Press, 1985.

Fig. 12.2 *Virgo (Parthenos) constellation. Detail of the Salamanca Sky (Fernando Gallego, 15th century AD).*

The subsequent Chapters will look at the sky constellations at equinoxes around the time of Neapolis' founding day. We will also look at Partenope's character, which was most likely tied to the constellation of the Virgin (Figure 12.2), and how the city's builders would have incorporated elements of her legends and myths into the architecture of Neapolis, which was the new city of Parthenope.

In the 5th century BC, for example, in 472 BC the vernal equinox occurred on 26th March and the fall equinox on 28th September.

Chapter 13
The fall equinox: Parthenope's voyage from Greece to Neapolis

The fall equinox inspired mythological and religious festivities that were frequently associated with harvesting and winemaking.[95] When Neapolis was founded in the 5th century BC, on the autumnal equinox the Sun was in the constellation of *Virgo*, which was related to various goddesses since Babylonian times. Among the Greeks, this constellation represented Demetra (Zeus' sister and the goddess of the harvest), Persephone (the queen of the underworld), Athena (Zeus' favourite daughter and the goddess of learning, arts, and war), Astraea (Astraeus and Eos' daughter and the virgin goddess of justice, innocence, purity, and precision), and many others.[96] The Greeks named this constellation *Parthenos*. The female name 'Parthenope' derives from *Parthenos* (Παρθένος, meaning 'Virgin') and *ops* (ὄψ, meaning 'eye', 'face', or 'appearance') and, therefore, it means '*She who has the look of a virgin*', or, also, '*She who has the look of (the goddess) Parthenos*'.

Figure 13.1 shows the configuration of the sky observed from Neapolis towards Vesuvius at dawn (5:57 a.m. our time) on the autumnal equinox on 28th September 472 BC. On that day, *Virgo* is parallel to the ecliptic, which is the yearly path of the Sun as seen from Earth. On the fall equinox, the Sun appeared just below Spica (the main star of *Virgo* known as the 'Virgin's Spike'), as if *Virgo* were sitting on the Sun (cf. Figure 15.2). The stars that draw *Virgo*'s head would have been visible by rising at approximately 2:30 a.m., when the sky was still dark.[97]

[95] Daniel Ogden, *A Companion to Greek Religion*, Singapore, Wiley-Blackwell, 2009.

[96] Theony Condos, *Star Myths of the Greeks and Romans: A Sourcebook Containing 'The Constellations' of Pseudo–Eratosthenes and the 'Poetic Astronomy' of Hyginus*, Grand Rapids, Phanes Press, 1997.

[97] Today the timing of this astronomical configuration is different since this zodiac sign runs from 24th August to 23rd September. On our autumnal equinox, 21st September, the Sun appears to be approaching the upper half (the head) rather than the lower one (the feet) of *Virgo*.

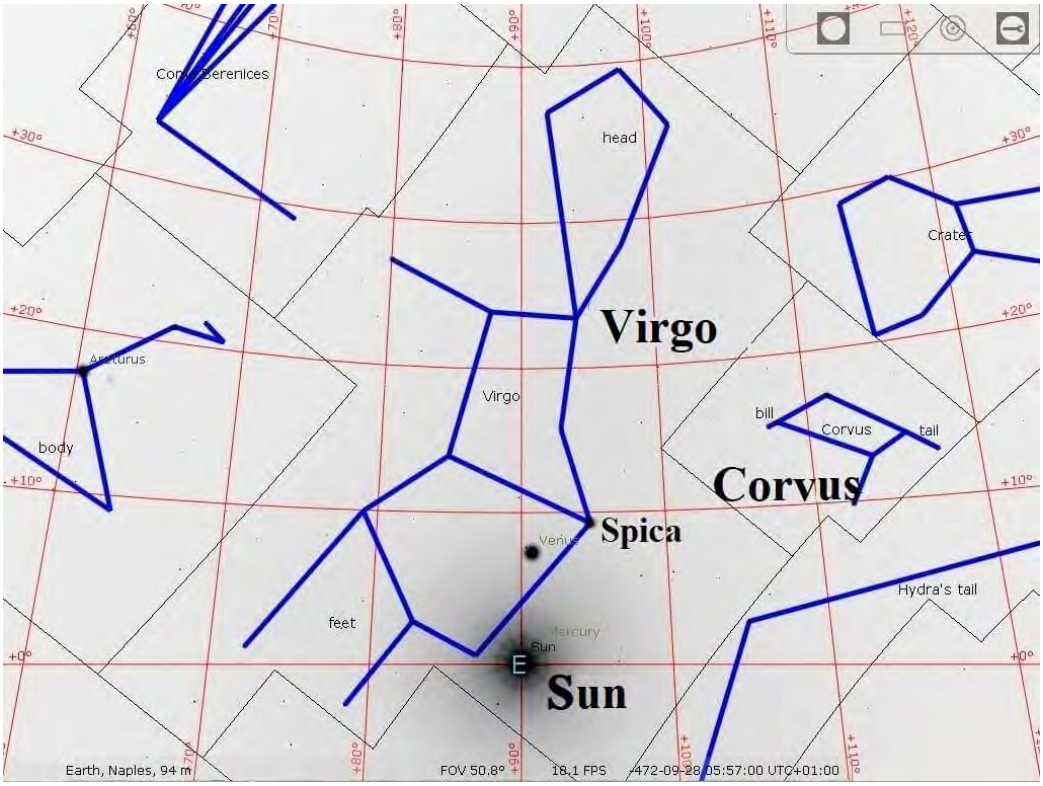

Fig. 13.1 *Dawn with constellations – Autumnal equinox of 28 September, 472 BC (Stellarium 0.18.2).*

Figure 13.2 depicts the sunrise of the autumnal equinox in 472 BC as seen from Sant'Elmo Hill. On that day, the Sun rose precisely over the Somma-Vesuvius complex, and *Virgo* was above it. As discussed in Chapter 9, a coin dating back to the 3rd century BC (Figure 9.3) appears to demonstrate the significance of both equinoxes. The coin is dedicated to Apollo, the Sun-god; the reverse side displays the sixteen-ray Sun and a Androprosop Bull, whose back appears to recall the outline of the volcano complex (cf. Figure 13.2).

On the autumnal equinox, like today, the volcano complex covered the precise moment of the sunrise above the astronomical horizon for about a half hour. Around 6:30 a.m., the Sun became fully visible. The star Spica rose about fifty minutes before the Sun and was visible shortly before dawn. As a result, people could easily spot *Virgo*'s exact location and contemplate her standing above the Sun. The heliacal rising of Spica (cf. Figure 16.2) occurred on 19th September 472 BC, just a few days before the autumnal equinox. As previously stated, the heliacal rising of important stars could inspire religious celebrations among ancient

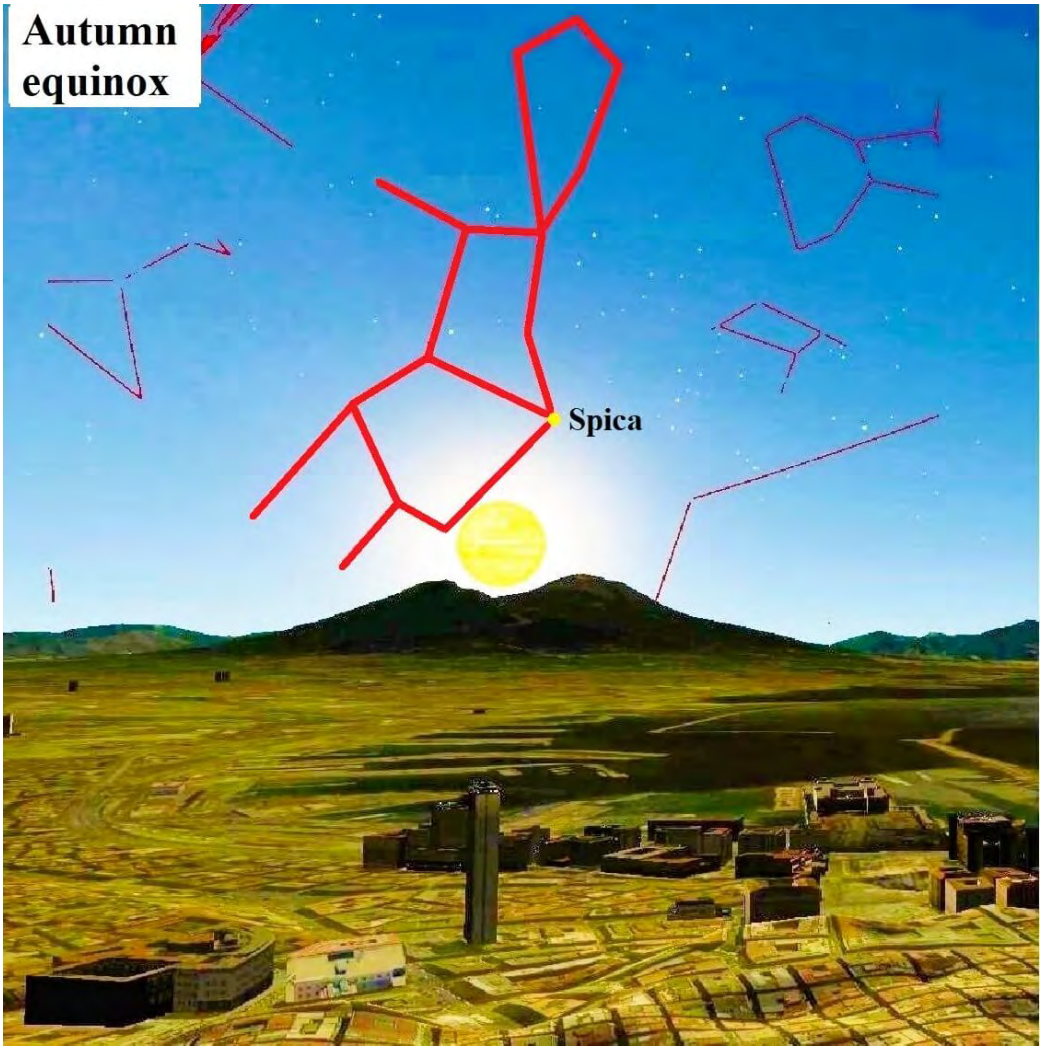

Fig. 13.2 *Dawn with constellations on the autumnal equinox of 28 September 472 BC seen from Sant'Elmo (Google Earth Pro).*

Greek communities.[98] Given these facts, it is highly plausible that the character of Parthenope was celebrated in Neapolis on 19th September, or just a few days before the autumnal equinox, which was also the period when the Greater Eleusinian Mysteries were celebrated by the Greeks.

[98] Efrosyni Boutsikas and Clive Ruggles, *Temples, stars, and ritual landscapes: the potential for archaeoastronomy in ancient Greece*, «American Journal of Archaeology», 115 (2011), n. 1, pp. 55–68.

Fig. 13.3 *Sunrise in Naples during equinoxes (20-21 March or 22–23 September) seen from the harbour.*

On the same day, sunset occurred at 5:56 p.m. Figure 13.4 shows that at approximately 9:00 p.m., when the stars were clearly visible in the dark sky, *Aquila*, the constellation of the Eagle, was visible at about 246° azimuth, that is, above Sant'Elmo Hill. On the equinox day, 9:00 p.m. was a significant moment of the night because it was just three hours after sunset and three hours before midnight, that is, it was between the first (from 6:00 to 9:00 p.m.) and second (from 9:00 p.m. to midnight) *Vigilia*, as the Romans called them.[99]

Both Greeks and Romans related *Aquila* to mythical birds and divine messengers.[100] The constellation includes *Altair*, the twelfth brightest star in the sky, which was probably visible from Neapolis just after twilight (starting at 7-8 p.m.) until midnight, when it set to the right of the hill. The constellation was visible from the lower decuman of Spaccanapoli above Sant'Elmo Hill. Being precisely oriented to the direction of the hill, the road would have directed the human gaze to the direction of Sant'Elmo Hill and naturally up to the sky (see Figure 1.4), enabling people to catch sight of the shining stars above the hill.

[99] The Romans divided the night from sunset to sunrise into four vigils called '*Vigilia*'.

[100] Theony Condos, *Star Myths of the Greeks and Romans*, Grand Rapids, Phanes Press, 1997.

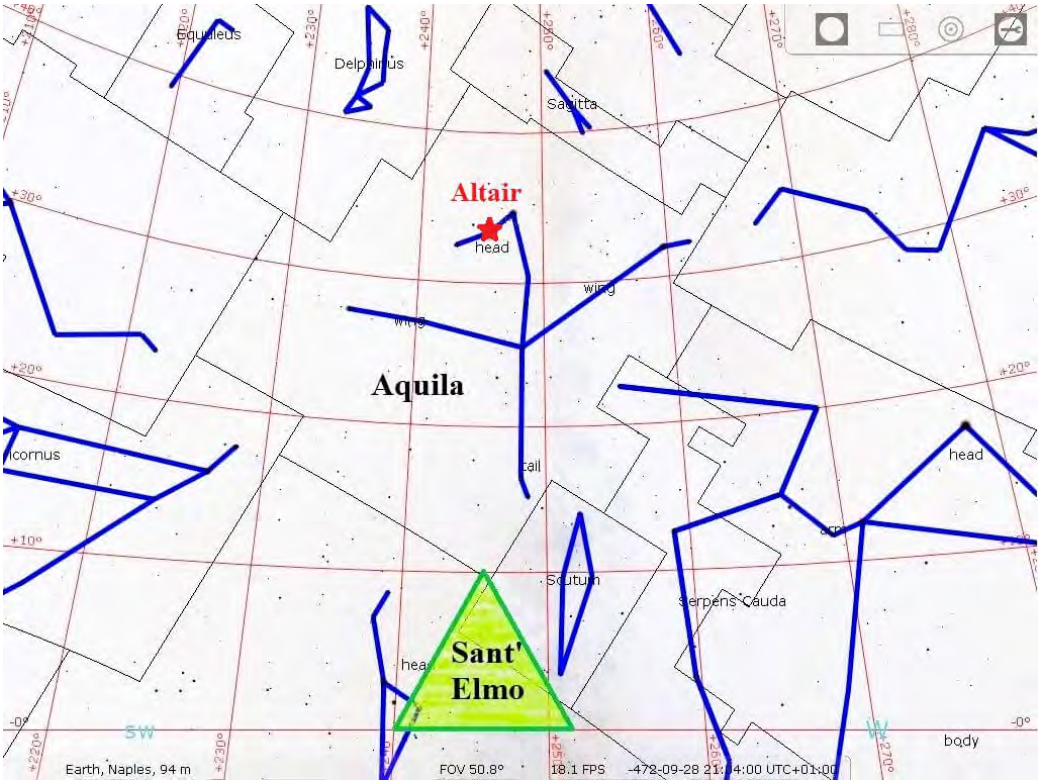

Fig. 13.4 *The sky above Sant'Elmo Hill seen from the lower decuman. Time: 9:04 p.m. on the autumnal equinox of 28 September 472 BC (Stellarium 0.18.2).*

To summarise, on the autumnal equinox, the constellation of the Virgin was hovering over the Sun for the full day, and the Sun was seen rising and shining just above the Somma-Vesuvius volcano complex to the east of Neapolis. During the day, the Sun and the constellation of the Virgin moved together over the sea from east to west. On the same day, shortly after sunset, a spectator from Neapolis could readily detect *Altair*, and, thus, the constellation of *Aquila*, which resembled a heavenly bird flying over Sant'Elmo Hill. As the night progressed, *Aquila* set as if the celestial bird progressively fell from left to right. Midnight (between the second and third *Vigilia*) was when the constellation disappeared from view, as if the bird had died while entering the underworld.

The constellations of *Virgo* and *Aquila* together may have provided the local people with the ways of narrating the legends and myths of Parthenope, and of her death as a real person or as a siren, namely a woman-bird, as several Greek

and Latin poets and historians (Homer, Strabo, Titus Livy, Virgil, Dionysius Periegetes, Lycophron, and Statius) claimed.[101]

Legends and myths of Parthenope: the princess/priestess or the harpy/siren?

Let us now review the legends and myths regarding Parthenope. According to some ancient legends reported by Neapolitan historians,[102] Parthenope was a princess whose father was *Eumelus*, king of Pherae, who might have lived in the 9th–8th century BC (Figure 13.5). During this period, a Greek community left Chalcis seeking land to establish a new colony. They first settled in Pithecusae (today's Ischia) in the Gulf of Naples (Figure 13.6). Later, the city of Cumae and the village of Parthenope were soon established on the mainland coast of Campania. The latter village was built near the tomb of Parthenope, where she was commemorated.

The Greek geographer and historian Strabo (c. 64 BC – after 21 AD) states that the Greek settlers were led by Hippocles of Cumae (it is unclear whether it was the Euboic or the Aeolian Cumae) and Megasthenes of Chalcis and that their voyage was guided by a dove during the day and by the sound of brass cymbals at night, which were interpreted as Apollo's signs.[103]

If Parthenope was simply the daughter of a Greek king who just joined the expedition, how did she become so important in the new Greek colonies that she was respected for centuries and honoured to the point where a major new city was named after her three hundred years after her death?

Strabo's narrative and Parthenope's legends overlap and could complement each other. Parthenope, Eumelus' daughter, was not a simple traveller, but the one who guided the Greek colonists from Chalcis to the Gulf of Naples by interpreting and recognising Apollo's dove and other signs, as also Statium (c. 45 AD

[101] Rabun M. Taylor, *The Temple of the Dioscuri and the mythic origins of Neapolis*, in *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 39–63.

[102] Giovanni Antonio Summonte, *Historia della Città e Regno di Napoli*, Antonio Bulifon, Napoli, 1601, book 1, c. 2–3, pp. 3–32; Francesco de' Pietri, *Dell'Historia Napoletana*, Napoli, 1634, book 1.

[103] Strabo, *Geography*, translated by. H. L. Jones, Harvard University Press, Loeb Classical Library edition, 1923, book 5, c. 4.4; C. Velleius Paterculus (19 BC – c. AD 31), *The Roman History*, in *Velleius Paterculus and Res Gestae Divi Augusti*, Tr. Frederick W. Shipley, Loeb Classical Library, 1924, book 1, par. 4. William Smith, *Cumae*, in *Dictionary of Greek and Roman Geography*, LLD, London, 1854; Cinzia Bearzot and Franca Landucci, *Tra mare e continente: l'isola d'Eubea*, Milano, Vita e Pensiero, 2013.

Fig. 13.5 *Profile of Princess Parthenope, the daughter of Eumelus, King of Pherae in Thessaly (Giovanni Antonio Summonte, 1601).*

– c. 96 AD) states.[104] Thus, she must have been a high priestess with oracular abilities because, after all, political or military authorities did not have the faculty of interpreting gods' signs.

[104] Statium (1st sec. AD), *Silvae*, translated by A. S. Kline, Poetry in Translation, 2012, book 3, c. 5, v. 78–80 («*...Of Parthenope; the Siren, borne there by the sea, guided to a gentle land, by Venus' dove, sent by Apollo himself...*»); Ivi, book 4, c. 8, v. 47–49 («*...and you, Apollo, guide to a far-wandering people, whose dove on your left shoulder fortunate Eumelus, Parthenope's father, fondly eyes and adores;...*»). Available at https://www.poetryintranslation.com/PITBR/Latin/Statiushome.php (accessed on 21/05/2024).

Fig. 13.6 *The hypothetical route taken by the founders of Pithecusae and Cumae guided by Parthenope from the Greek island of Euboea (in red) to the Gulf of Naples.*

Some legends narrate that Parthenope died in a shipwreck when the Greek fleet approached the Gulf of Naples. Her body was discovered on the cliffs of Megaride, a little island in front of Mount Echia, near the current Castel dell'Ovo (Figure 13.7). In any case, in her honour, the community constructed a sepulchre on the nearby promontory (Mount Echia or Pizzofalcone Hill), where the village of Parthenope was later erected, or on the neighbouring shore along one of the tributaries of the Sebethos River, which originally separated the sites of Palaepolis and Neapolis. Her sepulchre attracted the interest of both ancient (Lutatius, Titus Livy, and Strabo) and modern writers.[105]

Two Neapolitan churches were constructed atop Greek temples that could have been associated to her cult. The first one, *Sant'Aniello in Caponapoli*, was built on the ancient Temple of Demeter in the Acropolis of Neapolis (Figure 10.1, point E). The second, *San Giovanni Maggiore*, was built on the ancient temple of *Antinous*. This was the location of the Antinoites' phratry; the Christian tombstone, which was written in Latin and dedicated to Parthenope (but most likely referring to the city) reads: '*Creator of all things, most high, lovingly preserve Parthenope*' (Figure [Fig13.7]). The church stands close outside the walls of the ancient Greek city of Neapolis, near the port where, in antiquity, a tributary of the Sebethos River run between Neapolis and Palaepolis (Figure 10.1, point H). As we previously suggested, the site might also be where Parthenope's corpse was buried.[106]

[105] Carlo Celano, *Notitie del bello, dell'antico e del curioso della città di Napoli per i signori forastieri*, Napoli, Giacomo Raillard, 1692.

[106] Dinko Fabris, *Partenope da Sirena a Regina. Il Mito Musicale di Napoli*, Barletta, Cafagna, 2016.

Fig. 13.7 *(Above, yellow box) The town of Parthenope-Palaepolis on Pizzofalcone Hill; in the top-right corner there is Piazza del Plebiscito (Figure 13.18) and the Royal Palace of Naples. (Center) Castel dell'Ovo, on the islet of Megaride. (Below) Reconstruction 3D of Parthenope/Paleopolis (Marco Mellace, 2023).*

Fig. 13.8 *Epitaph dedicated to Parthenope – Basilica of San Giovanni Maggiore.*

Other Greek and Roman myths claim that Parthenope was also a siren. In Greek mythology, sirens were nymphs born to *Achelôos* (or *Akheloios*), the ancient River-god of Greece and one of the muses (Terpsichore, Melpomene, or Calliope), from whom the sirens inherited their musical and singing abilities. The term 'nymph' refers to a veiled woman, typically a young woman of marriageable age. Thus, mythological nymphs could be identified as virgin goddesses.

Nymph-sirens were also acknowledged in Pythagorean and Platonic theologies. Their vocals and melodies became the music for the celestial spheres, creating harmony across the cosmos.[107]

In his *Metamorphoses* Ovid[108] stated that the sirens were also the handmaids and companions of Persephone. Persephone's mother was Demeter (Ceres in Roman religion), who was the goddess of harvest and agriculture, the nurturer of youth and vegetation, the creator of the cycle of seasons, life, and death, and the

[107] Walter Burkert, *Love and Science in Ancient Pythagoreanism*, Cambridge MA, Harvard University Press, 1972; Plato (428-427 BC – 348-347 BC), *The Myth of Er*, in the *Republic*.
[108] Ovid (43 BC – 18 AD), *Metamorphoses*, translated by A. S. Kline, 2000, book 5, v. 533–571.

Fig. 13.9 *Bas-relief of a canefora, Demeter's priestess (Via San Gregorio Armeno, 13).*

defender of marriage and holy rules. An antique bas-relief at street level depicting a *canefora*, or goddess priestess, confirms Demeter's veneration in Neapolis. The figure wears a crown as mandated by the cult, holding a basket (thus the term 'canefora') in her left hand and a torch in her right. Today the bas-relief is visible among the stalls displaying Nativity figurines along *Via San Gregorio Armeno*, the central cardo (Figure 13.9). This hints at the possible existence of a siren-cult in Neapolis associated with the Eleusinian Mysteries.

When the underworld deity Hades (*Pluto* in Roman mythology) kidnapped Persephone, her mother Demeter began seeking her. Because she could not cross the sea, she gave the sirens wings so that they might fly and search for her daughter anywhere on the planet. However, the sirens failed to return Persephone to her mother. In some alternative versions of the myths, Demeter transformed the sirens into harpies as a punishment for having failed to protect her daughter from Hades.[109]

After discovering that Persephone was in the kingdom of the dead, Demeter demanded from Zeus that Hades return her daughter, whose absence had already

[109] Siegfried de Rachewiltz, *De Sirenibus: An Inquiry into Sirens from Homer to Shakespeare*, Cambridge MA, Taylor & Francis, 1987.

caused a hard winter on Earth. In the meantime, Persephone ate some fruit from the underworld (six grains of pomegranate), which forever bound her to Hades. Thus, Persephone became the goddess of the underworld, and the sirens, as harpies, remained at her service, linked to the deity of the dead. The sirens were frequently represented on burial urns because they were responsible, among other things, for escorting the souls of the departed to the underworld.

According to the myth, humanity and the gods continued to complain until Zeus made an agreement with his brother Hades that ensured Persephone's return from the underworld for at least six months per year. Demeter was overjoyed every time her daughter came back and, consequently, turned nature back to life by giving spring, summer, and new crops to the Earth. Thus, Persephone's myth established the existence of seasons and became the foundation for the Eleusinian Mysteries, the most well-known ceremonies in ancient Greece. Notice that in these legends, sirens were celestial maidens who were later transformed into harpies, that is, they were creatures with feminine heads and upper bodies but with bird wings, legs, and tails.

In alternative myths, the poets narrate that the sirens, being transformed into harpies, also used their charming and sorrowful song to entice sailors, deceiving, capturing, and eventually killing them. In the Odyssey (Book XII), Homer (8th–7th century BC) describes how two of these creatures attempted to lure Ulysses and his companions when they were sailing in the Gulf of Naples between Capri and the Sorrento peninsula (Figure 13.10 A).[110] Homer, however, did not provide any physical descriptions of the sirens or named them. Several centuries later, in the *Argonautics*, Apollónios Ródios (c. 295 BC – c. 215 BC) recounts that when Ulysses managed to resist the sirens' enticing song, three of them committed suicide by throwing themselves into the sea. In the Greek poems such as Lycophron's Alexandra (3rd century BC), the sirens were harpies who committed suicide. Three cities on the Tyrrhenian coast were founded where their dead bodies were discovered and named after them: *Leucosia* (meaning *'the one who has white limbs*') was found on the shore of *Poseidonia* (Paestum); Ligeia (meaning '*the one with the enchanting voice*') was found on the beach of Terina (Lamezia Terme) in Calabria; and *Parthenope* (meaning '*the one who has the look of a virgin*') was found on the rocks of the small island of Megaride in the Gulf of Naples, where Apollo himself was said to have brought her body. Discovered by the local population who was living nearby the legendary Tower of Phaleros, the body of Parthenope was then buried in a sepulchreon *Mount Echia*. In this hill there is an ancient road named *via Monte di Dio* (meaning the 'road of God').

[110] Lycophron (3rd century BC), *Alexandra*, in *The Alexandra of Lycophron*, translated by George W. Mooney, London, G. Bell and Sons, 1921, v. 712–737.

Fig. 13.10 *Portrayals of sirens. A: Stamnos (vase) depicting Ulysses who, tied to his ship mast, is mesmerized by the three sirens' songs (circa 480 BC – 460 BC, British Museum, London). B: Greek vase with a siren superimposed upon the Eagle constellation depicted in red (6th century BC, George Vallet Territorial Archaeological Museum of the Sorrento Peninsula, Piano di Sorrento). C: Leucosia (left), Parthenope (centre) and Ligeia (right) on a kalpis from Sorrento, 4th century BC (Eva Hofstetter, 1990).*

It is important to emphasise that Homer did not name the sirens, and there is no evidence that Parthenope was considered a harpy before the 3rd century BC. As a result, the idea that Parthenope was a harpy was a later creation. The true Parthenope was a different character, albeit the late rendition sung by poets is still highly popular today.

In any event, archaeological evidence points to the existence of harpy-siren worship along the coast of Campania. For example, the Greek vase in Figure 13.10B features a bird-siren with a woman's head. The object was part of burial equipment from the necropolis of *Vadabillo* (Sorrento Peninsula), dating back to the second half of the 6th century BC.[111] The figure, depicted with wings that appear to be more spread out than the other, and a head slanted to the right, closely fits the basic geometry of the *Aquila* constellation (Figure 13.4).

In fact, the bird-bodied sirens were a common feature of funerary and tomb art and were therefore associated with death. These sirens were a kind of beings that accompanied the souls of the dead to the underworld. *Vadabillo* was the location of a local Temple of the Sirens (Figure 7.5). Figure 13.10C shows another Greek vase from the Sorrentine peninsula (4th century BC) with possible depictions of Leucosia, Parthenope (in the centre), and Ligeia.

[111] Eva Hofstetter, *Sirenen im Archaischen und Klassischen Griechenland*, Würzburg, K. Triltsch, 1990.

Fig. 13.11 *Some kind of 'sirens' were linked to the cult of Aphrodite. (Left) Statuette of a siren from Myrina, 1st century BC. (Right) Roman relief with a man and a siren, 1–200 AD (Museum of Fine Arts, Boston).*

Finally, another interpretation of sirens derives from the use of the term siren to indicate winged hierodules. This title was, for example, given to the priestesses of Aphrodite, the goddess of beauty, love, generation, and spring, also known as *Venus* in Roman mythology. Female slaves who participated in temple rites, music, and dance received the same denomination. These young ladies engaged in sacred prostitution in Asia Minor (in Ashtart's Phoenician cult) and Babylon (in goddess Ishtar's cult), just as they could in the East, to raise temple funds and to obtain a dowry. Sirens, known for their humorous talents, were represented as bird-maidens (Figure 13.11). Prostitution was more frequent among foreigners and sailors; hence, this kind of siren could have been seen in seaside towns and port places. This could be one of the historical reasons why, as we know from Ulysses' stories, they were considered dangerous to sailors. In any event, their gentle voice earned them the label of sea muses; being daughters of aquatic deities, they possessed the capacity to become such.

Thus, in ancient iconography the sirens were represented as harpies or winged nymphs. Only much later, beginning in the Middle Ages, did they take on the appearance of mermaids, that is, ladies from the waist up and with fishtails on the

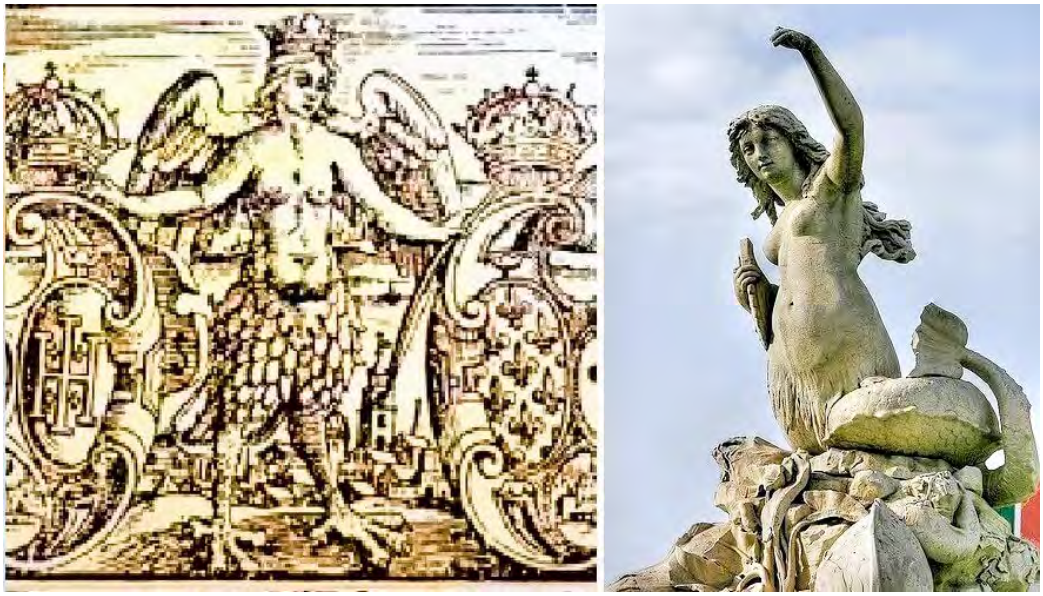

Fig. 13.12 *(Left) Parthenope depicted as a harpy (bird-woman) in a Neapolitan medieval print. (Right) Parthenope represented as a mermaid (fish-woman) in the Fountain of the Siren (Piazza Sannazaro, Naples, 19th century).*

rest of their bodies. The later characteristics can be found in several Parthenope statues sculpted in Naples since the Renaissance (Figure 13.12).

In Neapolis, the various legends concerning Parthenope, who was portrayed as both an ancestor gifted with great virtues and a siren, clearly overlapped, and interlaced. Yet, equating the Parthenope venerated in Neapolis with the harpy sung by the poets is erroneous. For example, in the coins from Terina (now Lamezia Terme in Calabria), Ligeia is represented as a winged nymph, not as a harpy.[112] The accompanying attributes (a dove, a crow, a hare, a branch of myrtle or laurel, or Aesculapius' rod) only partially characterised Aphrodite, while they more clearly referred to Apollo (Figure 13.13). In Neapolis too, Parthenope was revered as a nymph or winged goddess, a celestial siren associated with Apollo, rather than a wicked harpy or sacred hierodule. As previously stated, Pythagorean and Platonic theologies praised sirens as nymphs. Moreover, the Parthenope worshipped in Neapolis appears to have been an important historical figure directly tied to Apollo and the constellation of the Virgin rather than to the siren-harpy praised

[112] Francesco Cristiano, *Terina e il mito della sirena Ligea*, «Panorama Numismatico», 224 (2007), pp. 9–15; Rabun M. Taylor, *The early coinage of Neapolis*, in *Ancient Naples: A Documentary History Origins to c. 350 CE*, edited by Rabun M. Taylor, New York, Italica Press, 2021, pp. 85–112; Ancient Coinage of Bruttium, Terina, https://www.wildwinds.com/coins/greece/bruttium/terina/t.html (accessed 21/05/2024).

Fig. 13.13 *Coins from Terina (c. 300 BC) depicting the Ligeia represented as a winged nymph and holding a dove or the snake-wrapped rod of Asclepius, the son of Apollo, or showing a Sun.*

later by Lycophron and other poets. Her demeanour and intertwined storylines make her a character suitable for a cult of Apollo.[113]

Apollo is continuously mentioned in Parthenope's stories. For example, Giovanni Antonio Summonte (1601) cite ancient authors claiming that in Neapolis there was a statue of Parthenope worshipping Apollo holding a dove on his

[113] Giuseppe Sanchez, *La Campania sotterranea e brevi notizie degli edificii scavati entro roccia*, Napoli, 1833, book 13, reprinted in *Napoli Antri e Misteri (Costellazioni, Sirene, Oracoli e Sibille nella Campania delle Origini)*, Napoli, Stamperia del Valentino, 2012.

shoulder. When Neapolis was founded, Apollonian oracles promoted her cult twice in a few decades. As discussed in Chapter 6, an Oracle (probably Cumae's or Delphi's) specifically ordered the Cumaeans to create Neapolis as the new city of Parthenope. In a second occurrence, in 452 BC, by order of another Oracle (almost certainly Delphi's), the Athenian Admiral *Diotimos* introduced in her honour the *Lampadaforia-Lampadedromia* celebrations in Neapolis.[114] The Lampadaforia-Lampadedromia was an agonistic and religious event that included a competition-race among teams of athletes from each of the phratries of Neapolis in which runners carried torches and passed them to one another, much like a relay race. The goal was to cross the finish line as quickly as possible without extinguishing the flames. As a reward, the victor was most likely allowed to light the sacred fire in honour of Parthenope at her sepulchre in Paleopolis. In the Eleusinian Mysteries, torch races and processions often symbolized the Sun's journey across the sky.

The recurring involvement of the Apollonian oracles discussed above provides credence to the hypothesis that the Parthenope revered in Neapolis was an important religious figure associated with Apollo. Parthenope could have been one of Apollo's elite priestesses who served as oracles, like the Pythia of Delphi, who were virgin priestesses. Since she guided the Greeks to the new lands, the Oracles wanted Parthenope's name to be remembered forever and commemorated with an agonistic event that would have attracted the interest of all the people of Magna Graecia. Indeed, the course of the Lampadaforia ran from Neapolis (east) to Paleopolis (west). This race could have symbolised the colonists' journey from Greece (east) to Campania (west) with Apollo (represented by the torch), with the additional purpose of celebrating and honouring Parhenope, who made such a voyage possible. See also the comments by Giovanni Antonio Summonte (1601). The Lampadaforia became so important that a few centuries later, in 2 AD, the Roman Emperor Augustus turned it into those Isolympic games of Neapolis that were to become famous throughout the whole West.[115] Recent excavations in the city have also unearthed the temple whose inscriptions bear the victorious athletes' names (Figure 13.14).[116]

[114] Rabun M. Taylor, *The Greek City: From Parthenope to Neapolis*, in *Ancient Naples: A Documentary History Origins to c. 350 CE*, edited by Rabun M. Taylor, New York, Italica Press, 2021, pp. 31–84.

[115] Angela Palmentieri, *Marmora romana in medieval Naples*, in *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 120–151.

[116] Maria Luisa Nava, *Piazza Nicola Amore – stazione Duomo: l'area del Tempio dei Giochi isolimpici*, «AttiTaranto», 47 (2008), pp. 855–857.

Fig. 13.14 *Lampadedromia, or 'torch race'. Competitive inscriptions depicting the Isolympic games and remains of the temple dedicated to them (1st century AD – National Archaeological Museum of Naples).*

The orientation of Neapolis towards Pithecusae

Let us now return to our interpretation of the constellations as seen in Neapolis. As already explained, at dawn on the autumnal equinox, the Sun was in the sign of the Virgin and appeared exactly above the Somma-Vesuvius volcanic complex. During the day, the Sun and the constellation moved together in the sky above the gulf of Naples, eventually setting over the sea to the west of the city. Later, in the early evening, the star Altair of the *Aquila* constellation appeared high in the sky, returning from the sea to the land. Finally, around midnight, the star was observed setting near Sant'Elmo Hill. Given the legends of Parthenope detailed above, these astronomical images could have provided the people with a mythologically rich scenographic context.

At first, Parthenope could have been imagined flying over the sea on the shoulders of the Sun, that is, of Apollo. The imaginary picture could repres-

Fig. 13.15 *Rape of Persephone by Hades, with the helpless sirens (right) standing by. (Luca Giordano, 1689).*

ent Apollo's high priestess travelling with the Greek community from Greece to Campania following Apollo's dove. Since Spica's heliacal rising occurred on 19th September, the ten-day period leading up to the fall equinox (28th September) could have also reflected the time of the journey. Then, the Messenger of Apollo would resurface in the sky of Neapolis, this time as a celestial bird – the Eagle constellation – whose return from the sea and subsequent fall upon Sant'Elmo Hill symbolised Parthenope's arrival and subsequent death.

This tragic scene is in line with the myths related to both the historical figure of Parthenope and the siren found in the Eleusinian Mysteries. Here Persephone embodied the vegetation that sprouts in spring and summer, while Hades abducted her into the underworld, where the sirens, being forced to follow Persephone, went (Figure 13.15).[117] Thus, both the legends that identify Parthenope as a historical figure (directly linked to Apollo and the constellation of *Parthenos*) and those associated with the sirens of the Eleusinian Mysteries can be correlated with the autumnal equinox.

[117] Ovid (43 BC – 18 AD), *Metamorphoses*, translated by A. S. Kline, Poetry in Translation, 2000, book 5, v. 533–571.

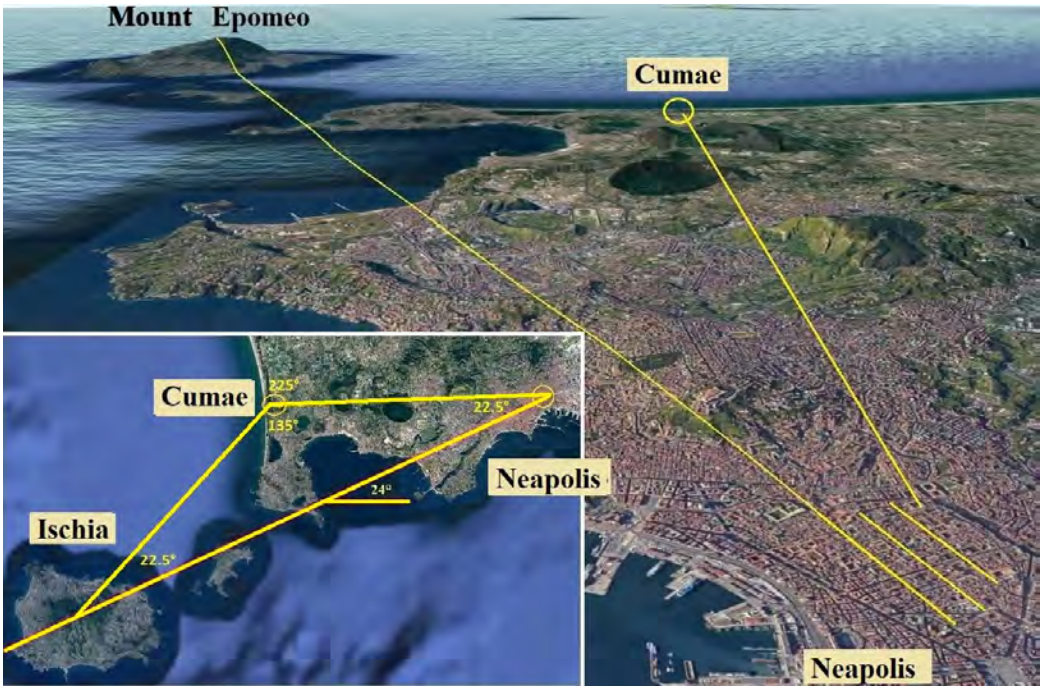

Fig. 13.16 *The alignment of the decumans of Neapolis with Monte Epomeo on the island of Pithecusae (Ischia). Neapolis is also located almost exactly at the east (E') of Cumae. The longer lines are the extension of the lower decuman of Neapolis.*

The orientation of the street in Neapolis could well emphasise the mythological symbolism of the place. In fact, the decumans are approximately 24° or, according to the alternative (N',E',S',W') reference system, 22.5° north of the equinoctial line. An imaginary line extending the lower decuman beyond Sant'Elmo Hill reaches the summit of *Mt. Epomeo* on the island of Ischia (Figure 13.16).

The alignment is geographically precise and appears intentional. In fact, Ischia is not visible from Neapolis; hence, Sant'Elmo Hill would have served as a bridge between Neapolis and the true target of its decuman orientation, which was Pithecusae (Ischia). Moreover, Neapolis is also located at roughly 88.5° azimuth from Cumae, and as already explained, the line joining Cumae and Neapolis could have been the W'-E' equinoctial line they actually used (Figure 7.5). Thus, the two cities formed an isosceles triangle with Ischia, with angles of 135° and 225° resembling the relationship between the lengths of night and day during solstices (see Chapter 9). Thus, it appears as if the builders of Neapolis intended to emphasise a kind of triad poly-relationship between Pithecusae, Cumae and Neapolis under the blessing of Apollo symbolised by the 16-rayed Sun.

Fig. 13.17 *Nestor's Cup, 8th century BC (Archaeological Museum of Pithecusae, Villa Arbusto, Lacco Ameno, Ischia).*

Pithecusae (Ischia) was the region's first Greek colony founded in the early 8th century BC. This island was considerably safer than the mainland coast. It is worth noting that the oldest available Greek artefact of the region – the *Cup of Nestor* – was found in the necropolis of *San Montano* in *Lacco Ameno* (Figure 13.17) in Ischia. This cup is particularly important because it bears one of the oldest examples of Greek writing in the Euboic alphabet that has survived until now.

Orienting Neapolis towards Ischia may have had a considerable appeal because it symbolically linked the New City to the first colony. The Greek ancestors of the founders of Neapolis were guided to these lands by Apollo and Parthenope. Thus, Neapolis' street position and orientation were precisely chosen to simultaneously celebrate Apollo and Parthenope. This idea was achieved by carefully choosing which of the eight directions indicated by the sixteen-rayed Sun had to be used to orient the decumans of Neapolis (Figure 9.4).

By placing the sixteen-rayed Sun in the centre of the agora of Neapolis, the Sun's ray pointing to the west was directed exactly towards Cumae, and the 22.5° anticlockwise rotated adjacent ray pointed exactly towards Sant'Elmo Hill and, beyond it, towards the first colony of Pithecusae (Ischia) (Figure 13.16). This careful choice resolved the geometrical uncertainty related to the eight directions of

Fig. 13.18 *The royal pontifical Basilica of San Francesco di Paola (Piazza del Plebiscito, near the Royal Palace and the San Carlo Theatre in Naples), considered one of the most important examples of neoclassical architecture in Italy. The sepulchre of Parthenope and/or the mausoleum dedicated to her could have been located near this place, which is inside Palaepolis, the old townlet of Parthenope on Pizzofalcone Hill (Vintage photo).*

the sixteen-rayed Sun and attributed to Neapolis the desired symbolic meaning of linking the New City to both Cumae and Pithecusae.

The whole interpretation of the place and events is summarised below by using the myths of Parthenope. The interval between the 19th of September and the autumnal equinox could have been associated with a grandiose image of Parthenope riding on the shoulders of the Sun-god, crossing the sea from east to west, because in the first half of the 5th century BC, on those days there was the heliacal rising of Spica, the main star of *Virgo* (Figure 16.2). The event could have been interpreted as an analogy for the earliest Greek colonists' voyage from Greece to the Gulf of Naples, which was guided by Parthenope under Apollo's protection. Furthermore, on the fall equinox evening, anyone walking down the lower decuman and looking towards Sant'Elmo Hill would have recalled the death of Parthenope, which occurred in that area and was symbolised by the set of the star Altair on Sant'Elmo Hill. That same sacrifice made the ultimate event possible: the establishment of the first Greek colony in Pithecusae on the island of Ischia, located exactly along the decuman line beyond Sant'Elmo (Figure 13.16).

Fig. 13.19 *Bust of Virgil (Publius Vergilius Maro, 15 October 70 BC – 21 September 19 BC). Vergiliano Park (Naples).*

Figure 13.7 shows Castel dell'Ovo, the oldest castle in Naples. This was the *Castrum Lucullianum*, located on the islet of Megaride in front of Mount Echia, also known as Pizzofalcone Hill. The castle dates to the 1st century BC and served as a luxury palace for the last Roman Emperor, Romulus Augustus (c. 465 – after 511 AD), who was deposed in 476 AD. Its current name is derived from a medieval legend where it is said that Virgil (Figure 13.19) buried in the castle's foundation a magical egg endowed with the ability to support the entire castle, which was thereafter known as *Calstel dell'Ovo*, or the 'Castle of the Egg'. Contemporaries regarded the poet Virgil as a magician, and he was beloved as the city protector for having proposed several urban works that liberated Neapolis from various plagues.

Megaride was the islet where Parthenope's corpse was discovered according to the myth of the siren. In the middle of the 8th century BC, Cumae citizens founded the village of Parthenope on Mount Echia near the sepulchre where Parthenope was buried, which could have been nearby today's *Basilica of San Francesco di Paola* (Figure 13.18).

Fig. 13.20 *Parthenope's nymphs taking their penates, or household gods, over the Seine (ceiling of the Charles X Museum, Louvre Museum: Charles Meynier, 1827). Notice the statue of the Sun-god (up high) and the one of Hercules (on the left).*

Chapter14
The coins of Neapolis: Parthenope and the Androprosop Bull

The vernal equinox marks the transition from winter to spring. In ancient times, it prompted religious festivities celebrating fertility, rebirth, and agriculture. The Lesser Eleusinian Mysteries celebrated Persephone's return from the underworld to symbolize this seasonal transition.[118] Figure 14.1 shows a specific astronomical configuration of the spring equinox, which could have inspired religious celebrations in Neapolis.

Once again, an observer from Neapolis would have seen the Sun rising right above the Somma-Vesuvius volcanic complex. In the evening of the same day, the observer, looking towards Sant'Elmo Hill from the lower decuman (*Spaccanapoli*), could have seen *Taurus* – the constellation of the Bull – appearing above the hill immediately after sunset at 6:10 p.m. Aldebaran, the main star of *Taurus*, became visible over Sant'Elmo Hill at dusk since February or March, when the Lesser Eleusinian Mysteries were usually celebrated by the Greeks. The Pleiades are found in the northwest of *Taurus*. The Orion constellation, recognisable by its three-star belt, moved over the hill at 7:30 p.m.; by then, *Taurus* was on the west side of Neapolis, that is, on the opposite side of the Somma-Vesuvius volcano complex at the east side of the city.

The constellation of the Bull was very important because it symbolised *Achelôos*, the River-god, who took on the physical aspect of a Bull during his fight with Hercules.[119] In the specific case of Neapolis, *Achelôos* was represented by *Sepeithos*, the River-god *Sebethos*, who fertilised the terrain of Neapolis.[120]

[118] Daniel Ogden, *A Companion to Greek Religion*, Singapore, Wiley-Blackwell, 2009.

[119] Jacob Stern, *Palaephatus*, in *On Unbelievable Tales: Palaephatus Peri Apiston*, edited by Jacob Stern, Wauconda, Bolchazy Carducci, 1996.

[120] Rabun M. Taylor, *River raptures: containment and control of water in Greek and Roman constructions of identity*, in *The Nature and Function of Water, Baths, Bathing and Hygiene from Antiquity Through the Renaissance*, edited by Cynthia Kosso & Anne Scott, Boston, Brill Academic, 2009, pp. 21–42.

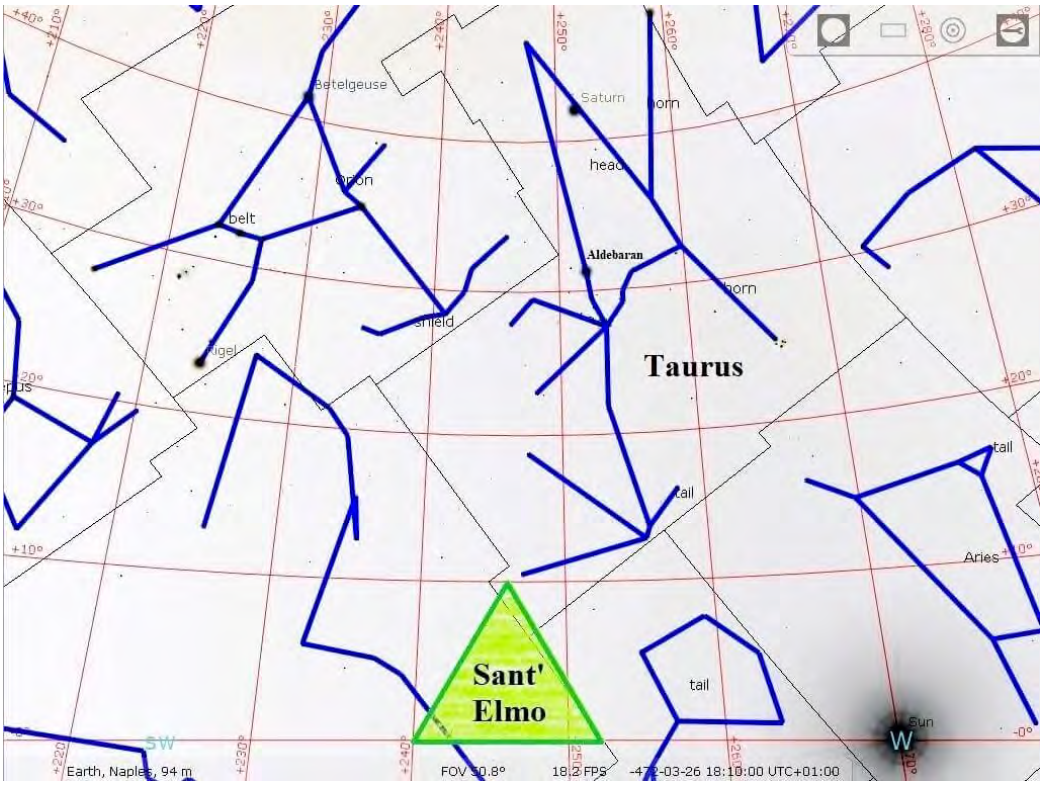

Fig. 14.1 *The sky above Sant'Elmo Hill: view from the lower decuman. The spring equinox of 26th March 472 BC. Time: 6:10 p.m. (Stellarium 0.18.2).*

Once again, local archaeological findings appear to confirm the astronomical interpretations proposed so far. Figures 14.2 A-C show various silver coins minted in Neapolis in the 4th and 3rd centuries BC.[121] The front depicts the head of an elegant, jewelled woman who is identified as Parthenope. She is flanked by other symbols such as dolphins, which could represent both the marine supremacy of Neapolis and a link with the dolphins of Apollo. Other coins show her together with a bird (perhaps a reference to Apollo's dove from ancient legends) or an amphora, maybe indicating that she was a nymph.

On the back of each coin are often found an Androprosop Bull and a winged goddess who is hovering over his head with a laurel wreath. The goddess is typically identified with Nike (the goddess of Victory), but this interpretation is not necessarily correct. A more plausible hypothesis is that in Neapolis the winged goddess represented a celestial image of Parthenope herself. Indeed, the goddess

[121] Rabun M. Taylor, *The early coinage of Neapolis*, in *Ancient Naples: A Documentary History Origins to c. 350 CE*, edited by Rabun M. Taylor, New York, Italica Press, 2021, pp. 85–112.

Fig. 14.2 *A, B, C: coins from Neapolis (4th–3rd century BC). Parthenope is depicted in the presence, respectively, of dolphins, a bird, and a hydria (obverse), and a winged woman crowning a Androprosop Bull (reverse). D: the siren Ligeia – Coin from Terina. E: the god Sebethos (obverse) and Parthenope sitting on a hydria (reverse) – Coin from Neapolis (450 BC – 420 BC).*

identified with the Virgo constellation was often portrayed as a winged lady, as also represented on the Farnese Atlas (see the Foreword).

Some sceptics may challenge the association of Parthenope with the winged goddess because the latter does not resemble a harpy. However, the depiction of a harpy never occurs on the coins from Neapolis. As explained in Chapter 14, for the local people of Neapolis Parthenope was more likely a real person who was later deified as a nymph rather than a harpy; such nymphs were often represented as winged ladies.

In fact, the coins from Terina (today's Lamezia Terme in Calabria) (Figures 13.13 and 14.2D), which bear Ligeia's picture, corroborate the above interpretation. The winged goddess seated on a mound or amphora with a laurel wreath in her hand represented Parthenope's siren-sister rather than the goddess Nike.[122] Thus, it is probable that these characters, when used to represent their respective cities, were portrayed as winged nymphs rather than siren-harpies to emphasise their celestial origin and, presumably, their connection to the Virgo constellation.

For example, Figure 14.2E illustrates a coin dated between 450 and 420 BC, which was one of the first discovered in the area of Neapolis; its style may have served as a template for later coins, including the ones of Terina, which are very similar. The images depicted the River-god Sebethos or the Sun-god Ebon (recognisable by the man's head with bull-like horns) and a winged goddess sitting on a large amphora; her head was slanted to the right and surrounded by the inscription 'Neapolis', which means that the winged goddess was the representation of Parthenope herself.[123] The amphora indicates that she was a nymph, similar to Ligeia on Terina's coins. Thus, the coins depicted Partenope and Ligeia as winged nymphs rather than harpies, which were female creatures with wings, half woman and half bird.

On subsequent local coins, the man-headed Bull may have replaced the massive amphora on which the winged goddess Parthenope sat, and the nymph was depicted as a winged goddess circling over the Bull.[124] It is worth noting that numerous Greek coins, especially those coined in Magna Graecia, depict the face of an Androprosop Bull. However, since 460 BC and for generations, the entire body of the Bull, paired with a winged goddess atop it, was only seen on the coins from Neapolis.[125]

It may be that the full-body Bull on the coin of Neapolis represented a personification of the Somma-Vesuvius volcanic complex, from which the Sebethos river was believed to spring.[126] The tympanum within the pediment of the Temple of the Dioscuri (1st century AD) (Figure 14.3) has an image that could confirm such an interpretation. Sebethos is on the right and has the semblance of an aquatic

[122] Francesco Cristiano, *Terina e il mito della sirena Ligea*, «Panorama Numismatico», 224 (2007), pp. 9–15.

[123] Arthur Sambon, *Le Monnaies Antiques d'Italie*, Paris, Bureaux du «Musée», 1903.

[124] Rabun M. Taylor, *The early coinage of Neapolis*, in *Ancient Naples: A Documentary History Origins to c. 350 CE*, edited by Rabun M. Taylor, New York, Italica Press, 2021, pp. 85–112.

[125] Nicholas J. Molinari and Nicola Sisci, *Potamikon: Sinews of Acheloios. A Comprehensive Catalog of the Bronze Coinage of the Man-Faced Bull, with Essays on Origin and Identity*, Oxford UK, Archaeopress, 2016.

[126] Teodoro Monticelli, *Sull'Origine delle Acque del Sebeto, di Napoli Antica, di Pozzuoli*, Napoli, Stabilimento Tipografico Dell'Aquila, 1840.

Fig. 14.3 *(Above) Pediment of the Temple of the Dioscuri – Work by Francisco de Holanda (16th century) drawn up before the destruction caused by a telluric event (1688). (Below) Fountain depicting the River-god Sebethos (1635 – Largo Sermoneta, Naples).*

divinity and a bearded and half-naked elderly man. He also seems to be wearing a horned headdress that recalls mountain vegetation.[127] The amphora reclined under him and the water flowing from it resemble a mountain cave and a river that flows from it. This same iconography is also present in the famous statue of Sebethos in *Largo Sermoneta* in Naples (Figure 14.3).

Indeed, images and statues of the River-god differ among them mostly because of the position of the amphora. For instance, the amphora is missing in the statue

[127] Rabun M. Taylor, *The Temple of the Dioscuri and the mythic origins of Neapolis*, in *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 39–63.

Fig. 14.4 *Statue of the Nile-god (2nd century AD – Largo Corpo di Napoli, Spaccanapoli, Naples).*

of the Nile River (2nd century AD) displayed in Naples in *Piazza Nilo* along the lower decuman (*Spaccanapoli*) (Figure 14.4). In other cases, the amphora stands on the side of the River-god or rests on his legs. The position of the amphora appears to describe some specific physical characteristic of the represented river.

There is a tradition in Naples that associates Sebethos with the Somma-Vesuvius volcanic complex, as demonstrated in some Neapolitan prints from past centuries. According to myth, Vesuvius was a centaur with whom the siren Parthenope fell deeply in love. Unfortunately, Zeus – who was also in love with the stunning siren – broke up their love. To prevent Parthenope from touching Vesuvius, Zeus transformed Vesuvius into the volcano. Figure 14.5A and the upper-left image in Figure 14.6 suggest that such an association could be traced back to ancient times. Indeed, as viewed from Neapolis, the volcanic complex resembles the back of the Androprosop Bull shown on local coins, as it appears to have two peaks due to its composition of two volcanoes, one inside the other. However, eruptions can change the form of volcanoes. Thus, did the ancient Greeks see the Somma-Vesuvius volcano complex as we see it today?

Mount Somma is the remnant of the large volcano that erupted around 16,300 BC; its collapse created the caldera in which the smaller Vesuvius emerged millennia later. The latter's current shape is the result of multiple eruptions that followed the infamous Plinian eruption of 79 AD, which destroyed Pompeii and Herculaneum. Probably there was also another eruption in 217 BC.[128] Mount Vesuvius's

[128] Note that the coins shown in Figure 14.2 are older than 217 BC.

Fig. 14.5 *A: The Somma-Vesuvius volcano seen from Sant'Elmo Hill. In this coin from Neapolis a winged nymph is crowning the Androprosop Bull. B: Fontana della Spinacorona, with a Parthenope-harpy standing on the Somma-Vesuvius complex.*

actual shape between the 5th century BC and the 1st century AD is uncertain, as Plinian eruptions caused its partial explosion.[129]

[129] Raffaello Cioni, Antonella Bertagnini, Roberto Santacroce and Daniele Andronico, *Explosive activity and eruption scenarios at Somma-Vesuvius (Italy): towards a new classification scheme*, «Journal of Volcanology and Geothermal Research», 178 (2008), n. 3, pp. 331–346.

The analysis of some frescoes from Pompeii suggested that before 73 AD, the volcano complex did not appear to have two peaks.[130] However, there are some similarities between ancient Roman frescoes and modern images indicating that the Somma-Vesuvius complex could have appeared since Greek-Roman times as a dominantly single, double, or even triple-peaked mountain, as seen from Pompeii, Naples, and Herculaneum, respectively.[131]

For example, Figure 14.6 compares two Pompeian frescoes dating from the 1st century AD with two pictures of the Somma-Vesuvius complex dated in the 18th century. The two Pompeian frescoes appear to depict a single peak mountain, but the image in the fresco in the middle of Figure 14.6 appears to be more realistic, and it shows a broken mountain. This broken-mountain image is very similar to the one of the volcano complex depicted in the upper-right figure dated to the 18th century, showing the southern side of the volcano, which is the one that could be seen from Pompeii. However, the upper-left figure, which is also dated to the 18th century, shows the western side of the volcano complex, which is the one seen from Naples and has two peaks. Therefore, while the height of Mount Vesuvius' primary cone has changed throughout the centuries, the fundamental profile of the Somma-Vesuvius volcano complex prior to the BC 217 and AD 79 eruptions may have been similar to its current shape by having two separate summits when it is seen from Neapolis; the overlapped shape resembles the back of the Androprosop Bull shown on the coins of Neapolis.

The winged goddess hovering above the Androprosop Bull could be Parthenope, travelling across the countryside to the source of the Sebethos on the slopes of the Somma-Vesuvius volcano complex. The coin picture would resemble the celestial landscape visible from Neapolis at dawn on the autumnal equinox, when the Virgo constellation towers over the bright Sun rising above the volcano (Figure 13.2).[132] In Figure 9.3 the coin with the 16-rayed Sun above the Androprosop Bull could depict the same astronomical scene (a sunrise over Somma-Vesuvius) as seen during the equinoxes. Finally, the large reclining amphora on which the young woman is sitting (Figure 14.2E) could also represent the Somma-Vesuvius complex since it recalls the image of a large mountain with a cave and a water spring.

[130] Antonio Nazzano, *The shape of Vesuvius before the 79 A.D. eruption according to a new finding from a Pompei fresco and Vesuvius central cone history in the last 2000 years*, «Annali di Geofisica», 42 (1999), n. 4, pp. 715–723.

[131] Richard B. Stothers and Michael R. Rampino, *Volcanic eruptions in the Mediterranean before A.D. 630 from written and archaeological sources*, «Journal of Geophysical Research», 88 (1983), n. B8, pp. 6357–6371.

[132] Flavio Russo, *Sebeto. Storia del Controverso Fiume di Napoli*, Torre del Greco, ESA, 2012.

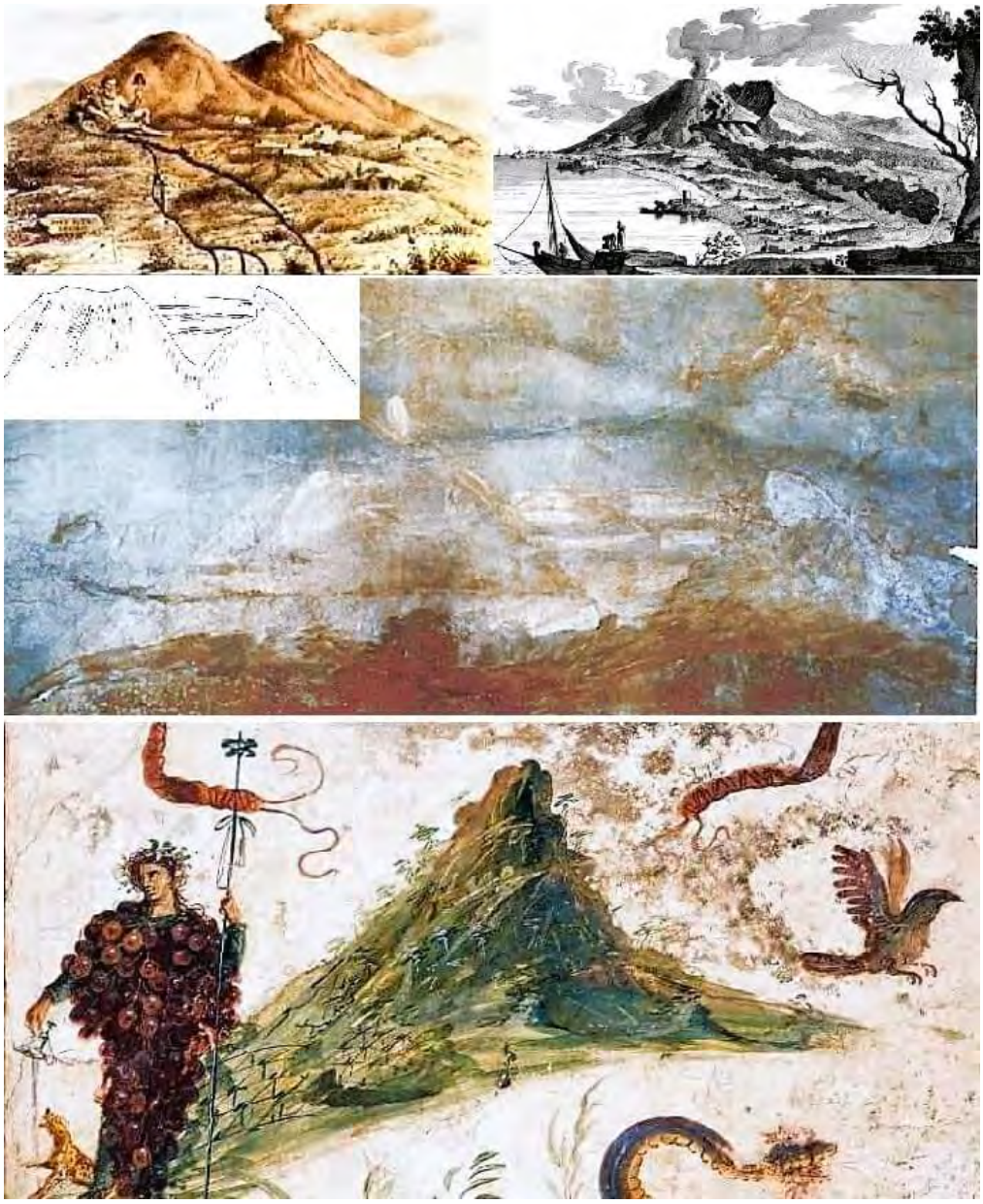

Fig. 14.6 *(Above left) The view of the Somma-Vesuvius complex as seen from Naples with the Sebethos spring (18th century). (Above right) The southern view during the eruption on 25th October 1751. (Middle) Mt. Vesuvius in a fresco from Pompeii (Citharist's House) looks similar to the 1751 picture of the volcano complex as seen from the south; note the* V*-shape of the volcano complex.*[13] *(Below) Another fresco from Pompeii (Centenario's House) (National Archaeological Museum of Naples).*

The proposed interpretation appears to be corroborated by the 16th-century fountain of the *Spinacorona*,[133] known in Naples as the *Fontana delle Zizze*, in which Parthenope (now depicted as a siren-harpy) stands over the Somma-Vesuvius volcano complex (Figure 14.5B).[134] This sculpture could have been inspired by ancient traditions that associated the constellation of the Virgin with Parthenope and the volcano complex on the autumnal equinox.[135] In fact, in the 16th century, at the dawn of this equinox, *Virgo* no longer appeared to be standing above the Sun and the volcanic complex, as it was in the 5th century BC.

Figure 14.7 shows an evident parallelism between the commemorative coin of Apollo in Figure 9.3 and the coins dedicated to Parthenope depicted in Figure 14.2. In the first coin, Apollo is represented on one side as a human figure and on the other as a celestial figure, that is, as the sixteen-rayed Sun above the Androprosop Bull. The second coin could have adopted the same style by representing Parthenope as a lady on one side and the winged nymph above the Bull on the other side. This parallelism suggests that the winged goddess could have been indeed Parthenope herself identified with *Virgo*.

Thus, the coins of Neapolis appear to confirm our conjecture that Partenope was honoured mostly around the autumn equinox when she would have crowned the Bull by rising with the Sun above the Somma-Vesuvius volcano complex. Perhaps, the spring equinox was also linked to the Bull because of the appearance of *Taurus* above Sant'Elmo Hill. Thus, the Eleusinian Mysteries, Parthenope, the Sun and the Androprosop Bull were likely linked together.

According to Macrobius,[136] the Androprosop Bull on the pre-Roman coins from Neapolis did not represent the River-god (*Achelôos* or Sebethos), but the local deity Bacchus Ebone (*Hèbon*); this divinity too recalled the Sun-god, for he represented the mature and nocturnal aspects of Apollo and Dionisio.[137] The coin depiction emphasises once again the identification of Parthenope with the constellation of the Virgin, which rises alongside and honours the Sun around the autumn equinox.

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[133] A copy of this statue is near the church of *Santa Caterina della Spinacorona*, while the original version was moved to the Museum of *San Martino* approximately a century ago.

[134] Gennaro Aspreno Galante, *Guida Sacra della Città di Napoli*, Napoli, Stamperia del Fibreno, 1872.

[135] Giuseppe Sanchez, *La Campania sotterranea e brevi notizie degli edificii scavati entro roccia*, Napoli, 1833, book 13, reprinted in *Napoli Antri e Misteri (Costellazioni, Sirene, Oracoli e Sibille nella Campania delle Origini)*, Napoli, Stamperia del Valentino, 2012.

[136] Macrobius (385 AD – 430 AD), *Saturnalia*, in *Macrobii Ambrosii Theodosii Saturnalia*, translated by R. A. Kaster, Oxford UK, Oxford University Press, 2011, c. 18, v. 9.

[137] Giuseppe Ruotolo, *Corpus Nummorum Rubastinorum*, Bari, Edipuglia, 2010.

Fig. 14.7 *Comparison between two coins dedicated, respectively, to Apollo (Figure 9.3) and Parthenope (Figure 14.2). The two coins show symmetric parallelisms: Apollo-Sun, Taurus-Taurus, and Parthenope-Winged Goddess. This style suggests that the winged goddess is the celestial image of Parthenope.*

Interestingly, only in mediaeval Naples Parthenope is represented as a real harpy (or even a mermaid), like in the statue of the Spinacorona's fountain and several other artefacts (Figure 13.12). However, neoclassical artworks depict Parthenope as a Greek princess or goddess. This representation of Parthenope is evident in Antonio Niccolini's (1772–1850) sculptural group on the facade of the *San Carlo Theatre* in Naples and other artworks of the same period (Figure 14.8). Figure 13.20 shows a painting by Charles Meynier (1768–1832); in this paint-

Fig. 14.8 *Parthenope between the genius of comedy and that of tragedy. Restored work atop the main façade of the San Carlo Theatre in Naples (Antonio Niccolini, 1816).*

ing, Parthenope is a goddess associated with the Sun-god and with Hercules, who fought against the River-god *Achelôos* represented by the Androprosop Bull.

Although the legends and myths examined in Chapters 13 and 14 are numerous and diverse, they do share several important aspects that are relevant to our inquiry. Included in this list are: (1) Parthenope was probably a historical figure; (2) she was associated with the first Greek colonists who founded Cumae and the neighbouring cities; (3) she was connected with Apollo, whose omens she interpreted; (4) her name clearly recalled a virgin; (5) once deified, she was indeed identified with theVirgo constellation of the Virgin; (6) *Virgo* was further linked with Apollo because the Sun was in this sign of the Virgin around the autumnal equinox; (7) the myths of the sirens seem to confirm the close relationship among songs, music, and the young woman; (8) the oracles of the Apollonian cult held Parthenope with profound veneration; (9) finally, in local coins she is never represented as a harpy. Who was Parthenope for the people of Neapolis, then?

Chapter 15 proposes a solution to the puzzling question.

Chapter 15
Parthenope, the Pythia of Delphi, and the Sibyl of Cumae

The evidence presented in previous chapters suggests that Parthenope was a revered ancestor of the Greek communities of Cumae and Neapolis. It was conjectured that she served as Apollo's oracle, guiding the first Chalcidian colonists to the new land in the Gulf of Naples. As a result, Parthenope may have been a high priestess with oracular abilities, similar to the Pythia of Delphi. Parthenope may have started the oracular tradition of Cumae, which was known for having housed a mythical Sibyl. Now, we will examine the qualities of the Pythia of Delphi and the Sibyl of Cumae to see whether it is reasonable to make such a conclusion.

The term *Pythia* derives from *Pytho*, the mythological serpent tasked with guarding the sanctuary of Delphi. The legend has it that the animal was killed by Apollo, who, with its carcass, built a new Oracle dedicated to himself. According to Strabo (c. 64 BC – after 21 AD, *Geography*, book 9, c. 3) and others, the priestess of Delphi lived in the sanctuary and was tasked by Apollo with reporting the will of his father Zeus to men. When the Pythia uttered prophecies, she was seated on a large concave tripod, where she answered in verse and prose to the questions posed by postulants from all over the Greek world. Figure 15.1 shows a reconstruction of the Temple of Apollo at Delphi.

Myths and legends narrate that the Oracle could foresee the seekers' future and destiny thanks to personal prophetic powers. These were strengthened by the *pneuma enthusiastikon* arising from a hypnotic gas exhaled from the bowels of the Earth. This caused the oracle to enter a state of trance that allowed her to communicate with the spirits. Hence, the oracle was believed to be possessed by the divinity. The trance state into which the priestess fell, with visible alterations in her body and voice, could, in some cases, be quite violent, sometimes leading her to death. The oracle was, therefore, a *medium* used by Apollo to communicate with human beings. The Pythia was Greece's most influential woman, and her opinion was sought on all critical matters.

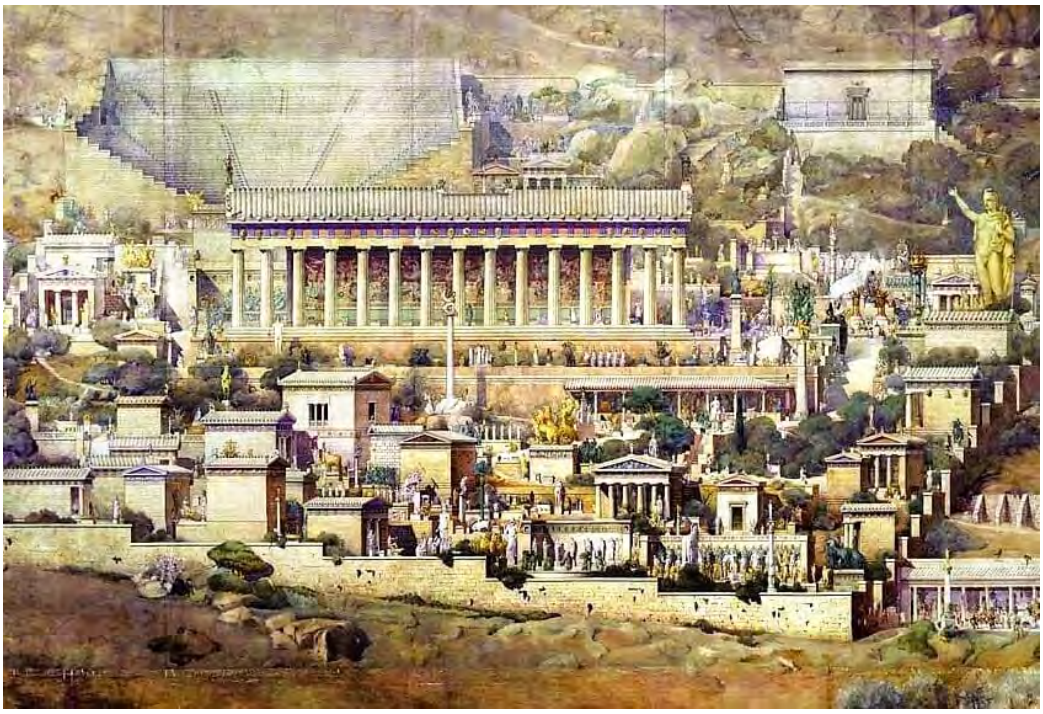

Fig. 15.1 *Artistic reconstruction of the Temple of Apollo in Delphi (Albert Tournaire, 1894).*

Christianity viewed pagan divinities as fallen angels,[138] that is, demons who used deception to seek human worship by mimicking the one and true God.[139] Oracular manifestations were abhorred as possible cases of demonic possessions; the Bible itself condemns all forms of spiritism, divination, and occult art.[140]

Oddly, pagan oracles became more and more passive with the advent of Christianity. This state of affairs was noticed by Plutarch himself (46/48 AD–125/127

[138] The Ancient Testament states (in Psalms 95/96, 5): «[5]*For all the gods of the Gentiles are devils: but the Lord made the heavens*»; and Saint Paul wrote (in 1 Cor. 10:19-20): «[19]*What then? Do I say, that what is offered in sacrifice to idols, is any thing? Or, that the idol is any thing?* [20]*But the things which the heathens sacrifice, they sacrifice to devils, and not to God. And I would not that you should be made partakers with devils*». (Douay-Rheims 1899 American Edition, DRA).

[139] Michael S. Heiser, *The Unseen Realm: Recovering the Supernatural Worldview of the Bible*, Bellingham, Lexham Press, 2015.

[140] Deuteronomy (in 18:10-12) states: «[10]*Neither let there be found among you any one that shall expiate his son or daughter, making them to pass through the fire: or that consulteth soothsayers, or observeth dreams and omens, neither let there be any wizard,*

[11]*Nor charmer, nor any one that consulteth pythonic spirits, or fortune tellers, or that seeketh the truth from the dead.* [12]*For the Lord abhorreth all these things, and for these abominations he will destroy them at thy coming*». (Douay-Rheims 1899 American Edition, DRA).

AD), who, in the last part of his life, was a priest of Apollo at the sanctuary of Delphi.[141] When Emperor Julian the Apostate (331–363 AD) consulted the oracle of the city in the hope of restoring the ancient Greco-Roman religion (361 AD), the disconsolate response of the Pythia marked the end of an epoch that had lasted over a thousand years:

> «*Tell the emperor that the Daidalic hall has fallen. No longer does Phoebus have his chamber, nor mantic laurel, nor prophetic spring, and the speaking water has been silenced*».[142]

In 362 AD, the Christian official Artemios, before being beheaded, reminded Julian of the power of Christ over the pagan gods:

> «*Know then that the strength and power of Christ are unconquerable and invincible. Indeed, you yourself have been informed of this by the oracles that Oribasios, physician and quaestor, brought you from [the temple of] Apollo at Delphi. And I shall remind you of the oracle, whether you want it or not*».[143]

In 394 AD, emperor Theodosius I the Great (347–395 AD) ordered the closure of the Temple of Delphi along with other oracular buildings. The temple was destroyed by its own priests so that it would not be re-consecrated as a Christian church. This is precisely what was done with the Temples of Jupiter and Apollo in Cumae (Figure 4.3) and with those of Neapolis, where the Catholic Cathedral itself was constructed on the ruins of the Temple of Apollo.

Virgil's fourth *Eclogue* talks of the birth of a child who will become divine and rule over the world; early Christian writer Lactantius (c. 250 – c. 325) claimed «*the poet* [i.e. Virgil] *foretold* [the future coming Christ] *according to the verses of the Cumaean Sibyl*». Many similar claims of Sibylline oracles (for example, the Erythraean and Tiburtine Sibyls) foretelling the advent of Jesus Christ have been made since then.[144]

Figure 15.2 depicts the Pythia as a veiled young woman who, when predicting the future, used to sit on an oracular tripod. The tripod chair is characterised by the Sun-symbols of Apollo (in this case, a star with eight rays rather than sixteen); its high-seat represented the Sun high in the sky. The whole picture suggests that

[141] Plutarch(46 AD – 120 AD), *De Defectu Oraculorum* (The Obsolescence of Oracles), in *Moralia*, translated by F. C. Babbitt, Cambridge MA and London, Loeb Classical Library, 1936, book 5, pp. 347–501.

[142] Timothy E. Gregory, *Julian and the Last Oracle at Delphi*, «Greek, Roman and Byzantine Studies», 24 (1983), n. 4, pp. 355–366, (pp. 355–356), available at https://grbs.library.duke.edu/index.php/grbs/article/view/5801 (accessed on 21/5/2024).

[143] Ivi, p. 357.

[144] H. W. Parker, *Sibyls and Sibylline Prophecy in Classical Antiquity*, New York, Routledge, 2014.

Fig. 15.2 *Attic kylix. Aegeus, the mythical king of Athens, is consulting the Pythia seated on the basin of the divination tripod (440 BC – 430 BC, Berlin Museum).*

the Pythia was suspended in the air and sat on the Sun, clearly recalling the image of the constellation of the Virgin placed in the same position – that is, sitting on the Sun – during the autumnal equinox (Figures 13.1 and 13.2). In her right hand, the oracle has a laurel twig, which also appears on the coins of Neapolis as being in the hand of the winged goddess (Figure 14.2).

The constellation of the Virgin rose before the Sun a few days before the autumnal equinox in the 1st millennium BC, as illustrated in Figures 13.1 and 13.2. *Corvus*, the constellation of the Crow, is located on the side of *Virgo* and may have signified Apollo's messenger as well as the dove of Parthenope's legends. Note that on some coins of Neapolis, a bird also appears on the side of Parthenope (Figure 14.2B). These constellations were considered significant because, for example, some Apollo oracular temples do not appear to point exactly east (azimuth 90°), but rather towards the first stars of Virgo (approximately 98° azimuth) or Corvus (azimuth: around 110° azimuth).[145]

[145] Ioannis Liritzis, Evgenia Bousoulegka, Anne Nyquist, Belen Castro, et al., *New evidence from archaeoastronomy on Apollo oracles and Apollo-Asclepius related cult*, «Journal of Cultural Heritage», 26 (2017), n. 4, pp. 129–143.

The link between the Pythia and the constellation of the Virgin appears obvious. First, the Pythia was a *parthenos*, that is to say, a virgin; considering that in ancient times this role was reserved for virgins, the veil equated her with a nymph, as Parthenope likely was. Diodorus Siculus (2nd century AD) describes how Echecrates of Thessaly, general of Ptolemy IV Philopator (3rd century BC), kidnapped and raped the Pythia of the period. Following the tragedy, it was decided that virgins would no longer prophesy, and that the Pythia function would be reserved for adult women. However, the oracle should have maintained the right to wear virgin robes in honour of the original priestesses. Diodorus described the Pythia as priestess dressed '*in the costume of a virgin*' (*Historical Library*, XVI, 26). As a result, the Pythia was a '*parthenope*' because she had to look as a *parthenos*, that is, as a 'virgin'.

Music was important for the cult of Apollo. Figure 15.3 shows Apollo sitting atop the Sun's tripod, like the Pythia He is surrounded by symbols that may be related to Parthenope's legends too. Apollo's cithara might also recall the singing of the sirens. Delphi was known for the Pythian games, second in importance only to the Olympic ones organised in Olympia. Singing, music, and poetry competitions with true actors were included in these events, which were held in the local theatre to honour Apollo, the protector of music and poetry. A further element of interest is represented by the wings, with which Apollo seems to be flying over the sea. A final reference to Apollo is represented by the dolphins; Delphi took its name from the word '*delphini*' (dolphin), because, according to the myth, Apollo arrived there from Crete riding a dolphin. Some coins from Neapolis show dolphins swimming around Parthenope (Figure 14.2A).

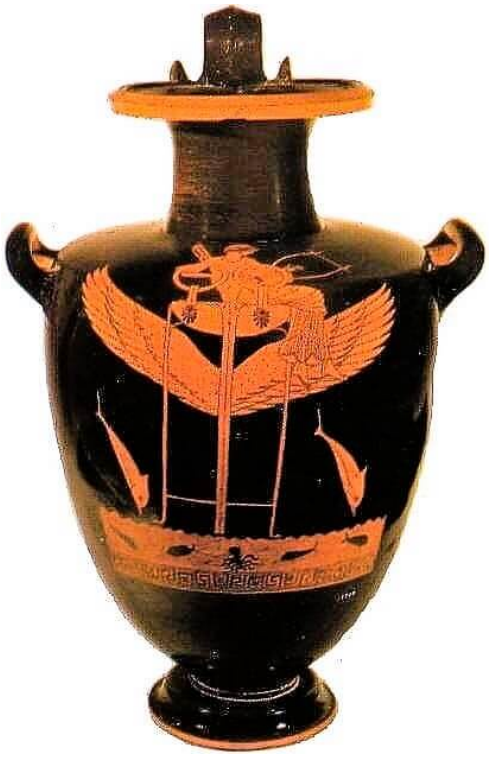

Fig. 15.3 *Apollo sitting on the tripod like the Pythia, with symbols (cithara, wings, sea, and dolphins) compatible with Parthenope's myths (Gregorian Etruscan Museum, Vatican City).*

The Roman coin in Figure 15.4 shows the Sibyl of Cumae on one side

Fig. 15.4 *(Left) Roman Denarius with the Sibyl and the oracular tripod surmounted by an amphora. The tripod is surrounded by a laurel wreath, which is a symbol of Apollo (coined by L. Manlius Torquatus, 65 BC). (Right) The Priestess of Delphi (1891, John Collier).*

and the oracular tripod of the Sun surmounted by an amphora on the other. The amphora represented the nymph, which was encircled by a laurel wreath that was the plant sacred to Apollo. Similar images appear in the coins dedicated to Parthenope, as shown in Figure 14.2. Ergo, several features of the Pythia of Delphi and of the Sibyl of Cumae mirror those associated with the Parthenope celebrated in Neapolis.

Therefore, Parthenope may have been an Apollonian oracle, analogous to the Pythia of Delphi. She led and accompanied the first Greek colonists to the Gulf of Naples. This interpretation would be supported by two critical points of our analysis. The first is the locals' profound veneration for her; the second is her customary depiction on local coins as a young, jewelled woman representing a goddess or a winged nymph. Importantly, on the coins of Neapolis, she was never depicted as a harpy, a woman with the tail and legs of a bird.

Such an elegant portrayal, along with the supporting symbols (the laurel twig, the amphora, the crow, the dolphins, and so on), could have better described an Apollo's priestess than an Aphrodite's hierodule.[146] Furthermore, there appears to be no obvious link between the Parthenope of Neapolis and the Aphrodite cult, despite the undeniable existence of a cult, or at least local traditions centred on hierodules and reportedly tied more closely to the harpy-sirens in Ulysses' story. The harpy-siren traditions were perhaps linked to the houses of the *lupanari* (from Latin she-wolf = prostitute), as found in the remains of Pompeii.

In previous Chapters, we speculated that Neapolis represented the entire cosmos with the sacred Fire at its heart to honour Zeus and Apollo and that Parthenope could have been the oracular high priestess who arrived at the coast of Campania with the first Greek colonists. If these views are right, the link between Neapolis and Parhenope becomes evident. The founders designed Neapolis with harmonious geometries and orientations that evoked the cosmos in order to simulate the Temple of the Gods. The temple-city housed Parthenope as its priestess-oracle, or perhaps as the Pythagorean Hestia – the Queen of Fire, the Goddess of the Hearth and Home, the Keeper of the sacred Fire – which in Neapolis could have also recalled the Lampadoforia that took place in the honor of Parthenope.

This interpretation also seems confirmed by the insights of some recent artists. Figure 15.5 depicts Parthenope in a coloured print (early 19th century). She is wearing a rayed crown – the symbol of the Sun – and is sitting at the entrance of a Greek temple indicated by columns, which is an evident reference to her iconography as a high priestess. Apollo's cithara, visible on the bottom left, also justifies the hypothesis that the temple was dedicated to Apollo, who was the protector of music and song as well. The shells lying on the ground at Parthenope's foot symbolise her bond with the sea from which she came. The position of Vesuvius in the background, with the sea on the right, hints that the temple may reproduce Neapolis. In the absence of specific images of the place, thus, the ruins of the temple depicted in the print must represent ancient Neapolis itself, seen as the abode of Parthenope.

[146] Dinko Fabris, *Partenope da Sirena a Regina. Il Mito Musicale di Napoli*, Barletta, Cafagna, 2016.

Fig. 15.5 *Parthenope (Print, 1826).*

Lastly, Figure 15.5 shows that Parthenope is pointing at the smoking Vesuvius and is holding a sceptre with two ears of corn, as if to underscore her role as the city's protectress and benefactress. The corn recalls the myths of Demeter and Persephone; being positioned on the left side of Parthenope, the two ears of corn create a clear connection between Parthenope and the *Virgo* constellation because its main star is *Spica* – also called *Spiga* – which can be seen on its left side. The denomination of the star derives from *Spica Virginis*, meaning the '*ear of corn of the Virgin*'.

Chapter 16
Final remarks: the witness of artists and poets

The goal of this work was to study the founding of Neapolis from a cultural and archaeoastronomic perspective by examining the city's urban design. In fact, the orientation of the decumans of Neapolis was neither determined by territorial or shoreline features nor by common astronomical references such as the direction of light at sunrise on equinoxes or solstices. The city's builders did, however, consider geographical and astronomical orientations, albeit in a more subtle and sophisticated manner.

I examined the region's religious and philosophical traditions in the 5th century BC, as well as its the paths of the Sun and star constellations, in relation to the geometry, topography, and spatial orientation of the streets of Neapolis. I concluded that the road grid of Neapolis and their orientation had a religious significance influenced by the Sun-cult of the Cumaeans, as well as the desire to honour Parthenope as a local deity. The proposed arguments were supported by astronomical and topographical evidence, local folklore, and artefacts, including the depictions on the coins of Neapolis. All these factors indicated a strong connection of Neapolis with the Sun, and Parthenope. A major feature of the street design stems from Pythagorean doctrine and symbolism such as the decagram, pentagram and golden ratio. The main points are summarized below.

The foundation of Neapolis predates Hippodamus, and, therefore, its street design may have served as a prototype for many other Greek and Roman urban centres. Interestingly, the decumans of Alexandria (founded in 331 BC) feature an orientation of about 66° azimuth; that is, they are about 24° anticlockwise rotated from the equinoctial line, just like in Neapolis. The creation of the Egyptian city was inspired by the cult of the Sun, represented on that occasion by the figure of the Macedonian king Alexander the Great. Perhaps Dinocrate da Rodi, the architect of the Egyptian city, was partly inspired by the urban planning of Neapolis as

a city dedicated to the Sun.[147] In any case, the importance of Neapolis in the history of city architecture was explicitly noted by Renaissance architects like Fra' Giocondo (1433–1515), who concluded that the planning of Neapolis should have inspired the 'ideal city' of Vitruvius (Figure 9.5).[148]

Neapolis should be considered a Pythagorean city since the city was intended to represent the cosmos according to such a doctrine. Pythagoras envisioned a perfectly ordered universe, which he called the *cosmos*; it was composed of 10 concentric spheres circling the Fire of Zeus. Humans could not directly see this Fire but only its image through the Sun. It follows then that Apollo, the Sun-god, was the most important entity that humans could directly see and worship. The Pythagorean doctrine was probably the world's most advanced system of thought at the time, and it could have best described the idea of a city miming the cosmos.

The Philosopher's followers were Sun worshippers, as well represented in a painting titled *Pythagoreans: Hymn to the Rising Sun* (1869) (Figure 16.1) by Russian artist F. Bronnikov (1827–1902). He spent most of his life in Rome and may have been aware of Neapolitan stories concerning a Pythagorean presence in Neapolis. In fact, the landscape depicted in the painting recalls the Bay of Naples before the founding of Neapolis on the summer solstice, as seen from the *Posillipo* promontory southwest of Sant'Elmo Hill. The mountain visible in the foreground could be Mt. Vesuvius, which is located to the east of *Posillipo*, with the rising Sun's light coming from northeast. The phase of the Moon on the upper right corner suggests the date of 19th June 1865.

The decumans of Neapolis are 24° anticlockwise rotated relative to the west-east (W-E) line. However, I conjectured that the Cumaeans' cardinal axes were slightly rotated anticlockwise by around 1.5° in relation to our cardinal system. In fact, the ancient inhabitants of the area could have conveniently selected the most eastern edge of the shoreline of the island of Capri, which they could see from the central agora of Neapolis, as their south point (S'). This is the (N',E',S',W') cardinal system shown in Figure 7.5.

The (N',E',S',W') coordinate system was practical and cosmologically important. In fact, with this coordinate system the Sun was seen from Neapolis at a height of 36° above the east point E' on the summer solstice and at 36° south of E' at dawn on the winter solstice, at about the same time (around 7:50 a.m.). The 36° angle was sacred because it is directly linked to the golden ratio Φ, to the

[147] Emanuele Greco, *L'urbanistica neapolitana: continuità dell'antico*, in *Neapolis*, Zevi Fausto (Ed.), Napoli, Guida, 1994, pp. 35–36; Alexandros Lagopoulos, *The semiotics of the Vitruvian city*, «Semiotica», 2009 (2009), n. 175, pp. 193–251.

[148] Gustaf Hamberg, *Vitruvius, Fra' Giocondo and the city plan of Naples*, «Acta Archaelogica», 36 (1965), pp. 105–125; Fausto Longo and Teresa Tauro, *Alle Origini dell'Urbanistica di Napoli*, Paestum, Pandemos - Paestum, 2017.

Fig. 16.1 *A group of Pythagoreans celebrating the rising Sun (F. Bronnikov, 1827–1902).*

pentagram and decagram, and to the number '10' representing the divine blessing and cosmic harmony. Furthermore, the acropolis of Cumae was also positioned exactly to the west (W') of Neapolis, implying that during the summer solstice, when the Sun's height reached 36°, anyone looking up from the temples of Cumae could envision the Sun exactly above Neapolis.

These astronomical angles likely captured the attention of the Cumaean religious authorities since their people worshipped the Sun and sought numerical symbolism in natural events that could be regarded as defining the holy nature of their location. The fact that from Cumae or Neapolis the Sun could be seen at 36° above E' on the summer solstice and at 36° south of E' on the winter solstice could have meant that the place was especially blessed by Zeus and by the Sun-god because the $36^\circ = 360^\circ/10$ angle and the Pythagorean pentagram, decagram, the sacred number '10' of the cosmos and Φ are directly related to each other.

Furthermore, the (N',E',S',W') coordinate system implies that the decumans of Neapolis were meant to be oriented at 22.5° anticlockwise from the equinoctial line rather then at 24° as found in Figures 7.3 and 7.4. The 22.5° angle corresponds to the division of a circle into sixteen equal portions and has crucial cosmological meanings. In the Greek world, this geometry represented a sixteen-rayed Sun and referred to the Sun-god Apollo. Also the Etruscans divided the sky into sixteen equal parts. In both cultures, the hexadecagram represented their entire religious

system, which for the Greeks consisted of the twelve main gods of Olympus plus the four constituent elements of the Earth. The deities were Zeus, Hera, Hephaestus, Athena, Apollo, Artemis, Ares, Aphrodite, Estia, Hermes, Demeter, and Poseidon. Hades was not considered to belong to Olympus, as he ruled the Underworld, where he lived with his wife Persephone.

With its rays, the Sun, standing in the centre of the agora of Neapolis at the point where the central cardo (*Via San Gregorio Armeno*) intersects the main decuman, determined a large square of 2x2 Greek stadia rotated anticlockwise by 22.5° with respect to the cardinal points (N', E', S', W'). In its upper and lower sections, the great square is limited by the upper and lower decumans, while the other two sides were formed by the cardines of *Via Duomo* and *Via Nilo*. The internal section consisted of four large square *insulae*, with each side measuring one *stadion*. This is how the 'ideal city' of Vitruvius was designed. The central square was then divided into ten strips by the cardines.

Moreover, starting from *Via San Gregorio Armeno* and walking through *Spaccanapoli* for ten cardines (hence, for two stadia), the traveller reaches *Vico Scassacocchi* (right before *Vico della Pace*) where *Via Forcella* joins the lower decuman with a deviation of 36°, like the Sun's angles relative to E' seen on the solstices. The distance of this roadway division from the agora of Neapolis measures $\sqrt{1+2^2} = \sqrt{5}$ stadia and determines the radius of a circle that touches the Greek walls of Neapolis at the north, south, and west, thus determining the inner area of the city. Adding one *stadion* to this radius gives two times the golden ratio ($\sqrt{5}+1 = 2\Phi$), and this length determines a large outer circle of the city, which could have represented the ring of water that surrounded Neapolis. This large circle inscribes a large decagon whose diagonals determine the position of the upper and lower decumans as well as that of various cardines. The ratio between the radius of the decagon and the distance between the upper and lower decumans is the golden ratio $\Phi = (1+\sqrt{5})/2$.

Thus, in its most technical aspect, the orthogonal street grid of Neapolis can be constructed with a decagonal or double-pentagonal design. The sides of the decagon measure two Greek *stadia*, and its radius is equal to a length that in stadia measures $2 \times \Phi$, that is, twice the golden ratio, which is defined as the ratio between the radius and the side of the decagon. A further element was an internal subdivision of the cardines based once again on the number '5' or '10'. Therefore, it is easy to notice multiple references to the Pythagorean doctrine, such as the decagon/decagram, pentagon/pentagram, the golden ratio, and, in general, the number '10' and the 36° angle that recalls the Pythagorean *Tetraktys* and the pentagram. Moreover, the hexadecagram orientation recalls the Sun-god.

In conclusion, the builders of Neapolis were likely experts in Pythagorean cosmology because they used the decagram (representing the cosmos) and the hexa-

decagram (the sixteen-pointed star representing the Sun-god) to provide the city with a specific geometry and geographic orientation. The internal section of the road structure of Neapolis was designed by taking into account the following geometries: 1) the square, a metaphor for the four elements of the Earth, that is, earth, water, air, and fire; 2) the pentagram, a sacred symbol of light, health, vitality, and blessing; 3) the circle, which hints at celestial spheres; 4) the decagram and the city subdivision based on number '10' (the *Tetraktys*), which metaphorically referred to the cosmos. These geometries could have been derived from the Sun's paths, as visible in the 5th century BC in the sky of Neapolis during the solstices. These astronomical configurations could have let the local people consider the site sacred. Thus, the urban structure of Neapolis appears to be an ideal representation of the cosmos in accordance with a solar cult. As we discussed in Chapter 11 and sketched in Figures 11.1, 11.2, and 11.3, the city plan looks like a jewel, symbolising Pythagorean cosmology.

I have also investigated the legends and myth of Parthenope in relation to the equinoxes by focusing on the paths traced by the *Virgo*, *Aquila*, and *Taurus* constellations. Moreover, Sant'Elmo Hill could have served as a bridge to orient the lower decuman of Neapolis precisely towards the island of Pithecusae (Ischia), the first Greek colony.

The character of Parthenope was especially important for the Greek communities that founded Neapolis. Her religious relevance is demonstrated by the fact that the most important Greek religious authorities of the time, most likely the Oracles from Cumae and Delphi, requested that Neapolis – the 'New City' to be built – retained both her name and memory through specific rituals. Around 452 BC, the Athenian admiral Diotimos introduced to Neapolis the competitive *Lampadoforia-Lampadedromia* in honour of Parthenope by order of an Oracle, most likely Delphi. These games grew in popularity until they equalled Olympia's ones as Isolympic games. Neapolis was the only privileged western city chosen to host these ceremonies, first in homage to Parthenope, then Rome, and finally Augustus. Neapolis remained the sole Greek city in the Western Roman Empire despite the increasing Romanization of Sicily and Magna Graecia; thus, the New City of Parthenope kept its old language, as well as its institutions, cults, and lifestyle practices.

On the autumnal equinox, *Virgo* stood above the Sun, which at dawn rose above the Somma-Vesuvius volcano complex, creating a spectacular geographical and astronomical conjunction. This constellation – *Parthenos* in Greek – likely represented Parthenope herself. Moreover, the path of the constellation together with the Sun goes from east to west, and this movement recalls the first Greek voyage from Greece to Campania. *Aquila*, which appeared in the sky above Sant'Elmo

Hill during the evening of the same fall equinox, probably called to mind Parthenope's death and the first Greek colony of the region founded in Pithecusae.

On the other hand, the start of spring corresponded to Persephone's return from the underworld, which was associated with the rebirth of plants. All of this could not have been possible without Sebethos's vital contribution: it was this deity who fertilised Neapolis by irrigating the surrounding area all the way to Mount Vesuvius. This was the reason why on the coins of Neapolis Parthenope honoured Sebethos, the Androprosop Bull.

The appearance of the *Virgo*, *Taurus*, *Aquila* constellations on the equinox days suggested that the cults of Parthenope and Sebethos were connected reciprocally with the Eleusinian Mysteries. The *Lampadoforia* in honour of Parthenope might have also represented the sirens' feverish activity in search of Persephone (the daughter of Demeter, the goddess of vegetation and fruitfulness), who had been kidnapped by Hades. This myth symbolised the onset of autumn. However, the *Lampadoforia* more likely represented the voyage of the first Greek community from Greece to Pithecusae.

I suggested that the celebrations in honour of Parthenope were held on 19th September or just a few days before the autumnal equinox, because, in the early 5th century BC, the heliacal rising of Spica (the main and brightest star of Virgo) occurred on that day (Figure 16.2). A few days later, the autumnal equinox arrived (on 28th September 472 BC), and this was the same period when the Greater Eleusinian Mysteries were celebrated.

Regarding the relation between the Sun and Neapolis, it is interesting that the most typical name of the Neapolitan area is *Ciro*,[149] that is, Cyrus (*Kuros*, meaning '*Sun*' in Persian).[150] The popularity of the name Ciro in Naples and nearby cities is due to the local devotion to St. Cyrus of Alexandria, a physician, hermit, and Christian martyr (3rd century – 303 AD) beheaded in Egypt during the Diocletianic Great Persecution. In Egypt, the devotion to St. Cyrus mostly developed because of miraculous healing that occurred in the church where the saint's relics were venerated. The main devotional practice was that of the '*incubatio*', that is, sleeping lying on the floor close to the relics and waiting, during sleep, for the apparition of the saint who could indicate the remedies for the disease. The practice was comparable to that carried out in ancient Greece in temples devoted to Asclepius (the son of Apollo and the deity of healing and medicine). Around

[149] 66.8% of the 79605 persons in Italy named 'Ciro' live in Campania; *Map of the name Ciro*, Nomix, available at https://www.nomix.it/mappe-dei-nomi-italiani/CIRO (accessed 21/05/2024).

[150] The throne name of Cyrus the Great was '*Kourosh*', meaning 'Lord of the Sun': Plutarch (46 AD – 120 AD), *The Life of Artaxerxes*, in *The Parallel Lives by Plutarch*, translated by Bernadotte Perrin, Cambridge MA and London, Loeb Classical Library, 1923; K. M. Sheard, *Llewellyn's Complete Book of Names*, Woodbury, Llewellyn Worldwide Ltd, 2011.

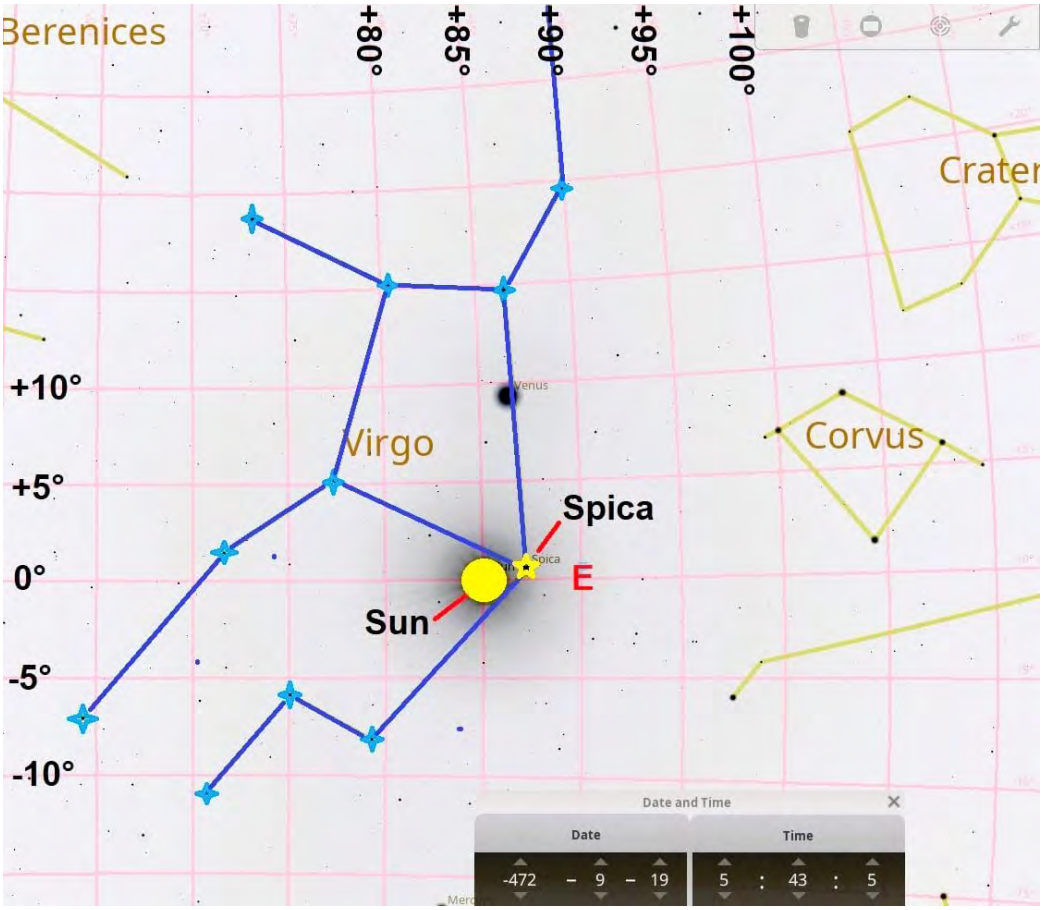

Fig. 16.2 *The heliacal rising of Spica, the primary star of Virgo/Parthenos, on 19th September 472 BC. Parthenope's celebration in Neapolis is speculated to have taken place on this day or a few days before the autumnal equinox.*

the 10th century, St. Cyrus' relics were translated from Alexandria to Rome by some Alexandrian monks and venerated by the local Alexandrian colony; also in Naples, Alexandrian merchants promoted his veneration for centuries. Some of his relics were translated around 1600 from Rome to Naples in the church of *Gesù Nuovo*, to Portici and other nearby towns. In Naples, the veneration for St. Cyrus was mostly promoted by St. Francesco De Geronimo (1676–1716). It is possible that the relics of St. Cyrus were translated to Naples because his martyrdom was like that of St. Januarius, and perhaps because the saint's name and fame recalled some pre-existing ancient local tradition of a Sun-cult, facilitating a strong local veneration of the saint, as it did.

Naples' traditional musical repertoire includes several world-famous pieces that praise the Sun, such as *O Sole Mio* and *Chist' è 'o Paese d' 'o Sole* ('This is the place of the Sun').[151] It is no surprise, then, that the earliest known Neapolitan song is *Jesce Sole!* ('Come Out, Sun!'), presumably composed during the Middle Ages. The refrain reads as follows:[152]

Jesce sole, jesce sole
nun te fa' cchiù suspirà!
Siente mai ca le ffigliuole
hanno tanto da prià?

These lyrics recall an invocation to the Sun that the ancients could have uttered at dawn. Here, the reference could also be to some prayers pronounced by the priestesses of Apollo.

Regarding the relation between Parthenope and Neapolis, this essey proposed that the character venerated in Neapolis and known as Parthenope was not one of the three sirens or harpies who tried to seduce Ulysses, as seen in a fresco from Pompeii (Figure 16.3). Such myths originated centuries after the foundation of Neapolis. Indeed, Lycophron of Chalcis (3rd century BC) was the first poet who mentioned that the sirens involved in Odysseus' adventures were named Parthenope, Leucosia, and Ligea. His poem *Alexandra* was composed several centuries after the foundation of ancient Parthenope (8th century BC) and of Neapolis (5th century BC), while Homer's *Odyssey*, written about the founding of Cumae and centuries before the founding of Neapolis, does not mention the sirens' names or that they were harpies. Consequently, it is reasonable to assume that Lycophron borrowed the names of his three sirens from the pre-existing religious cults in the area as poetic fiction. In fact, on the coins from Neapolis, Parthenope was never represented as a harpy, but only as a young princess-priestess or as a winged nymph.

Several Neapolitan historians[153] agree that Parthenope was a princess and very likely also the high priestess who accompanied the first Greek colonists and guided them from the island of Euboea in Greece to the coast of Campania by serving as their Apollonian oracle. The legends talk of a mystical dove sent by Apollo that Parthenope recognised and followed during her voyage.

[151] Ettore de Mura, *L'Enciclopedia della Canzone Napoletana*, Napoli, Il Torchio, 1969; Dinko Fabris, *Partenope da Sirena a Regina. Il Mito Musicale di Napoli*, Barletta, Cafagna, 2016.
[152] *Jesce Sole*, in *Storia della musica: Storia della Canzone napoletana*, https://www. italianopera.org/Canzone/Napoletana/JesceSole.html (accessed 21/05/2024).
[153] Cited works: Giovanni Antonio Summonte, 1601; Francesco de' Pietri, 1634; Giuseppe Sanchez, 1833.

Fig. 16.3 *Ulysses resisting the song of the three sirens (fresco from Pompeii, 1st century AD, London, British Museum).*

These stories explain why Parthenope must have been considered extremely important to the local Greek community, and that she deserved to be praised and remembered. She was the founder of the Greek colonies on the coasts of Campania, and she was celebrated for the same reasons why Christopher Columbus is today honoured and celebrated in America, namely, as the one who discovered the new land and founded the first settlements. Parthenope was thanked for having made possible the journey from Greece to Pithecusae and the establishment of new local Greek colonies.

The historical figure of Parthenope may even have originated the oracular tradition of Cumae and perhaps also the myth of the famous Sibyl who lived there. Loved and admired for her sublime virtues, Parthenope (who might have died in a shipwreck in the Gulf of Naples) wassurely buried on Mt. Echia, on the promontory of Pizzofalcone in front of Castel dell'Ovo in Naples, southwest of the site of the New City. Later, she came to be venerated by the local community as the goddess represented by the constellation of the Virgin that, on the fall equinox, appeared standing on the Sun as they both rose above the Somma-Vesuvius volcano complex.

An additional link can be found between Parthenope and the Sibyl of Cumae. The fresco shown in Figure 16.4 was discovered during the 1749 excavations in Herculaneum, which, like Pompeii, had been destroyed by the eruption of Vesuvius in 79 AD. This artwork is interpreted as showing the young Sibyl of Cumae and Apollo in the instant right before the maiden is possessed by the divinity, thus becoming its oracular instrument.[154] Apollo is looking at the Sibyl softly as he stands up. On the other hand, the Sibyl's seat has lion's paws calling to mind the Delphic tripod; she looks like a praying girl with her head lowered in a humble and submissive attitude, and she is holding a branch of laurel, a plant sacred to Apollo and a symbol of glory and victory. Between Apollo and the Sibyl there is a bird, which could refer to the mystical dove of the legend of Parthenope sent by Apollo to guide her during the voyage of the Greek communities from Greece to the coasts of Campania.

In *Metamorphoses* (Ovid, 43 BC – 18 AD) the Sibyl of Cumae says to Aeneas that the Sun-god *Phoebus*,[155] having fallen in love with her, offered her anything as long as she would accept to be his Oracle, lending him her voice. The maiden asked in exchange to be allowed to live as many years as the sand grains she could hold, naively forgetting at the same time to ask him to grant her eternal youth. Apollo kept his promise; yet, having fallen for her, he also promised her eternal youth on the condition that, in exchange, she offered him her virginity. The Sibyl, however, did not let him bribe her; she refused the obscene offer that would dishonour her as a woman and priestess and remained pure and chaste forever.[156] The same myth tells us that Apollo gave the Sibyl 1000 years of life. The Sibyl told Aeneas that she already lived 700 years and that she would have died after 300 years of her meeting with the Trojan hero. As she got older, her body would have shrivelled and shrunk more and more until she became as small as a cicada;

[154] Ginevra Latini, *Sibylla: Il Mito della Sibilla Cumana nelle Metamorfosi Ovidiane e in un Affresco di Ercolano*, Roma, Arbor Sapientie, 2019.

[155] Main epithet attributed to Apollo, meaning 'shining' referring both to its beauty and its link with the Sun.

[156] Ovid (43 BC – 18 AD), *Metamorphoses*, book 14, v. 101–153.

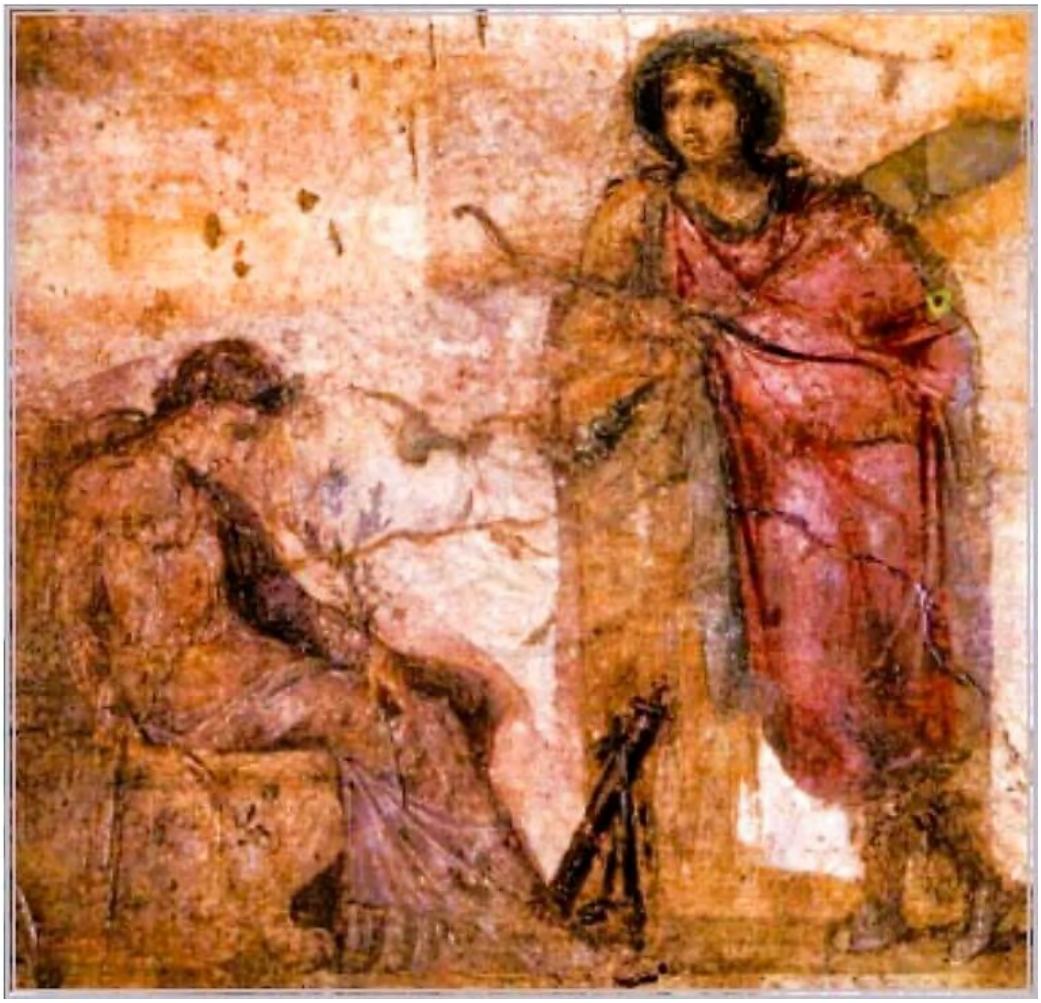

Fig. 16.4 *This fresco from Herculaneum (1st century AD, National Archaeological Museum, Naples) is commonly interpreted as representing the Sibyl of Cumae (right) and Apollo (left). Between the two characters, however, there is a bird, which could have represented the mystical dove of the legends of Parthenope. Thus, the portrayed Sibyl could have been the Parthenope celebrated in Neapolis (and likely in all Greek cities of the area) together with the Sun-god.*

after a thousand years, she would have turned to dust, and only her voice would have remained. This spiritualized voice continued to sing those prophetic hymns of Apollo that could still be heard in his Temple.

It is critical to realize that according to the account of Ovid the mythical Sibyl died about 300 years, or a bit more, after the war of Troy around 1184 BC. This means that the Sibyl died after 884 BC, that is, within one century before the

foundation nearby the sepulchre of Parthenope of the old village of Parthenope in the 8th century BC. The chronology matches. The Sibyl in the fresco as well as in the story by Ovid was humble, religious, remained virgin forever and Aeneas thought that she was a goddess. Thus, the mythical Sibyl of Cumae was '*Parthenope*', that is, '*She who looks like* (the goddess) *Parthenos* (Virgin)'. Hence, at her death Parthenope became a heavenly nymph associated with the constellation of the Virgin, and, as such, the beloved numen was worshipped in ancient Neapolis with Apollo, where she is still fondly remembered.

Were Parthenope and the Cumaean Sibyl the same character?

Here I report and comment on the whole text of *Metamorphoses* (book 14:101–153), where Ovid describes the visit of Aeneas to the mythical Sibyl of Cumae. Many features match Parthenope's legends and myths, implying that Ovid's portrayal of the Sibyl of Cumae may have been inspired by the ancient legends of Parthenope. These are the main points:

- The Sibyl deeply loved Apollo, and Apollo loved her in a unique way; their relationship was unique and profound as the one between Parthenope and Apollo narrated in the ancient legends of Neapolis reported by Giovanni Antonio Summonte (1601), Francesco de' Pietri (1634), and other authors;
- Ovid emphasizes that the Sibyl was humble and a perpetual virgin (a *parthenos*); in addition, she was only a woman (that is, a real character) but still she appeared to men as a goddess; thus, she had the appearance of a 'virgin goddess', that is, she '*looked like* (the goddess) *Parthenos*', hence '*Parthenope*';
- In the honour of the Sibyl, men would have constructed a temple and burned incense; this is exactly what happened with Parthenope in Neapolis by the order of the Apollonian Oracles;
- The Cumaean Sibyl had the faculty to enter and exit the underworld and was rather gloomy; this makes her similar to the siren-nymphs who escorted the dead because they were linked to Persephone, as explained in the Eleusinian Mysteries;
- The Cumaean Sibyl said that she would have died 300 years after her meeting with Aeneas, which means 3-4 centuries after the war of Troy that occurred in the 12th century AD. Thus, the death of the Sibyl happened in the 9th-8th century BC, which is when Parthenope was said to have died in her legends, that is, just before the foundation of the old settlement of Parthenope at her sepulchre in the 8th century;

- Her voice would have lasted forever, which means the Sibyl would not have been forgotten; the Apollonian Oracles ordered the founding of Neapolis for all generations to remember and celebrate Parthenope;
- The Sibyl founded the oracular tradition of Cumae; Parhenope was the first priestess-oracle to arrive to the coast of Campania.

Let us read Ovid's story regarding the meeting between the Cumaean Sybil and Aeneas:[157]

«*When he had passed those islands, and left the walls of Parthenope behind him to starboard, the tomb of Misenus, the trumpeter, the son of Aeolus, was to larboard, and the shore of Cumae, a place filled with marshy sedges. He entered the cave of the Sibyl, and asked to go down to Avernus, to find his father's ghost. Then the Sibyl after remaining, for a long time, with her eyes gazing at the earth, lifted them, at last, filled with the frenzy of the god, and cried: 'You ask great things, man of great achievements, whose hand has been tested by the sword, whose faith has been tested by the fire. But have no fear, Trojan, you will have what you desire, and, with me as your guide, you will know the halls of Elysium, and earth's strangest realm, and the likeness of your dear father. To virtue, no way is barred.'*

She spoke, and pointed out to him a gleaming golden bough, in the woods of Proserpine, the Juno of Avernus, and ordered him to break it from the tree. Aeneas obeyed, and saw the power of dread Dis, and he saw his own ancestors, and the ancient shade of great-souled Anchises. He learned also the laws of those regions, and the trials he must undergo in fresh wars.

Then taking the return path, with weary paces, he eased the labour by talking with his Cumean guide. As he travelled the fearful road through the shadowy twilight, he said: 'Whether you are truly a goddess, or only most beloved by the gods, you will always be like a goddess to me, and I will acknowledge myself in your debt, who have allowed me to enter the place of the dead, and having seen that place of the dead, escape it. When I reach the upper air, I will build a temple to you, for this service, and burn incense in your honour.'

The priestess gazed at him and with a deep sigh, said: 'I am not a goddess: and do not assume any human being is worth the honour of holy incense, or err out of ignorance. I was offered eternal life without end, if I would surrender my virginity to Phoebus my lover. While he still hoped for it, while he desired to bribe me beforehand with gifts, he said: "Virgin of Cumae, choose what you wish, and what you wish you shall have." Pointing to a pile of dust, that had collected, I foolishly begged to have as many anniversaries of my birth, as were represented by the dust. But I forgot to ask that the years should be accompanied by youth.

[157] Ovid (43 BC – 18 AD), *Metamorphoses*, book 14, v. 101–153.

He gave me the years, and lasting youth, as well, if I would surrender: I rejected Phoebus's gift, and never married.

'But now my more fruitful time has turned its back on me, and old age comes, with tottering step, that must be long endured. Though I have now lived seven centuries, three hundred harvests, three hundred vintages, still remain to be seen, to equal the content of the dust. The time will come when the passage of days will render such body as I have tiny, and my limbs, consumed with age, will reduce to the slightest of burdens. I will be thought never to have loved, and never to have delighted a god. Phoebus too perhaps will either not know me, or will deny that he loved me. I will go as far as having to suffer transformation, and I will be viewed as non-existent, but still known as a voice: the fates will bequeath me a voice'».

Thus, the urban planning of Neapolis may have considered and evoked a large number of cultural and religious aspects relevant to the local community. The above interpretations could explain why Neapolis was the '*City of the Sun*' and of '*Parthenope*'.

What happened next?

Where is the Sun of Naples today? ...

(hint: find the 16-rayed Sun shown above in the next chapter)

Chapter 17
Epilogue: From Apollo to Jesus Christ ... through Saint Januarius' martyrdom

Neapolis was an important economic, commercial, military, and cultural city of Magna Graecia, and it was also the epitome of the local cult of the Sun (Apollo and Zeus), which historically had its epicentre in Cumae, the oracular seat. Neapolis was dedicated to Parthenope, who may have been the first Sibyl and the founder of the local Greek colonies. With the advent of Christianity, especially since the 4th century AD onwards, the city's religious identity changed, and Neapolis quickly became one of Christendom's main cities. What brought about this change from pagan to Christian Neapolis? What happened to the *Divine Sun* that its inhabitants had revered since the city's foundation?

This epilogue answers the above questions and reveals where the *Sun of Naples* is to be found today. The focal point is the martyrdom of Saint *Januarius* (*San Gennaro*), the patron saint of Naples, whose relics are still shrouded in mystery and guarded in the Cathedral of Naples.[158] The feast of St. Januarius falls on 19th September, the day of his martyrdom.

In 303 AD, Emperor Diocletian (242/245–311/312) ordered the 'Great Persecution' of Christians, which was requested by the Oracle of the Temple of Apollo at Didyma (Miletus).[159] The governor of Campania, *Dragonzio*, ordered the arrest of Sossius, the deacon of Miseno. Januarius, Bishop of Benevento (272–305), accompanied by *Desiderius* (the lector) and *Festus* (the deacon), visited Pozzuoli's faithful and the prisoner to soothe them.

When *Timotheus*, the new governor of Campania, learned about this, he ordered their arrest as well. After repeated fruitless attempts to persuade Januarius to

[158] Historical sources: *Martyrologium Hieronymianum* (5th century); *Vatican Acts* (8th–9th century); *Carthaginian Calendar* (505 AD); *Bolognese Acts* (8th–9th century); and others. *Acts of Hieromartyr Januarius, Bishop of Benevento*, available at https://www.oodegr.com/tradizione/tradizione_index/vitesanti/gennaro.htm (accessed 21/05/2024).

[159] Giuseppe Ricciotti, *La «Era dei Martiri»*, Milano, Mondadori, 1962.

Fig. 17.1 *St. Januarius emerges unharmed from the furnace (1646, Jusepe de Ribera).*

sacrifice to the pagan gods and abandon his faith in Jesus Christ, the governor sentenced the bishop to be thrown into a burning furnace, but Januariussurvived unharmed.[160] The following day, he and his companions were sentenced to be slaughtered by lions (or bears) at Pozzuoli's main amphitheatre (Figure 4.6). According to the tradition, the execution failed because, following Bishop Januarius' public prayer (perhaps as an exorcism), the beasts meekly lay down in tame submission at his feet (Figures 4.7 and 17.10). Timotheus outright delivered another death sentence, but he became blind and sought the assistance of Januarius. He was miraculously healed by the saint's powerful intercession. Bystanders were all stunned by the sequence of prodigies and demanded that the convicts be released. However, Timotheus, infuriated, ordered the beheading of Januarius, his companions, and the Puteolans *Proculus*, *Eutyches*, and *Acutius*, who had requested Januarius' release.

The martyrdom occurred on 19th September 305 AD, in the *Forum Vulcano* near *Solfatara* in Pozzuoli, today's location of the Sanctuary of *San Gennaro* at the *Solfatara*. Tradition says that, on that occasion, a woman collected Januarius' blood in two ampoules now kept in the Cathedral of Naples. This church is renowned for the phenomenon of the liquefaction of the saint's blood, which usually occurs on 19th September, 16th December and the first Sunday in May. Many regard it as a prodigy. The body was buried in Pozzuoli. The locals soon began to revere Januarius as a saint, and, in the 4th century, some of his relics (his head and blood) were brought into the newly built Cathedral of Neapolis. In the 5th century, the rest of the body was transferred to the catacombs of Capodimonte, then to the Abbey of Montevergine, and, in 1497, to the Cathedral of Naples.

[160] Probably this was not the real planned execution, but rather a kind of torture by burning.

Fig. 17.2 *Sunrise on 19th September, the day of St. Januarius' martyrdom.*

Let us consider the circumstances of this event to better understand the significance of Januarius' martyrdom for Neapolis.

1) The local community was particularly religious; moreover, due to its important harbour, Pozzuoli accommodated most of Apollo's worshippers, who came from all over the Roman Empire to consult the Oracle in Cumae.

2) Januarius and his companions were arrested and condemned to death solely for religious reasons, as the claimed charge was their unwillingness to recognise and worship pagan divinities. The persecution was thought to have been approved by Apollo since it was ordered by the Oracle in Didyma (Miletus), the most influential Apollonian shrine of the time.

3) Even the sentence '*ad bestias*' in the amphitheatre of Pozzuoli had religious significance since, as shown in Chapter 4, the edifice had the same direction as sunrise on the winter solstice, just like Apollo's temple at Cumae. As a result, the amphitheatre was primarily dedicated to Apollo, and all events held there, including Bishop Januarius' execution, were probably intended to honour him first. Also the Roman Colosseum was likely dedicated mainly to Apollo because of the over 30-metre-high statue of the Sun-god there placed. In general, amphitheatres were consecrated to various divinities, like Apollo, and the events that occurred there, including executions, were offered to the gods.[161]

[161] All events at the amphitheatres were meant to honour and please pagan gods. Christians regarded them as idolatrous. For example, Terullian (c. 155 – c. 220 AD) wrote (197–202 AD) a

Fig. 17.3 *The Basilica of Santa Restituta, built in 334 AD on the Temple of Apollo (Naples Cathedral, early 4th century AD).*

Timotheus may have intended to publicly celebrate the execution of Christian Bishop Januarius and his companions in front of the pagan community and Apollonian pilgrims visiting Pozzuoli and Cumae. By offering this brutal event as a sacrifice to Apollo, he would have encouraged pagan devotion, emphasising the superiority of this cult and the pagan gods over Jesus Christ. Yet, the miracles that occurred on that occasion, with the beasts crouched at the feet of the Christian prisoners in prayer, had the opposite effect. The pagan people who were attending the scene in astonishment from the stands of the amphitheatre could only conclude that, against all expectations, the Christian God had outclassed Apollo.

According to hagiographic traditions, despite the popular outcry, Timotheus refused to release the prisoners, who were beheaded on the 19th of September.

treatise on the subject titled *De Spectaculis* (*On the Spectacles*, Tr. S. Thelwall, Buffalo NY, Christian Literature Pub., 1885), in which he reminds the readers that those spectacles were linked to various pagan rites and sacrificial rituals, and he exhorts Christians not to attend circuses, theatres, or amphitheatres because such events were impious, sacrilegious, and diabolical.

The governor's new execution date, which predates by a few days the autumnal equinox (occurred on 23rd September), may not have been a coincidental event. In this period, the Sun was in the Virgo constellation, and in the 5th century BC, that is, when Neapolis was founded, 19th September was when Spica, the brightest star of Virgo/Parthenos had a heliacal rising (Figure 16.2, cf. Chapters 13 and 16). Actually, in 305 AD the heliacal rising of Spica occurred just a few days later, on 24th September. According to the provided interpretations, 19th September, or a few days before the autumnal equinox, was roughly the period when the celebrations in honour of Parthenope could have taken place in Neapolis since the foundation of the city.

The story suggests that, embarrassed by what had happened in the amphitheatre, Timotheus desired revenge. This was his final, albeit belated, attempt to salvage face and repair the damage that Bishop Januarius had done to Apollo's reputation. For the common people, however, Jesus Christ had already won the contest. According to tradition, the series of miracles instantly converted approximately 5,000 individuals.

Therefore, Januarius' martyrdom and Apollo's local cult appear to be intricately linked together. The popularity and universal importance of St. Januarius could have derived from the fact that, precisely in one of the Roman Empire's epicentres for the cult of Apollo, his martyrdom converted the hearts of the locals to Jesus Christ over Apollo. This could explain why the populace quickly began honouring the martyr, as demonstrated by the fact that his blood was collected upon his execution, and why multitudes of people converted to Christianity. Beginning in the 4th century, the new faith in Jesus Christ, considered the 'True Light', quickly replaced the old faith in Helium/Apollo. Simultaneously, the cult of Parthenope and other minor divinities in Greek mythology was progressively superseded by that of the local Christian martyrs, who became Neapolis' new protectors. Furthermore, if in Neapolis Parthenope was celebrated around 19th September, swapping her cult for the veneration of St. Januarius would have been straightforward. Furthermore, the cult of Parthenope herself could be readily replaced by the devotion of the Virgin Mary, Mother of God.

The Great Persecution ended around 305–306 AD when Emperor Constantine the Great (274–337 AD) – the first Roman emperor to convert to Christianity – took the power. In 334 AD he ordered that the *Basilica of the Saviour* – the new Catholic Cathedral of Neapolis (Figure 1.3) – be built on the ruins of the city's pre-existing Temple of Apollo.[162] The choice represented Jesus Christ's triumph

[162] In a passage from the life of Pope Sylvester, the *Liber Pontificalis* (Louise Ropes Loomis, 1916, p. 70) reports: 'Constantine Augustus built a basilica in the city of Naples', from Louise Ropes Loomis, *The Book of the Popes*, New York, Columbia University Press, 1916, p. 70.

Fig. 17.4 *The early Christian baptistery of San Giovanni in Fonte in the Basilica of Santa Restituta (4th century) – Detail of the vault.*

over Apollo. St. Januarius' relics (together with those of St. Restituta, another saint slain during the same persecution and the subject of numerous miracles) were brought to this particular church. The goal was to emphasise St. Januarius' role in the mystical confrontation in the amphitheatre of Puteoli that ended with Jesus Christ's triumph over Apollo. This church is the city's oldest religious building, dating back to early Christianity; it is presently annexed to today's Cathedral of Naples, and it is known as the Basilica of Santa Restituta (Figure 17.3). The rich and numerous symbols of this church and the entire Cathedral recall some elements of the ancient cult of the Sun/Apollo, although reinterpreted from a Christian perspective. These symbols will now be briefly analysed.

The Basilica's baptistery is attributed to Emperor Constantine, and it still retains some 4th-century mosaics (Figure 17.4). The vault's octagonal base (representing the cosmos) contains eight golden rays (representing the Sun). The central Constantinian Christogram in gold, which alludes to the Sun as the source of light, is encircled by eight-rayed golden stars. God's hand is crowning Jesus Christ's

Fig. 17.5 *Lello da Orvieto's Madonna del Principio enthroned, with the Child between St. Januarius and St. Restituta (1322).*

monogram with a golden laurel wreath, representing *victory*. The picture is reminiscent of Neapolis coins depicting a Bull crowned by a winged nymph (Figure 14.2). As previously mentioned, the octagonal diagram represents the cosmos and the Sun; this image was also used to embellish the ceiling of the Basilica of Santa Restituta (Figure 17.3).

Another notable feature of the main chapel is Lello da Orvieto's magnificent mosaic of the *Madonna del Principio* enthroned with the Child between St. Januarius and St. Restituta (14th century) (Figure 17.5). Bright eight-rayed golden stars representing the Sun are plainly visible on all of the chapel's arches (Figure 17.3, insert on the right).

The mosaic's golden background highlights the mystical and radiant nature of its surroundings. The throne in the centre has numerous little crosses and two gold eight-rayed stars at the top of the armrests; similar stars embellish the throne base. The crosses suggest that the image represents the 'Throne of the Lamb' (i.e., the sacrificial victim: *Apocalypse of St. John, 5:6*); the two eight-rayed suns imply that the same image represents the 'Throne of the Sun' (compare with the picture of the

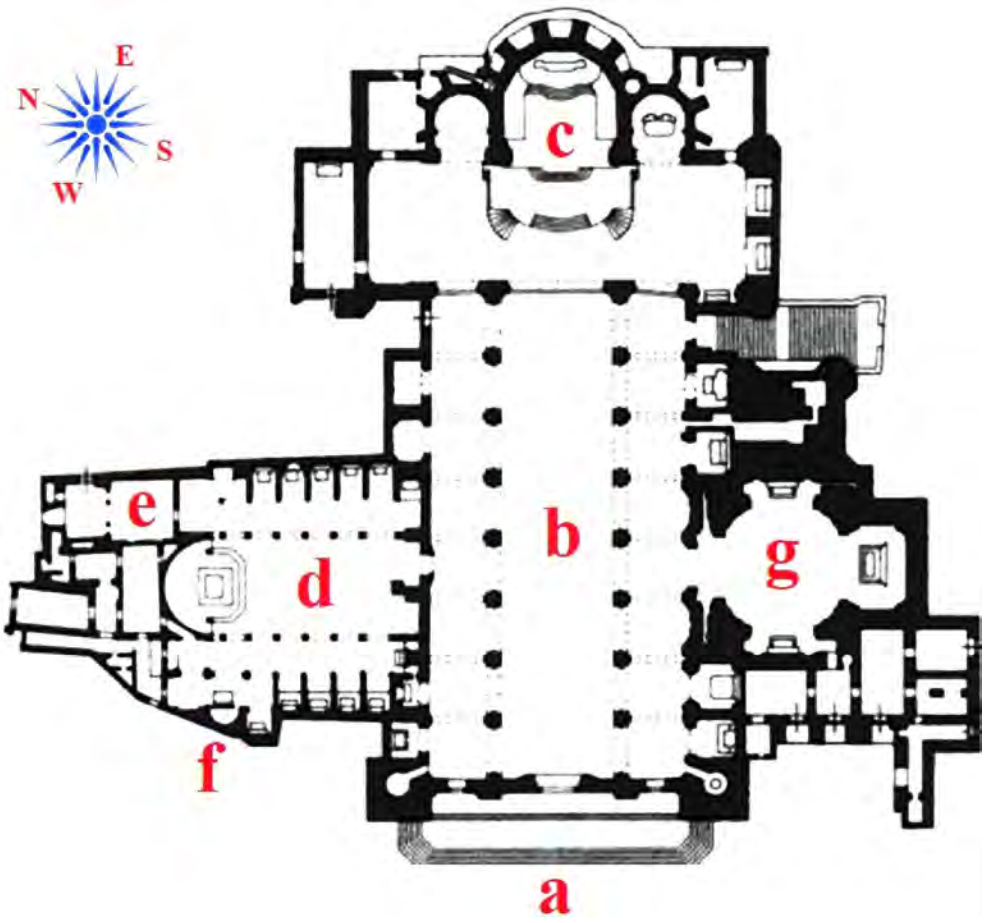

Fig. 17.6 *Plan of the Naples Cathedral: (a) Entrance, facade; (b) Interior, central nave; (c) Apse; (d) Basilica of Santa Restituta; (e) Baptistery of San Giovanni in Fonte; (f) Chapel of Madonna del Principio; (g) Royal Chapel of the Treasure of St. Januarius. The photos show the apse above the main altar with the symbol of the eight-rayed Sun on the upper windows.*

Sun on Pythia's tripod, Figure 15.2). The Virgin Mary on the throne wears a blue gown with golden themes and a crown of twelve eight-pointed stars, resembling Mary, Queen of Heaven (*Apocalypses of St. John, 12:1*). Finally, the centre is dominated by Jesus Christ, who is dazzling and shining, with all-gold clothing and a halo. He resembles a young adult rather than a kid, as was customary in Byzantine art, and he is the source of the mystical light that pervades the entire mosaic. This image, which recalls the celestial Sun reinterpreted in a Christian key and identified with Jesus Christ, is particularly striking given that the Basilica was built on the site of the Temple of Apollo.

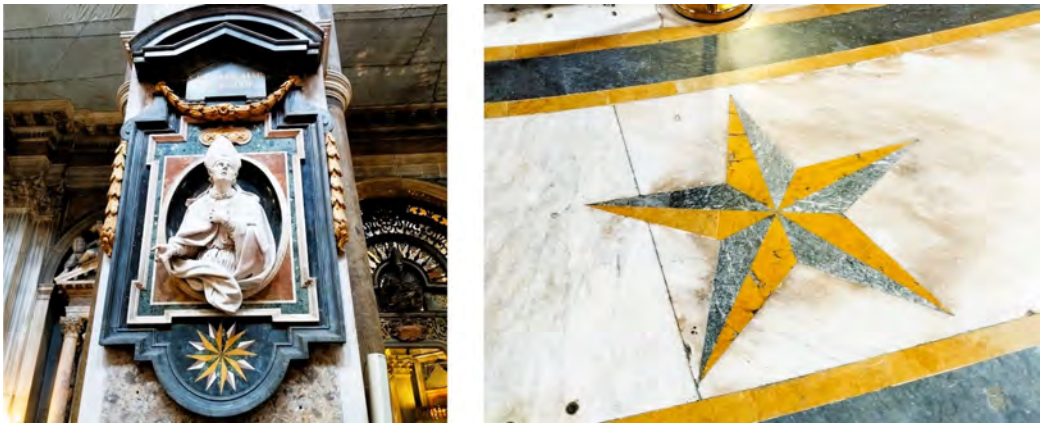

Fig. 17.7 *The sixteen-rayed Sun in the central nave and the Pythagorean pentagram, representing the five wounds of Jesus Christ, on the floor of the apse in front of the altar.*

The Cathedral of Naples contains several emblems of Greek culture and Pythagorean theology, which, as we saw, are linked to the cosmos and the Sun. The Royal Chapel of the Treasure of St. Januarius in the Cathedral, built in the 17th century, is a Baroque masterpiece that contains all of the cosmic and solar symbols examined in this study (Figure 17.8). The vault's structure and concentric circle design refer to the subdivision of the cosmos theorised by Pythagoras (Figure 5.3). The central figure is God the Father, who is surrounded by a golden ring of light that recalls the Fire of Zeus, the divine centre of Pythagora's *cosmos*. The ring of angels and clouds that surrounds him evokes the anti-Earth, which shields the divinity from being directly visible to men. The second gold ring depicts the Earth, while the third represents the Moon in its light and dark phases. Finally, the four arches that support the dome are reminiscent of the fourth ring and are embellished with a sequence of octagons and golden eight-rayed suns, a clear reference to the Sun and its revolution around the Earth and the cosmos. According to Pythagorean cosmology, the Sun revolved around Zeus' Fire, and represented its image visible to man. The octagonal Royal Chapel also recalls the cosmology of the 'ideal city' of Vitruvius, with its square inscribed in an octagon and circumscribed around a sixteen-rayed sun (Figure 9.5). Pentagrams are present on the floor at the base of the apse; and sixteen- and eight-rayed suns on all columns in the central nave beneath sculptures of various saints (Figure 17.7).

Finally, five spectacular depictions of the eight-rayed sun on the apse windows above the Cathedral's main altar emphasise the church's relationship with the Sun and the cosmos. The five windows appear to be oriented as the five sides of a half-decagon representing the cosmos centred above the altar representing the divinity (Figure 17.9).

Fig. 17.8 *The Royal Chapel of the Treasure of St. Januarius, Cathedral of Naples. Its domed vault features solar symbols (eight-rayed stars) and cosmic geometries based on octagons and concentric circles according to Pythagorean cosmology (Figure 5.3). The oldest portrait of St. Januarius (5th century, Catacombs of St. Januarius, Capodimonte).*

Fig. 17.9 *The apse above the main altar with the symbol of the eight-rayed Sun on the five upper windows. The five windows are oriented as the five sides of half decagon.*

To conclude, the Greeks and Cumaeans envisioned Neapolis as the 'City of the Sun'. Since its inception, Helium/Apollo has been seen as a symbol of the divine light that men seek. Following that, thanks to the witness of St. Januarius and other martyrs, Jesus Christ was recognised as the genuine 'Sun' of Neapolis (Figure 17.10), ushering in a new era for the city until today. According to Francesco de' Pietri (1634) Neapolis was the first Christian city of the world, and the first city in Italy where the image of the Virgin Mary, Mother of God, was venerated. The symbols, mosaics, relics, streets, and churches of the ancient centre, with their geometries and magnificences, preserve the remembrance of the legacy of Neapolis, whose 'Sun' still lives among its inhabitants.

Fig. 17.10 *The miracle of Saint Januarius in the amphitheatre of Pozzuoli with the lions laid down in tame submission at his feet and Sun-like Jesus Christ in triumph up on the sky with additional symbols of the Sun and Cosmos on the arch. The Royal Chapel of the Treasure of St. Januarius, Cathedral of Naples.*

Appendix
Alternative interpretations and curiosities

In my account of the street grid and orientation of Neapolis, I argued that its architects connected a variety of elements, including astronomical signs, geometric correlations, and, more broadly, their philosophical ideas and religious traditions. I employed an eclectic approach by incorporating a wide range of data. Alternative interpretations are possible; the question is whether they can effectively account for all relevant data.

Chapter 8 outlined the model proposed by Renato Palmieri (1990) for the street grid of Neapolis. His model is particularly notable and fascinating because Palmieri attempted to incorporate a variety of geometric, astronomical, historical, and cultural aspects. However, I pointed out the limitations of such a model, and I proposed a new model that could better account for a wide range of data.

This Appendix evaluates and critique other potential interpretations of the planning of Neapolis. Other cultural curiosities regarding the city and the surrounding area are also discussed.

Were Neapolis' decumans oriented as the Earth's axial tilt?

The decumans of Neapolis are oriented at about 66° azimuth, that is, they are anticlockwise rotated by 24° relative to the equinoctial line (Figure 7.3). However, Chapter 9 argued that the intended street orientation could more likely have been 22.5° because, for the builders of Neapolis, it could have been much easier and more culturally relevant to adopt a city design based on the sixteen-rayed Sun (one of the major Greek religious symbols) and a coordinate frame of reference anticlockwise rotated by about 1.5° compared to the real one (Figure 7.5). Nevertheless, if the urban planners of Neapolis were able to accurately determine the real coordinates that we have today and if in the last 2500 years the land did not

move due to the numerous earthquakes that occurred in the area, the decuman orientation might also be explained in an alternative manner.

For instance, the Stellarium astronomical planetarium calculates that the obliquity of the Earth's axis[1] during the first half of the 5th century BC was approximately 23.75°, which is the average between 23.5° and 24°. According to this measure, one could argue that the orientation of the central cardo (today's *Via San Gregorio Armeno*) relative to the equinoctial line could have mimicked the Earth's obliquity about the ecliptic, which is also the inclination of the solar orbital plane relative to the Earth's equatorial one.

In ancient times, in theory, the obliquity of the Earth's axis could be measured using the length of the shadow of a vertical pole fixed to the ground at noon (local time) during the summer and winter solstices, as shown in Figure A.1.[2] In Neapolis (located at 40°51'22.72"N – 14°14'47.08"E), the maximum solar elevation at noon during the summer solstice (28th June 472 BC) was 72°:53':43.7", while during the winter solstice (26th December 472 BC), it was 25°:23':23.2". The inclination of the Earth's rotation axis is the difference of the two elevations divided by two, which, back then, was approximately 23.75°. Today, the Earth's obliquity is approximately 23.45° because, it oscillates between around 22.5° and 24.5° over 41,000 years.

If the above conjecture were correct, such a view would be historically important. In fact, China and India have roughly computed the Earth's obliquity since 1100 BC.[3] However, it is believed that the Greeks were able to conduct such calculations with sufficient accuracy only as early as the end of the 4th century BC, thanks to the work of the geographer Pytheas of Massalia (350 BC – 285 BC).[4] If the planners of Neapolis had measured the correct tilt of the Earth's axis more than 150 years before Pytheas, this would be historically relevant, but to establish this technological possibility among the 5th-century Greek communities, more explicit evidence is necessary.

Another possibility is that the builders of Neapolis might have deduced the 24° angle of the inclination of the ecliptic by using the average lunistice with respect to the equinoctial line. A lunar standstill, or lunistice, is when the Moon reaches

[1] In astronomy, obliquity, also known as axial tilt, is the angle between an object's rotational axis and its orbital axis.

[2] The geographical latitude is given by 90° minus the average between the solar elevation at noon during the two solstices; alternatively, it can be calculated as 90° minus the solar elevation at noon during the equinoxes.

[3] A. Wittmann, *The Obliquity of the Ecliptic*, «Astronomy and Astrophysics», 73 (1979), pp. 129–131.

[4] John Ellard Gore, *Astronomical Essays Historical and Descriptive*, Charleston SC, BiblioBazaar, 2009.

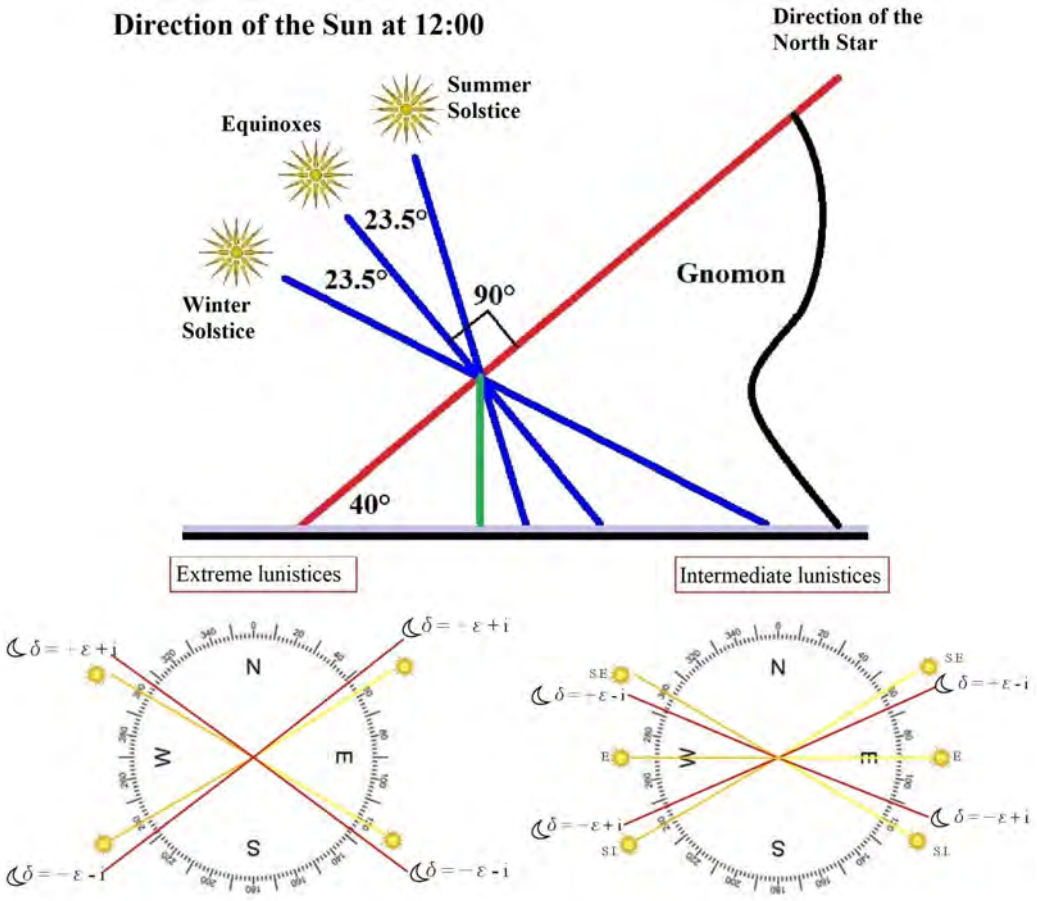

Fig. A.1 *(Above) Current measurement of the inclination of the ecliptic (around 23.5°) from Naples (latitude: approximately 40°) carried out through a gnomon or a vertical pole (green line). Evaluation of the position of the Sun at noon during the winter and summer solstices. (Below) Position of the extreme and intermediate lunistices.*

its furthest north or furthest south point during the course of a month. Indeed, the ancient Greeks carefully measured the position of the Moon for their calendars. To explain this methodology, one needs to consider that the Moon's orbit is inclined with respect to the Earth's one by an angle of $i \approx 5.15°$. Thus, the Moon's orbit intersects the ecliptic at two nodes. The line of nodes – the intersection between the two respective planes – has a retrograde motion: for an observer on Earth, it rotates westward along the ecliptic with a period of 18.6 years, or 19.3549° per year. With respect to the celestial equator, the inclination ε of the ecliptic relative to the celestial equator can be calculated from the average lunistice angles because, during the nodal retrograde motion, the inclination of the lunar orbit

with respect to the Earth's equator varies between $\varepsilon + i$ (upper lunistice) and $\varepsilon - i$ (intermediate lunistice).

In any case, I do not think that the above conjectures are plausible because they generate more issues than they purport to solve. For example, such hypotheses would imply that in the 5th century BC, astronomical knowledge was extremely advanced in Magna Graecia, also because, from Neapolis, the lunistice equation needs to be implemented with latitudinal information. Moonrise and moonset in Neapolis always oscillated between the angles of local solstices, which measured not 24° but approximately 32° with respect to the equinoctial line; that is, the local lunistices vary between 37° and 27°. In addition, it is unlikely that the ancient Greeks could estimate cardinal points with an accuracy of the order of a fraction of a degree. Finally, it would be unclear why the planners of Neapolis picked this exact angle to position the city's decumans, given that their inhabitants could not have seen this specific astronomical configuration in their sky. In conclusion, the fact that the average inclination of decumans was close to the Earth's tilt during the 5th century BC appears to be only an unexpected coincidence.

The model of Neapolis by Longo and Tauro

Longo and Tauro conducted an interesting study to explain the street grid of Neapolis (Figure A.2).[5] They noted that the urban layout was partially defined by a circle divided into 16 sectors and observed that the planning of the city resembled what Vitruvius proposed as the '*ideal city*' 2000 years ago. The most innovative aspect of their account is the hypothesis that the structure was based on a golden ratio design. However, they did not provide any religious, cultural, or philosophical context that could have motivated their proposed design, which is depicted in Figure A.2. Furthermore, their model raises some fundamental questions, as I demonstrate below.

According to their model, ABDE (the city's large central square) measures 2×2 Greek stadia. The distance CD determines the radius of the circle that defines the inner area of the city starting from O, which is the intersection between the central decuman and the cardo of *Via San Gregorio Armeno*. As I showed in Chapter 10,

[5] Fausto Longo and Teresa Tauro, *Costruire la città: riflessioni sull'impianto urbano di Neapolis*, in *Dromoi: Studi del Mondo Antico Offerti a Emanuele Greco dai Suoi Allievi della Scuola Archeologica Italiana di Atene*, edited by Fausto Longo, Riccardo Di Cesare & Privitera Santo, Paestum, Pandemos - Paestum, 2016, pp. 189–212; Fausto Longo and Teresa Tauro, *Alle Origini dell'Urbanistica di Napoli*, Paestum, Pandemos - Paestum, 2017.

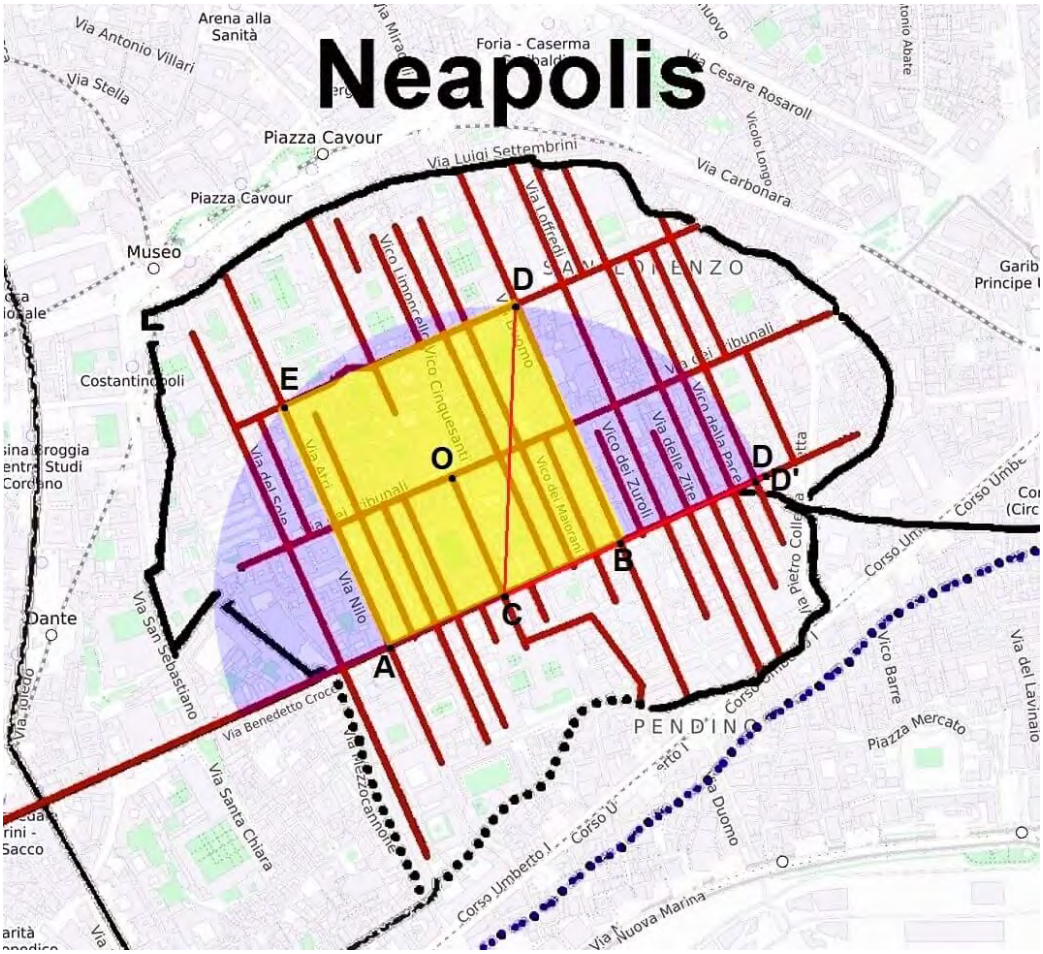

Fig. A.2 *The urban model of Neapolis proposed by Longo and Tauro.*

this radius has a length of $\sqrt{5}$ Greek stadia, and the resulting circle does perfectly fit the city walls at many points when the centre is the point O.

However, Longo and Tauro add to their model the following second element that has questionable validity: they claim that the same radius length ($\sqrt{5}$ Greek stadia) also defines the distance between intersection C (which connects *Spaccanapoli* with *Via San Gregorio Armeno*) and point D, where they claim that *Via Forcella* deviates from the lower decuman. This deviation is identified by the authors as the intersection between *Vico della Pace* and *Spaccanapoli*. Consequently, the distance between the point A and *Via Forcella* (the proposed point D) would be related to the golden ratio because it would be $(1+\sqrt{5}) = 2\Phi$.

However, *Vico della Pace* is the eleventh cardo to the east of *Via San Gregorio Armeno*. The number '11' appears to have no special importance regarding the

design of Neapolis. The street grid of the city was described in Chapter 10 and it clearly adopted a street division based on the proportions of the number '10', which has an important Pythagorean meaning. Moreover, the model is also mathematically incorrect because the theoretical distance between *Via San Gregorio Armeno* and the eleventh cardo to the east (*Vico della Pace*) is $11 \times 0.2 = 2.2$ Greek stadia, where 0.2 stadia is the theoretical distance between two adjacent cardines, as Longo and Tauro acknowledge. Yet, $\sqrt{5}$ is 2.236..., which is numerically and theoretically different from 2.2. Thus, the city builders would have made a serious geometrical error. Indeed, Figure A.2 shows that the real point predicted by their model is D' and not D, and D' does not correspond to the theoretical intersection of any cardo with the lower decuman.

Furthermore, Longo and Tauro did not explain why the builders regarded the eleventh cardo from *Via San Gregorio Armeno* as significant or why, in order to reveal the golden ratio, the reference point had to be moved from the natural centre (the point O in the agora) to point C (the intersection of the central cardo and the lower decuman). Thus, their model appears to be inadequate; there is no credible philosophical rationale or archaeoastronomic substratum to support it.

In Chapters 9-11, I argued that Neapolis does have a street-grid design based on the golden ratio; this design, however, derives from a decagonal geometry, which is culturally motivated and much more precise than the geometry proposed by Longo and Tauro. In addition, the most reasonable reference point for the city construction must be O, that is, the actual centre of the city (compare Figure A.2 to Figure 11.1), not point C as proposed by Longo and Tauro.

The solar-orientation design of Herculaneum and Pompeii

Dall'Osso proposed another interpretation of the street orientation of Neapolis, which is partially in line with the one exposed in this book.[6] His model was based on the street grid of *Herculaneum* (buried in the Vesuvius eruption of 79 AD together with Pompeii) and only indirectly on that of Neapolis.

According to myths, Herculaneum was founded by Hercules in the 13th century BC. This ancient city was characterised by a Hippodameian plan of Greek origin dating to the 5th century BC. The street-plan of Herculaneum is made of two or three decumans and a few cardines. The orientation of its streets, like in the case of Neapolis, does not follow the coastline. Dall'Osso remarked that '*in founding their cities the Greeks tried to use the great benefits of the Sun and the air as*

[6] Innocenzo Dall'Osso, *Ercolano*, «Nuova Antologia di Lettere, Scienze e Arti», 121 (1906), n. 5, pp. 107–118.

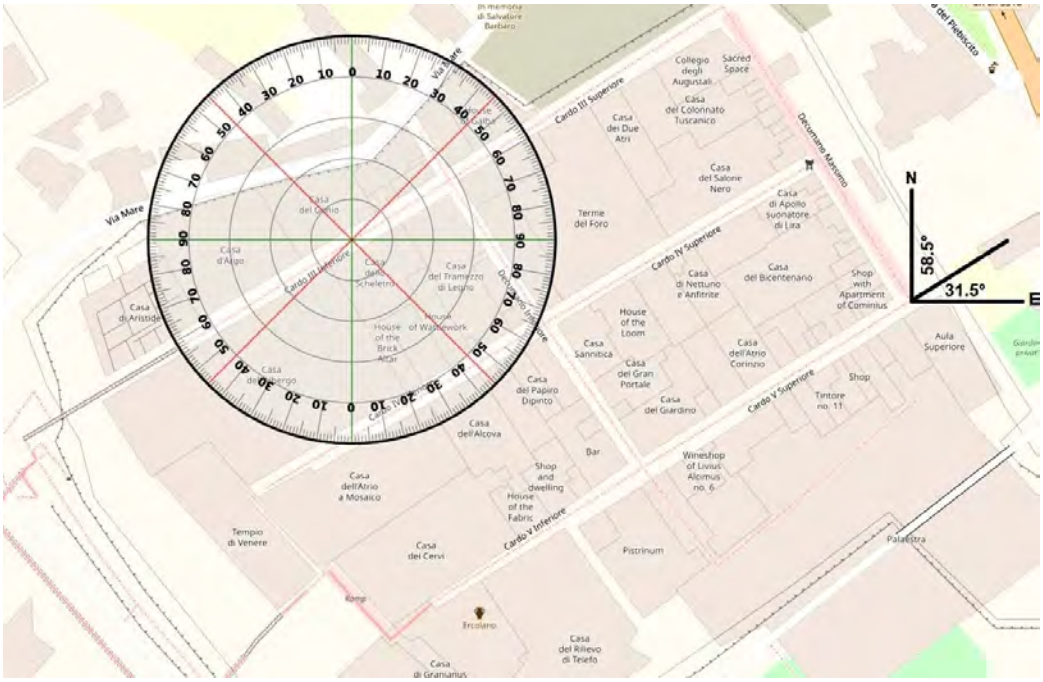

Fig. A.3 *Plan of Ancient Herculaneum. The orientation of the three wide cardines indicated (58°-59° azimuth) roughly coincides with the solar direction during sunrise on the summer solstice and sunset on the winter solstice.*

an advantage and, imitating the archetypes of eastern cities, they based their orientation on the Sun. However, following the Babylonian example, they regulated themselves not with the sundial but with the empirical norm of the point where the Sun rose or set on the day chosen for the foundation.'

Thus, he conjectured that Neapolis was founded on the day when the sunlight direction at sunset was oriented along the decumans of the city at 66° azimuth. Dall'Osso proposed 1st November or 10th February, without however specifying that on those dates sunset would only be visible from Neapolis above Sant'Elmo Hill, that is, at a height of around 5° or 6° from the horizon. This hypothesis may be plausible but is difficult to confirm because it is unknown when the *Dies Natalis* of Neapolis was celebrated. Furthermore, the complex topology of the local area, which, as we know, is surrounded by hills and mountains, would make the task even more arduous. Finally, the same hypothesis would not even explain the other geometric and geographic elements covered in this essay.

In any case, our analysis of the orientation of the three large cardines of Herculaneum, which we measured using Google Earth Pro, gives 58°-59° azimuth (about 31°-32° from the equinoctial line: Figure A.3). This result suggests that

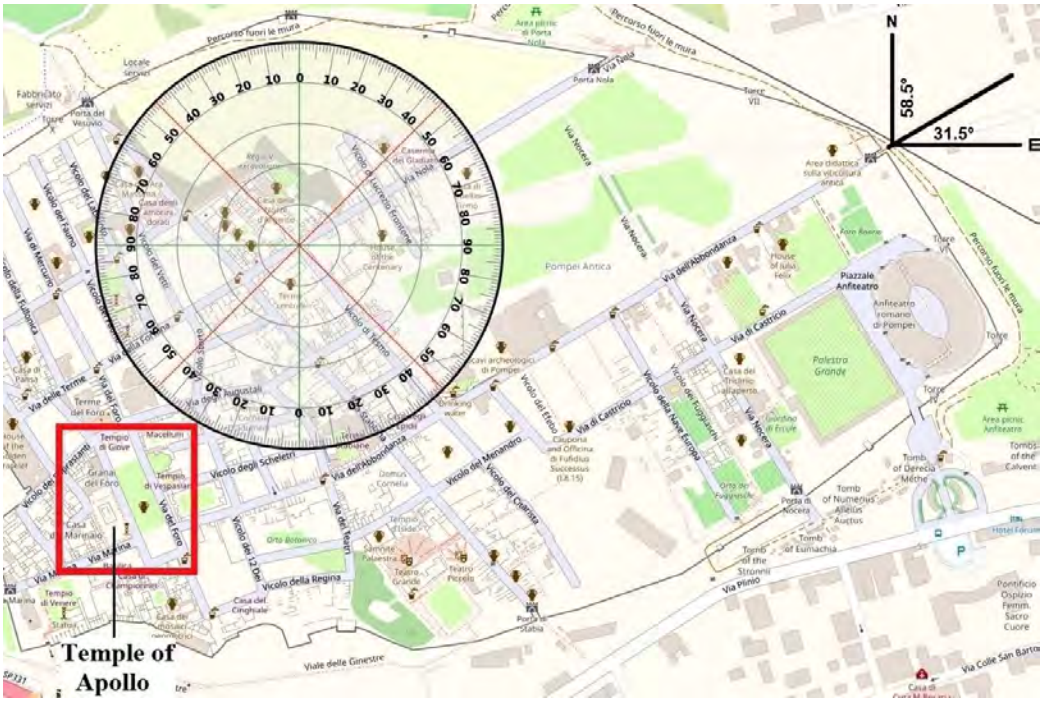

Fig. A.4 *Plan of Ancient Pompeii. The orientation of the three decumans (58°-59° azimuth) roughly coincides with the solar direction during sunrise on the summer solstice and sunset on the winter solstice. Hwever, the Forum and the Temple of Apollo (bottom left) are oriented like the streets of Neapolis at 24° (Figure 3.4).*

they were roughly aligned with sunrise on the summer solstice or with sunset over the sea on the winter solstice (which occurs approximately at 31°-32° from the equinoctial line; compare with Figure 7.3). The same orientation (58°-59° azimuth) characterises the main streets of ancient Pompeii, also located at the foot of the Somma-Vesuvius volcano complex and structured in a partially Hippodameian style dating to the 5th–4th century BC. Examples are *Via dell'Abbondanza*, V*ia delle Terme-Fortuna-Nola*, and *Via di Castricio* (Figure A.4). In the 5th century BC, both cities were under Greek sovereignty before passing to Samnite rule.

This similarity between Herculaneum and Pompeii cannot be accidental. The results further confirm that during solstices, Sun-worship in this area was so important that it inspired the orientation of several cities. As a result, the interpretative solar-cosmology plan presented for Neapolis in previous Chapters is indirectly reinforced by the peculiar road orientation of Pompeii and Herculaneum. The latter recalls equinoxes as well because the myth of Hercules includes the hero's struggle against the Bull, that is, *Achelôos* (the River-god and the father of sirens), who was identified with Sebethos in this area.

In conclusion, for Greek colonists, the chief religious and astronomical reference point was the solar position at sunrise or sunset during solstices and equinoxes. This interpretation is also supported by the astronomical orientation of the large temples on the Acropolis of Cumae, which were dedicated to Jupiter and Apollo (cf. Figures 4.3 and 4.4). In the case of the foundation of Neapolis, these elements were then further enriched by the Pythagorean cosmological doctrine associated with the number '10' and the golden ratio, as well as by the cult of Parthenope and Sebethos.

The Etruscan Temple: the cosmology of the number '16'

This work proposed an archaeoastronomic interpretation of the urban planning of Neapolis by considering the Sun-cult religion of the Cumaeans, who founded the city. I argued that the decumans of Neapolis were meant to be 22.5° anticlockwise rotated from the equinoctial line. The sixteen-rayed Sun that the Greeks used to symbolise the Sun-god may have motivated this specific angle. Furthermore, the builders of Neapolis could have used other astronomical data, such as the course of the Sun observed from Neapolis at the solstices and equinoxes for planning the street grid and orient it towards Ischia in memory of Parthenope (Figures 9.4 and 13.16). In fact, more particular geometric elements of the street grid of the city appear to have been inspired by Pythagorean cosmology, which was developed in Magna Graecia just before and around the foundation of Neapolis.

However, some Etruscan influence cannot be ruled out to explain the planning of Neapolis. The Etruscans inhabited mainly the central part of Italy, between the Arno and Tiber rivers and the Tyrrhenian Sea. They also occupied larger areas, including Lombardy, Veneto, Liguria, the Po Valley, Tuscany, Marche, and Campania. Their contacts with Greek coastal colonies led to numerous economic and cultural exchanges. There was no shortage of military clashes too, like the famous battle of Cumae (474 BC), when their defeat by the Greeks caused them to move away from those lands. If Neapolis was founded around 470 BC, the event may have also served to celebrate such a military victory.

Latin writers portray the Etruscans as rather superstitious people.[7] They considered the number '16' to be sacred and their day was most likely made of 16 hours long (90 minutes each), divided into eight hours during the day and eight hours at night. The Etruscans used to divide the celestial vault into sixteen regions of influence (eight positive and eight negative), and they utilised this concept to

[7] For example see: Lucius Annaeus Seneca (4 BC – 65 AD), in *Physical Science in the Time of Nero*, translated by John Clarke, London, MacMillan and Co., 1910, book 2, c. 32, pp. 79–81.

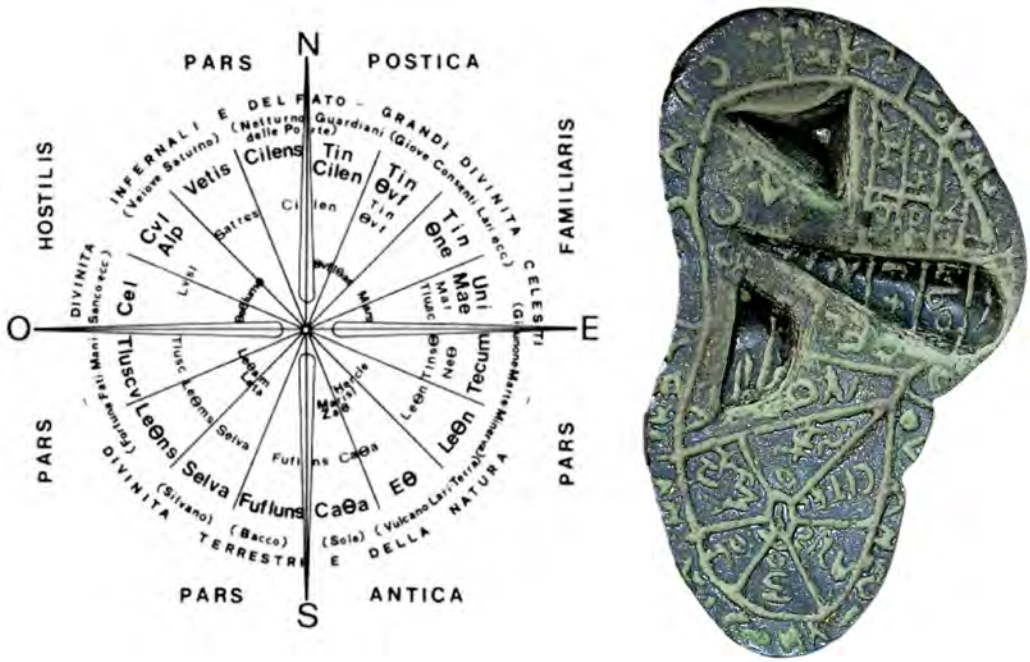

Fig. A.5 *(Left) The Etruscan Temple. (Right) The Liver of Piacenza, which the Etruscan haruspices used for divination. The names of the sixteen gods of their pantheon are reported all around.*

organise the construction of temples and new cities. As a circle divided into 16 sectors creates angles of 22.5°, this concept could have inspired the orientation of the decumans of Neapolis.

Haruspicinae art was based on determining the *Templum*, that is, the sacred space that the subdivision of the celestial vault was projected upon. This was assumed to be crossed by the perpendicular lines of the *cardo* (north-south direction) and the *decuman* (east-west direction). The two lines divided the sky into four sections that corresponded to the northeast, southeast, southwest, and northwest. The northeastern area housed the heavenly gods and was considered very favourable because this is where the summer sunrise occurs. The northwestern area was the most ominous, as this is the underworld gods' abode and the area where the summer Sun sets. The other two areas were homes to the gods of nature (water and earth): the southeast was the area of the winter sunrise and was considered partially auspicious, and the southwest was the area of the winter sunset and was considered partially ominous. The Etruscans, who felt that macrocosm and microcosm were closely related, believed that the celestial vault was also reflected on the individual living and non-living elements of the Earth, including

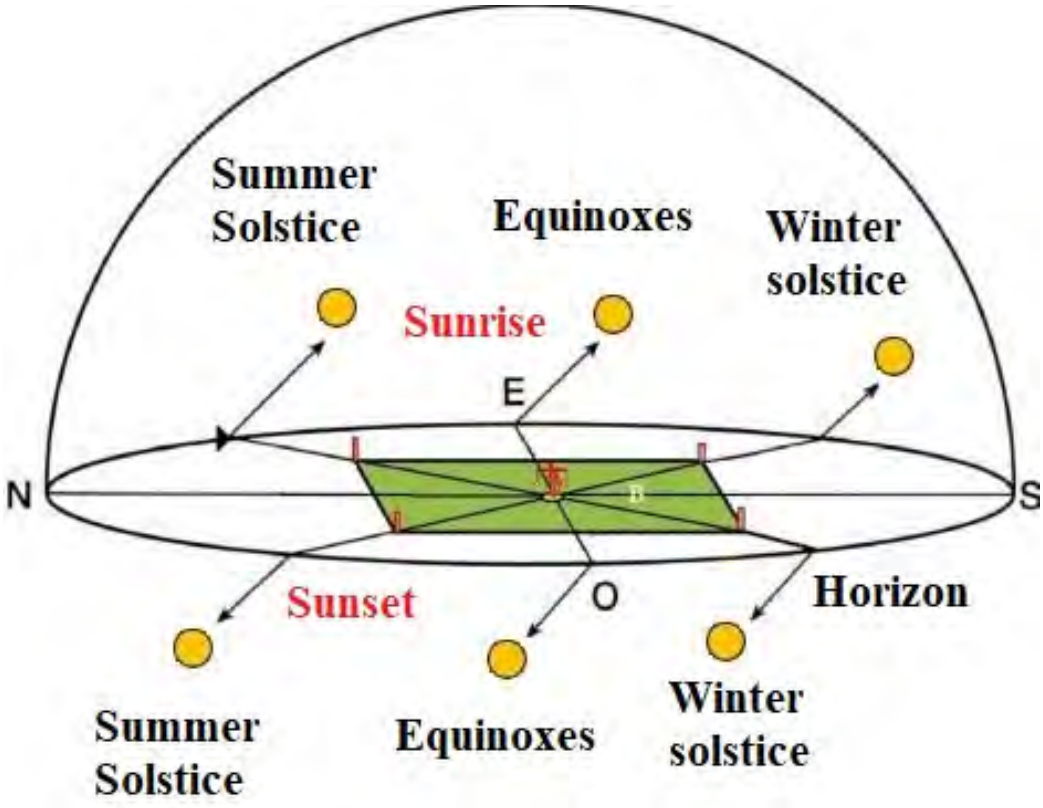

Fig. A.6 *Theoretical structure of the Roman Castrum based on the rules dictated by the Etruscans.*

animal liver and intestines. Consequently, the haruspices predicted fate by carefully examining the entrails of sacrificed animals (usually sheep). If they found some specific signs, such as scars or other anomalies, they compared the organ to a bronze model as the '*liver of Piacenza*', which shows the sixteen divisions of the *Templum* with the names of the respective divinities (Figure A.5). The goal was to identify the sector of the sky in the liver model to which the scar corresponded – hence, the sector indicated the divinity that had sent that sign (auspicious or not) – and subsequently try to understand its meaning.

Therefore, orienting the axes of a temple or the decumans and cardines of a whole city along a definite direction meant placing that temple or city under the protection of a specific deity. In the case of Neapolis, the 22.5° anticlockwise street orientation from the equinoctial line meant to associate the city with the celestial divinities (for example, Jupiter/Zeus in the northeast quadrant) and some of the terrestrial ones. Yet, figuring out which divinities the several regions of the

sky were linked to is not an easy task for us. One of the reasons was that the Etruscan pantheon was not orderly but varied, and we know almost nothing about the details of this complex culture.

The Greek communities of Cumae might have incorporated some of the Etruscan cosmology into their philosophical systems and considered it for the planning of Neapolis. However, Etruscan influence is more conspicuous in Roman town planning. To exemplify, the Roman *Castrum* was planned as a rectangle oriented like the cardinal axes, while the diagonals were aligned with the sunrise sunlight directions on the solstices (Figure A.6). Even the foundation of Rome and Vitruvius' model of the '*ideal city*' may have been inspired by Etruscan cosmology. For instance, Dionysius of Halicarnassus (around 60 BC – 7 AD) stated: '*many of the writers maintained that Rome itself was a Tyrrhenian city*' (i.e., an Etruscan city).[8]

However, there is no evidence of a direct Etruscan involvement in the founding of Neapolis. Any affinity between the two cosmologies could be based on components shared by the two cultures, such as the mystical significance linked with the number '16' and the idea that a city should somehow reflect a cosmic order. All Greeks identified the sixteen (or twelve, or eight) rayed star with the Sun and their sacred pantheon, as explained above and demonstrated by a coin from Neapolis (Figure 9.3). The Sun was the primary religious emblem for all Hellenes (Arcadians, Athenians, Tessalians, and Macedonians) as their source of life. In all of its iterations, the emblem was connected also with virginity because the priestesses-oracles of Apollo were virgins, and various virgin deities, including Athena, were affiliated with the Sun. Figure A.7 shows her with a sixteen-ray Sun shield.

Elements of astronomical geography

In this text, frequent mention has been made of sunrises and sunsets, stars, and the directions they indicate during solstices and equinoxes. The angles measured by the ancients, however, corresponded to the rising and setting points of the Sun or other stars, not on the astronomical horizon but on the local natural one represented by the profile of the landscape visible from the observation place. Only these events were visible and could thus carry a meaning.

Let us take as an example the solar path observed from a location surrounded by a landscape partly featuring a view of sea, mountains, and hills, like in the

[8] Dionysius of Halicarnassus, *The Roman Antiquities of Dionysius of Halicarnassus*, translated by Cary Earnest, Cambridge (MA), Harvard University Press, 1960, book 1, s. 29.2, p. 93.

Fig. A.7 *Pithos with Athena with the Sun's shield (Athens, 4th century BC).*

case of Neapolis and its surroundings. The marine horizon corresponds to the astronomical one, while the landscape profile corresponds to the natural horizon.

Figure A.8 shows the path of the Sun at the equinoxes and solstices with its rising and setting, as an observer can see from point G. On the astronomical horizon, these events occur at point S, while on the natural horizon, they occur at point S', that is, when the Sun disc appears or disappears behind the mountains. In the northern hemisphere, the Sun rises above the horizon from a location to the east, moves south, reaches its zenith at 12:00 local time, and then falls back to the west until it sets. At noon, the Sun's height is the highest on the summer solstice and the lowest on the winter solstice, while during equinoxes the Sun rises and sets exactly at the east (E) and west (W) points, respectively. Things differ when sunrise occurs at a certain azimuth angle over the astronomical horizon. In this case, because of the landscape of mountains and hills, the sunrise visible from

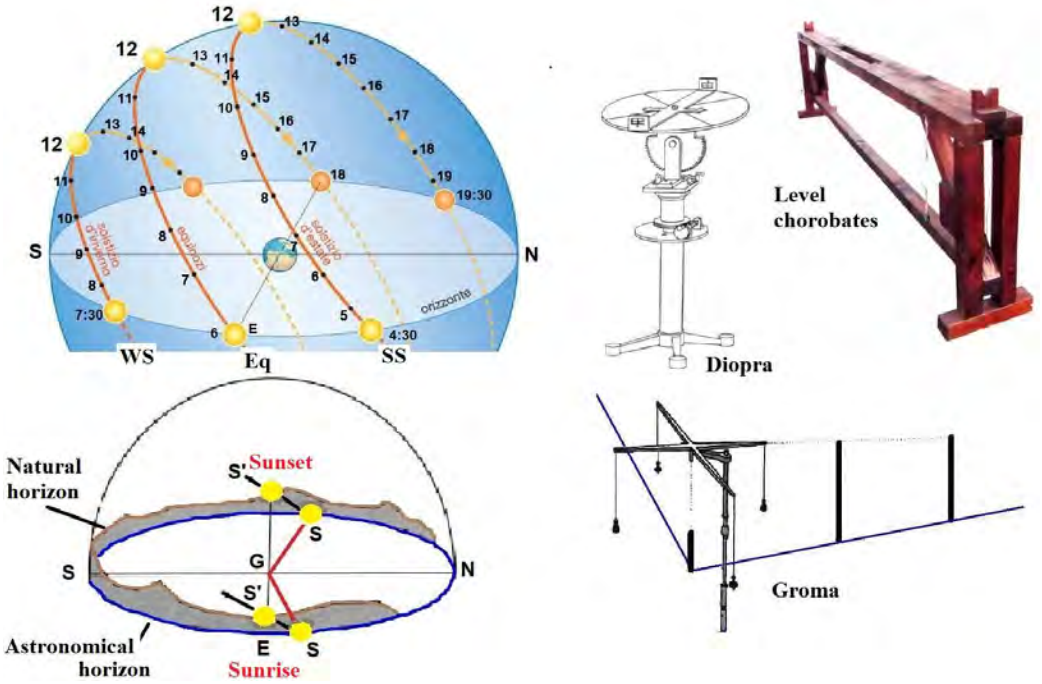

Fig. A.8 *(Above) The changing path of the Sun in relation to the seasons. The Sun is low in winter, a bit higher in spring and autumn, and reaches the maximum height during summer. This drawing applies to the northern hemisphere because in the southern one the cardinal points are reversed. (Below) The astronomical horizon and the natural horizon. (Right) A diopra, level-chorobates, and the use of the groma.*

point G occurs shortly afterwards and at a slightly greater azimuth angle, depending on the height and distance of the landscape outline. The opposite occurs at sunset; that is, a visible sunset occurs just before the astronomical one at a smaller azimuth angle. To create a correspondence between a temple or a road orientation and a specific astronomical event such as the rising or setting of the Sun (or of the moon, a planet, or a star) on a given day, the direction chosen would have been GS' because of its visibility and not GS, which would have been invisible.

To align, square, and measure various vertical and horizontal angles and to trace the relative straight and orthogonal lines on the ground, the Greeks and the Romans used various tools such as the *groma*, the *level-chorobates*, the *altimeter-lychnia*, and the more complex *dioptra* (Figure A.8).

The legend of the Neapolitan 'pastiera'

An excellent way to conclude this essey is with a palate-titillating oddity. There is a link between the urban planning of ancient Neapolis and today's Neapolitan gastronomic culture. What we are talking about is the Neapolitan *pastiera*, the most typical local Easter cake. The Queen of the Two Sicilies, Maria Teresa of Austria,[9] nicknamed by the soldiers '*the queen who never smiles*', found it so delicious she could not help but smile. It seems that at this point the King exclaimed: «*To make my wife smile we needed pastiera, now I will have to wait until next Easter to see her smile again*».

Pastiera is a shortcrust pastry cake filled with a mixture of ricotta cheese, candied fruit, sugar, eggs, whole wheat grains boiled in milk, and various flavourings. It looks like a custard fruit tart, but its special feature is a decoration in a trellis design made of a total of seven (three in one direction and four in the other) pastry strips arranged in a Greek cross. They simulate the planimetry of Neapolis, with the three decumans and four cardines that intersect them (Figure A.9).

A legend says that Parthenope invented the *Pastiera*. Indeed, every spring, the inhabitants of Neapolis – moved by the sweetness of the siren singing and the loving words she dedicated to them – used to offer her the first produce of the season. The offerings included flour, ricotta cheese, eggs, wheat boiled in milk, orange blossom water, spices, and sugar. Finally, the siren, happy to have received such a wealth of gifts, placed the precious offerings at the feet of the gods of Olympus, who mixed the delicious ingredients, thus creating the Neapolitan Pastiera. Something similar may have been part of the rich range of votive offerings carried in procession by pagan priestesses, in conjunction with the spring equinox, which today is followed by the celebration of Christian Easter.

The legend of Parthenope and the Easter cake of Naples could have derived from the cult of Demeter. The letter was the goddess of wheat and of the Earth's fertility, as well as the goddess of Greek-Roman Neapolis, much the same as Apollo and the Dioscuri (Castor and Pollux). We can notice a connection with the constellation of the Virgin, where the main star *Spica*, or *wheat spike*, appears to be hand-held (Figure 13.2 and 15.5).

What opened the way for today's cake was a 16th-century recipe perfected in convents, with a particularly famous one being prepared by the nuns of San Gregorio Armeno. It is in the proximity of this convent, almost on the opposite side of the road, that one can find the famous bas-relief of the *canefora*, that is, a priestess of Demetra in procession (Figure 13.9).

[9] Maria Teresa of Austria (1816–1867) was the second wife of Ferdinand II of Bourbon (1810–1859), King of the Two Sicilies.

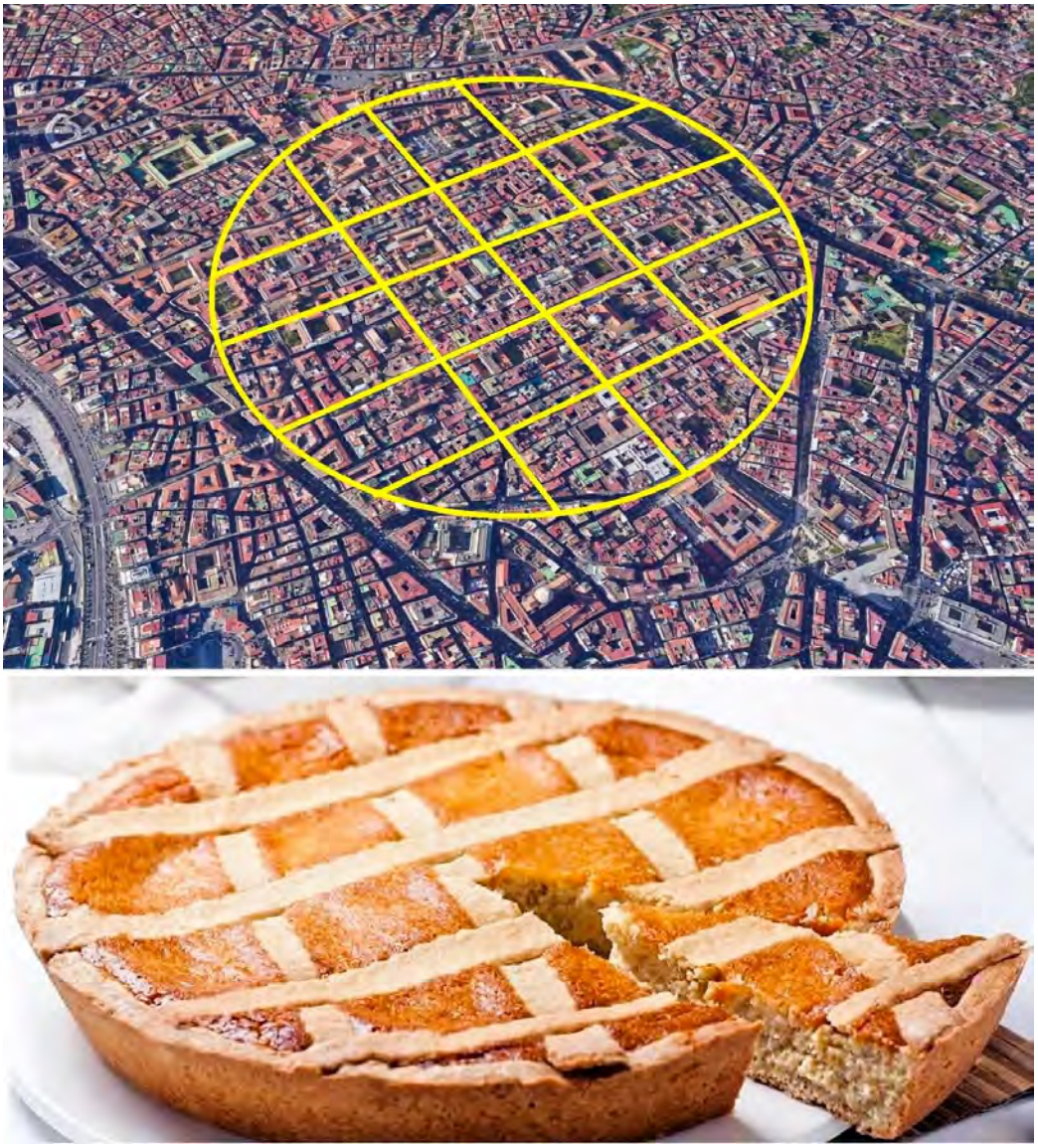

Fig. A.9 *A Neapolitan pastiera. Its seven orthogonal strips reproduce the Hippodamian plan of Neapolis with three decumans and four main cardines.*

Neapolitan Pastiera: the (author's) recipe

For the shortcrust pastry: mix 80 g of sugar, 20 g of honey, and 100 g of softened butter; add one egg and 20 g of milk, then 1/2 sachet of vanilla yeast and some lemon and orange zest for the aroma; lastly, add around 300 g of flour and a pinch of salt. The dough is ready when it no longer sticks to your hands; it must be wrapped in plastic film and let rest in the refrigerator for about one hour.[10]

For the filling: combine 350 g of whole wheat boiled in 150 ml of milk, 25 g of butter, some lemon zest and/or orange peel, a pinch of salt, and, if desired, ½ teaspoonful of cinnamon. Cook until milk is fully absorbed; let cool; remove the lemon and orange peels; and, if desired, blend 50-100 g of the product. Combine 300 g of drained ricotta cheese (possibly made from sheep or water buffalo milk) with 250 g of sugar and 30 g of honey; let rest. Beat three medium-size eggs, adding 25 ml or a vial of orange blossom water or orange flavouring and some lemon and/or orange zest. Lastly, combine the creamy mixture of wheat, ricotta cheese, and eggs; cut 80-100 g of candied citron or candied orange cubes into pieces. Add them to some milk if the mixture is too dry or dense. The filling is now ready.

Roll out 3/4 of the shortcrust pastry (about 3 mm thick) and place it in a greased 24 cm round pan. There should be enough shortcrust pastry left to make seven strips to cross over the top, as shown in Figure A.9. Pour in the filling, arrange the pastry strips, and bake at 175 °C for about one hour (the colour should look as in Figure A.9). Serve the next day with some sprinkled powdered sugar, if desired.

[10] The shortcrust pastry recipe can also be used for the base and strips of a jam crust of 24-26 cm in diameter. Use about 300 g of jam. Bake the jam crust at 180 °C for about 25 minutes.

References

Agafonkin Volodymir, *Road Orientation Map*, 2022. Available at https://mourner.github.io/road-orientation-map (accessed on 21/05/2024).

Alburz Ronak, Tol Gijs Willem, *A Re-Evaluation of the Iconography of the Etruscan Bronze Lamp of Cortona*, «Etruscan and Italic Studies», 2024, https://doi.org/10.1515/etst-2023-0019 (accessed on 21/05/2024).

Allman George Johnston, *Greek Geometry From Thales to Euclid*, Dublin, University Press, 1877.

Amato Lucio, Guastaferro Carmella, Cinque Aldo, di Donato Valentino, Romano Paola, Ruello Maria Rosaria, Perriello Zampelli Sebastiano, Morhange Christophe, Russo Ermolli Elda, Irollo Giolanda, Carsana Vittoria, Giampaola Daniela, *Morphoevolutionary reconstructions in the territory of Naples*, «Méditerranee», 112 (2009), pp. 23–31.

Aristotle, *Politics*, translated by H. Rackham, Cambridge (MA), Harvard University Press, 1944, book 7, sec. 1327, http://data.perseus.org/citations/urn:cts:greekLit:tlg0086.tlg035.perseus-eng1:7.1327a (accessed on 21/05/2024).

Bearzot Cinzia, Landucci Franca, *Tra mare e continente: l'isola d'Eubea*, Milano, Vita e Pensiero, 2013.

Belmonte Juan Antonio, Shaltout M. A. Mosalam, *In Search of Cosmic Order: Selected Essays on Egyptian Archaeoastronomy*, Cairo, American University in Cairo Press, 2009.

Bilić Tomislav, Apollo, *Helios, and the solstices in the Athenian, Delphian, and Delian calendars*, «Numen», 59 (2012), n. 5-6, pp. 509–532.

Boeing Geoff, *Urban spatial order: street network orientation, configuration, and entropy*, «Applied Network Science», 4 (2019), n. 67.

Boutsikas Efrosyni, Ruggles Clive, *Temples, stars, and ritual landscapes: the potential for archaeoastronomy in ancient Greece*, «American Journal of Archaeology», 115 (2011), n. 1, pp. 55–68.

Burkert Walter, *Love and Science in Ancient Pythagoreanism*, Cambridge MA, Harvard University Press, 1972.

Burkert Walter, *Greek Religion*, Cambridge MA, Harvard University Press, 1985.

Camodeca Giuseppe, *Iscrizioni pubbliche nuove o riedite e monumenti di Cumae. I, Foro e tempio di Apollo*, «Annali di Archeologia e Storia Antica», 8 (2001), pp. 149–162.

Camodeca Giuseppe, *La documentazione epigrafica e i templi dell'acropoli di Cuma romana*, in *Cuma, il Tempio di Giove e la terrazza superiore dell'Acropoli*, edited by Rescigno Carlo, Venosa, Osanna Edizioni, 2012, pp. 67–84.

Carafa Paolo, *Culti e Santuari della Campania Antica*, Roma, Istituto Poligrafico dello Stato, 2007.

Celano Carlo, *Notitie del bello, dell'antico e del curioso della città di Napoli per i signori forastieri*, Napoli, Giacomo Raillard, 1692.

Cerchiai Luca, Jannelli Lorena, Longo Fausto, *The Greek Cities of Magna Graecia and Sicily*, Los Angeles, The J. Paul Getty Museum, 2004.

Cioni Raffaello, Bertagnini Antonella, Santacroce Roberto, Andronico Daniele, *Explosive activity and eruption scenarios at Somma-Vesuvius (Italy): towards a new classification scheme*, «Journal of Volcanology and Geothermal Research», 178 (2008), n. 3, pp. 331–346.

Condos Theony, *Star Myths of the Greeks and Romans: A Sourcebook Containing 'The Constellations' of Pseudo–Eratosthenes and the 'Poetic Astronomy' of Hyginus*, Grand Rapids, Phanes Press, 1997.

Cornieti Michele, *Urban space as sacred space: observations on city and necropolis design in Populonia*, in *Disegnare il Tempo e l'Armonia,* edited by Mandelli Emma, Lavoratti Gaia, Boston MA, Alinea, 2010, pp. 17–19.

Creekmore III Andrew T., Fisher Kevin D., *Making Ancient Cities: Space and Place in Early Urban Societies*, Cambridge MA, Cambridge University Press, 2014.

Cristiano Francesco, *Terina e il mito della sirena Ligea*, «Panorama Numismatico», 224 (2007), pp. 9–15.

Dall'Osso Innocenzo, *Ercolano*, «Nuova Antologia di Lettere, Scienze e Arti», 121 (1906), n. 5, pp. 107–118.

Debiasi Andrea, *L'Epica Perduta: Eumelo, il Ciclo e l'Occidente*, Roma, L'Erma di Bretschneider, 2004.

de' Pietri Francesco, *Dell'Historia Napoletana*, Napoli, Gio. Domenico Montanaro, 1634, book 1.

de Rachewiltz Siegfried, *De Sirenibus: An Inquiry into Sirens from Homer to Shakespeare*, Cambridge MA, Taylor & Francis, 1987.

Diogenes Laertius, *Lives of Eminent Philosophers*, translated by R. D. Hicks, Cambridge (MA), Harvard University Press, 1972, book 1, sec. 12, http://data.perseus.org/citations/urn:cts:greekLit:tlg0004.tlg001.perseus-eng1:1.prologue (accessed on 21/05/2024).

Dionysius of Halicarnassus, *The Roman Antiquities of Dionysius of Halicarnassus*, translated by Cary Earnest, Cambridge (MA), Harvard University Press, 1960, book 1, s. 29.2, p. 93.

Fabris Dinko, *Partenope da Sirena a Regina. Il Mito Musicale di Napoli*, Barletta, Cafagna, 2016.

Ferrajoli Ferdinando, *Napoli Monumentale*, Naples, Adriano Gallina Editore, 1981.

Ferro Luisa, Magli Giulio, *The astronomical orientation of the urban plan of Alexandria*, «Oxford Journal of Archaeology», 31 (2012), n. 4, pp. 381–389.

Galante Gennaro Aspreno, *Guida Sacra della Città di Napoli*, Napoli, Stamperia del Fibreno, 1872.

Giampaola Daniela, d'Agostino Bruno, *Osservazioni storiche e archeologiche sulla fondazione di Neapolis*, in *Noctes Campanae. Studi di storia antica ed archeologia dell'Italia preromana e romana in memoria di Martin W. Frederiksen*, edited by William V. Harris & Elio Lo Cascio, Napoli, Luciano, 2005, pp. 49–80.

Giampaola Daniela, *Archaeology and the city: the waterfront redevelopment*, «Journal of Land Use, Mobility and Environment», 2 (2009), n. 3, pp. 37–46.

Giampaola Daniela, Longobardo Francesca, *Napoli greca e romana: tra Museo archeologico nazionale e centro antico*, Napoli, Electa Napoli, 2000.

Gill David W. J., *Hippodamus and the Piraeus*, «Historia: Zeitschrift für Alte Geschichte», 55 (2006), n. 1, pp. 1–15.

Gore John Ellard, *Astronomical Essays Historical and Descriptive*, Charleston SC, BiblioBazaar, 2009.

Greco Emanuele, Torelli Mario, *Storia dell'Urbanistica. Il Mondo Greco*, Roma-Bari, Laterza, 1983.

Greco Emanuele, *L'urbanistica neapolitana: continuità dell'antico,* in *Neapolis*, Zevi Fausto (Ed.), Napoli, Guida, 1994, pp. 35–36.

Gregory Timothy E., *Julian and the Last Oracle at Delphi*, «Greek, Roman and Byzantine Studies», 24 (1983), n. 4, pp. 355–366, available at https://grbs.library.duke.edu/index.php/grbs/article/view/5801 (accessed on 21/5/2024).

Grenfell Bernard P., Hunt Arthur S., *The Hibeh Papyri*, London, Oxford University Press, 1906.

Griffing Steven L., *The Golden Section: An Ancient Egyptian and Grecian Proportion*, Philadelphia, Xlibris US, 2007.

Gulbekian Edward, *The origin and value of the stadion unit used by Eratosthenes in the third century BC*, «Archive for History of Exact Sciences», 37 (1987), n. 4, pp. 359–363.

Guthrie Kenneth S., Fideler David R., *The Pythagorean Sourcebook and Library: An Anthology of Ancient Writings Which Relate to Pythagoràs and Pythagorean Philosophy*, Michigan, Phanes Press, 1987.

Haack Steven C., *The Astronomical Orientation of the Egyptian Pyramids*, «Journal for the History of Astronomy», 15 (1984), n. 7, pp. 119–125.

Hall Manly P., *The Secret Teachings of All Ages*, USA, Manly P. Hall Book, 2012.

Hamberg Gustaf, *Vitruvius, Fra' Giocondo and the city plan of Naples: a commentary on some principles of ancient urbanism and their rediscovery in the Renaissance*, «Acta Archaelogica», 36 (1965), pp. 105–125.

Haverfield, Francis J., *Ancient Town-Planning*, Hamburg, Clarendon Press, 1913.

Heiser Michael S., *The Unseen Realm: Recovering the Supernatural Worldview of the Bible*, Bellingham, Lexham Press, 2015.

Hofstetter Eva, *Sirenen im Archaischen und Klassischen Griechenland*, Würzburg, K. Triltsch, 1990.

Hoteit Aida, *Standards of Classical Architecture Criticism: Between Mathematics and Philosophy*, «Journal of Architectural Research and Development», 5 (2021), n. 2, pp. 1–20.

Huffman Carl, *Philolaus*, in the *Stanford Encyclopedia of Philosophy*, Stanford, 2020, https://plato.stanford.edu/entries/philolaus/ (accessed on 21/05/2024).

Hughes Jessica, Buongiovanni Claudio, *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, Oxford UK, Oxford University Press, 2015.

Incerti Manuela, *The urban fabric of Bologna: orientation problems*, in *Transformations of Urban Form: From Interpretations to Methodologies in Practice, the Sixth International Seminar on Urban Form,* Florence, 1999, pp. 3–12.

Isler Hans P., *Achelôos, Eine Monographie*, Bern, Verlag, 1970.

Kahn Charles H., *Pythagoràs and the Pythagoreans*, Indianapolis, Hackett Publishing, 2001.

Kepler Johannes, *Epitome Astronomiae Copernicanae* (1618–1621), in *Epitome of Copernican Astronomy and Harmonies of the World*, translated by Glenn Charles Wallis, Prometheus Books, 1995, book 4, sec. 1.2.

Lagopoulos Alexandros, *The semiotics of the Vitruvian city*, «Semiotica», 2009 (2009), n. 175, pp. 193–251.

Langella Elviro, *Omaggio a Renato Palmieri*, Napoli, Istituto Italiano Studi Filosofici, 2016.

Latini Ginevra, *Sibylla: Il Mito della Sibilla Cumana nelle Metamorfosi Ovidiane e in un Affresco di Ercolano*, Roma, Arbor Sapientie, 2019.

Lindsay Adams W., Borza Eugene N., *Philip II, Alexander the Great and the Macedonian Heritage*, Washington, University Press of America, 1982.

Liritzis Ioannis, Bousoulegka Evgenia, Nyquist Anne, Castro Belen, Alotaibi Fahad M., Androniki Drivaliari Androniki, *New evidence from archaeoastronomy on Apollo oracles and Apollo-Asclepius related cult*, «Journal of Cultural Heritage», 26 (2017), n. 4, pp. 129–143.

Livio Mario, *The Golden Ratio: The Story of Phi, the World's Most Astonishing Number*, New York, Crown, 2003.

Longo Fausto, Tauro Teresa, *Costruire la città: riflessioni sull'impianto urbano di Neapolis*, in *Dromoi: Studi del Mondo Antico Offerti a Emanuele Greco dai Suoi Allievi della Scuola Archeologica Italiana di Atene*, edited by Fausto Longo, Riccardo Di Cesare & Privitera Santo, Paestum, Pandemos - Paestum, 2016, pp. 189–212.

Longo Fausto, Tauro Teresa, *Alle Origini dell'Urbanistica di Napoli*, Paestum, Pandemos - Paestum, 2017.

Loomis Louise Ropes (translator), *The Book of the Popes* (*Liber Pontificalis*), New York, Columbia University Press, 1916, https://ia801907.us.archive.org/8/items/LiberPontificalis/Liber%20pontificalis.pdf (accessed on 21/05/2024).

Lycophron (3rd century BC), *Alexandra*, in *The Alexandra of Lycophron*, translated by George W. Mooney, London, G. Bell and Sons, 1921, v. 712–737.

Macrobius Ambrosius Theodosius (385 AD – 430 AD), *Saturnalia*, in *Macrobii Ambrosii Theodosii Saturnalia*, translated by R. A. Kaster, Oxford UK, Oxford University Press, 2011, c. 18, v. 9, https://digilibl.t.uniupo.it/xtf/view?query=;brand=default;docId=dlt000339/dlt000339.xml; (accessed on 21/05/2024).

Magli Giulio, *On the orientation of Roman towns in Italy*, «Oxford Journal of Archaeology», 27 (2008), pp. 63–71.

Magli Giulio, *Archaeoastronomy: Introduction to the Science of Stars and Stones*, Switzerland, Springer, 2015.

Mazza Luigi, *Plan and constitution - Aristotle's Hippodamus: toward an 'ostensive' definition of spatial planning*, «The Town Planning Review», 80 (2009), n. 2, pp. 113–141.

Mele Alfonzo, *Il commercio greco arcaico. Prexis ed emporìe*, Napoli, Publications du Centre Jean Bérard, 1979.

Mellace Marco, *Neapolis 3d Napoli greca in 100 foto v3.0 ricostruzione 3D*, 2023, https://www.youtube.com/watch?v=nElRlCZKZwU&t=104s (accessed on 21/05/2024).

Miletti Lorenzo, *The image of the classical Naples in Strabo's Geography and other ancient literary sources*, in *Remembering Parthenope: The Reception of*

Classical Naples from Antiquity to the Present, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 19–38.

Molinari Nicholas J., Sisci Nicola, *Potamikon: Sinews of Acheloios. A Comprehensive Catalog of the Bronze Coinage of the Man-Faced Bull, with Essays on Origin and Identity*, Oxford UK, Archaeopress, 2016.

Monticelli Teodoro, *Sull'Origine delle Acque del Sebeto, di Napoli Antica, di Pozzuoli*, Napoli, Stabilimento Tipografico Dell'Aquila, 1840.

de Mura Ettore, *L'Enciclopedia della Canzone Napoletana*, Napoli, Il Torchio, 1969.

Nassa Mario, *Cubulteria: Ragguagli sulla moneta attribuitagli e sul controverso simbolo del toro androprosopo*, 2010, https://online.fliphtml5.com/zochf/ufyk/ (accessed on 21/05/2024).

Nava Maria Luisa, *Piazza Nicola Amore – stazione Duomo: l'area del Tempio dei Giochi isolimpici*, «AttiTaranto», 47 (2008), pp. 855–857.

Nazzano Antonio, *The shape of Vesuvius before the 79 A.D. eruption according to a new finding from a Pompei fresco and Vesuvius central cone history in the last 2000 years*, «*Annali di Geofisica*», 42 (1999), n. 4, pp. 715–723.

Ogden Daniel, *A Companion to Greek Religion*, Singapore, Wiley-Blackwell, 2009.

Ovid (43 BC – 18 AD), *Metamorphoses*, translated by A. S. Kline, Poetry in Translation, 2000, book 5, v. 533–571, https://www.poetryintranslation.com/PITBR/Latin/Metamorph5.php (accessed on 21/05/2024).

Ovid (43 BC – 18 AD), *Metamorphoses*, translated by A. S. Kline, Poetry in Translation, 2000, book 14, v. 101–153, https://www.poetryintranslation.com/PITBR/Latin/Metamorph14.php (accessed on 21/05/2024).

Pagano Mario, *Una proposta di identificazione per il santuario di Demetra sull'acropoli di Cuma*, «Puteoli: studi di storia antica», 11 (1987), pp. 79–91.

Pais Ettore, *The temple of the sirens in the Sorrentine peninsula*, «American Journal of Archaeology», 9 (1905), n. 1, pp. 1–6.

Palmentieri Angela, *Marmora romana in medieval Naples*, in *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 120–151.

Palmieri Renato, *La chiave astronomica della fondazione di Neapolis: L'atto di fondazione di Partenope-Neapolis in una rêverie neoclassica*, «Corriere Partenopeo», 31 March 1990, http://web.rcm.napoli.it/clip/napoli1.htm (accessed on 21/05/2024).

Parker, H. W., *Sibyls and Sibylline Prophecy in Classical Antiquity*, New York, Routledge, 2014.

Paterculus C. Velleius (19 BC – c. AD 31), *The Roman History*, in *Velleius Paterculus and Res Gestae Divi Augusti*, translated by Frederick W. Shipley, Loeb Classical Library, 1924, book 1, par. 4, https://penelope.uchicago.edu/Thayer/E/Roman/Texts/Velleius_Paterculus/1*.html (accessed on 21/05/2024).

Pedicini Luciano, *Napoli*, Napoli, Electa Napoli, 1997.

Piccolo Paolo, *Dell'Origine e della Fondazione dei Sedili di Napoli*, Napoli, Luciano, 2005.

Planeaux Christopher, *The Athenian Calendar*, in thr *World History Encyclopedia*, 2015, https://www.worldhistory.org/article/833/the-athenian-calendar/ (accessed on 21/05/2024).

Plato (428-427 BC – 348-347 BC), *The Myth of Er*, in *The* R*epublic*, translated by Benjamin Jowett, New York, P. F. Collier & Son, 1901, book 10, http://www.ldysinger.com/@texts/0-03_plato/03_myth_er.htm (accessed on 21/05/2024).

Plato, *Laws*, translated by R. G. Bury, Cambridge (MA), Harvard University Press, 1967 & 1968, book 5, sec. 747, http://www.perseus.tufts.edu/hopper/text?doc=urn:cts:greekLit:tlg0059.tlg034.perseus-eng1:5.747 (accessed on 21/05/2024).

Plutarch (46 AD – 120 AD), *The Life of Artaxerxes*, in *The Parallel Lives by Plutarch*, translated by Bernadotte Perrin, Cambridge MA and London, Loeb Classical Library, 1923, https://penelope.uchicago.edu/Thayer/E/Roman/Texts/Plutarch/Lives/Artaxerxes*.html (accessed on 21/05/2024).

Plutarch (46 AD – 120 AD), *De Defectu Oraculorum* (The Obsolescence of Oracles), in *Moralia*, translated by F. C. Babbitt, Cambridge MA and London, Loeb Classical Library, 1936, book 5, pp. 347–501. https://penelope.uchicago.edu/Thayer/E/Roman/Texts/Plutarch/Moralia/De_defectu_oraculorum*.html (accessed on 21/05/2024).

Porphyry (234 AD – 305 AD), *Life of Pythagoràs*, in *Pythagoras Sourcebook and Library: An Anthology of Ancient Writings Which Relate to Pythagoras and Pythagorean Philosophy*, translated by Kenneth Sylvan Guthrie, USA, Phanes Pr, 1920, https://www.tertullian.org/fathers/porphyry_life_of_pythagoras_02_text.htm (accessed on 21/05/2024).

Pulighe Giuseppe, Baiocchi Valerio, Lupia Flavio, *Horizontal accuracy assessment of very high-resolution Google Earth images in the city of Rome, Italy*, «International Journal of Digital Earth», 9 (2015), n. 4, pp. 342–362.

Quaranta Renato, *Atlante-Guida della Napoli Greco-Romana*, Napoli, Intra Moenia, 2010.

Rescigno Carlo, *Cuma, il Tempio di Giove e la Terrazza Superiore dell'Acropoli*, Caserta, Osanna Edizioni, 2012.

Ricciotti Giuseppe, *La* «*Era dei Martiri*», Milano, Mondadori, 1962.

Riedweg Christoph, *Pitagora: Vita, dottrina e influenza,* Vita e Pensiero, Milano, 2007.

Ruotolo Giuseppe, *Corpus Nummorum Rubastinorum*, Bari, Edipuglia, 2010.

Russo Flavio, *Sebeto. Storia del Controverso Fiume di Napoli*, Torre del Greco, ESA, 2012.

Sambon Arthur, *Le Monnaies Antiques d'Italie*, Paris, Bureaux du «Musée», 1903.

Sanchez Giuseppe, *La Campania sotterranea e brevi notizie degli edificii scavati entro roccia*, Napoli, 1833, book 13, reprinted in *Napoli Antri e Misteri (Costellazioni, Sirene, Oracoli e Sibille nella Campania delle Origini)*, Napoli, Stamperia del Valentino, 2012.

Scafetta Nicola, Mazzarella Adriano, *The city of the Sun and Parthenope: classical astronomy and the planning of Neapolis, Magna Graecia*, «Journal of Historical Geography», 65 (2019), n. 7, pp. 29–47.

Seneca Lucius Annaeus the Younger (4 BC – 65 AD), *Naturalis Quaestiones*, in *Physical Science in the Time of Nero*, translated by John Clarke, London, MacMillan and Co., 1910, book 2, c. 32, pp. 79–81.

Sheard, K. M., *Llewellyn's Complete Book of Names*, Woodbury, Llewellyn Worldwide Ltd, 2011.

Smith William, *Cumae*, in *Dictionary of Greek and Roman Geography*, LLD. London, 1854.

Sparavigna Amelia Carolina, *Roman towns oriented to sunrise and sunset on solstices*, «SSRN», (2016), n. 2777118, pp. 1–6.

Stanley Thomas, *Pythagoràs: His Life and Teachings*, Lake Worth FL, Ibis Press, 2010.

Statium Publius Papinius (1st sec. AD), *Silvae*, translated by A. S. Kline, Poetry in Translation, 2012, book 3, c. 5, v. 78–80 («*...Of Parthenope; the Siren, borne there by the sea, guided to a gentle land, by Venus' dove, sent by Apollo himself...*»),
https://www.poetryintranslation.com/PITBR/Latin/StatiusSilvaeBkIII.php (accessed on 21/05/2024).

Statium Publius Papinius (1st sec. AD), *Silvae*, translated by A. S. Kline, Poetry in Translation, 2012, book 4, c. 8, v. 47–49 («*...and you, Apollo, guide to a far-wandering people, whose dove on your left shoulder fortunate Eumelus, Parthenope's father, fondly eyes and adores;...*»), https://www.poetryintranslation.com/PITBR/Latin/StatiusSilvaeBkIV.php (accessed on 21/05/2024).

Stern Jacob, *Palaephatus,* in *On Unbelievable Tales: Palaephatus Peri Apiston*, edited by Jacob Stern, Wauconda, Bolchazy Carducci, 1996.

Stothers Richard B., Rampino Michael R., *Volcanic eruptions in the Mediterranean before A.D. 630 from written and archaeological sources*, «Journal of Geophysical Research», 88 (1983), n. B8, pp. 6357–6371.

Strabo (c. 64 BC – after 21 AD), *Geography*, translated by. H. L. Jones, Harvard University Press, Loeb Classical Library edition, 1923, book 5, c. 4.4, https://penelope.uchicago.edu/Thayer/e/roman/texts/strabo/5d*.html (accessed on 21/05/2024).

Strabo (c. 64 BC – after 21 AD), *Geography*, translated by. H. L. Jones, Harvard University Press, Loeb Classical Library edition, 1923, book 9, c. 3, https://penelope.uchicago.edu/Thayer/E/Roman/Texts/Strabo/9C*.html (accessed on 21/05/2024).

Summonte Giovanni Antonio, *Historia della Città e Regno di Napoli*, Antonio Bulifon, Napoli, 1601, book 1, c. 2–3, pp. 3–32. https://books.google.it/books/about/Historia_della_citta_e_regno_di_Napoli.html (accessed on 21/05/2024).

Taylor Rabun M., *River raptures: containment and control of water in Greek and Roman constructions of identity*, in *The Nature and Function of Water, Baths, Bathing and Hygiene from Antiquity Through the Renaissance*, edited by Cynthia Kosso & Anne Scott, Boston, Brill Academic, 2009, pp. 21–42.

Taylor Rabun M., *The Temple of the Dioscuri and the mythic origins of Neapolis*, in *Remembering Parthenope: The Reception of Classical Naples from Antiquity to the Present*, edited by Jessica Hughes & Claudio Buongiovanni, Oxford UK, Oxford University Press, 2015, pp. 39–63.

Taylor Rabun M., *The early coinage of Neapolis*, in *Ancient Naples: A Documentary History Origins to c. 350 CE*, edited by Rabun M. Taylor, New York, Italica Press, 2021, pp. 85–112.

Taylor Rabun M., *The Greek City: From Parthenope to Neapolis*, in *Ancient Naples: A Documentary History Origins to c. 350 CE*, edited by Rabun M. Taylor, New York, Italica Press, 2021, pp. 31–84.

Terullian, *De spectaculis*, 197–202 AD, in *Ante-Nicene Fathers*, edited by Alexander Roberts, James Donaldson & A. Cleveland Coxe, translated by S. Thelwall, Buffalo (NY), Christian Literature Publishing Co., 1885, https://www.newadvent.org/fathers/0303.htm (accessed on 21/05/2024).

Thesleff Holger, *Pythagoreanism*, in *Encyclopedia Britannica*, 12 Jan. 2024. https://www.britannica.com/science/Pythagoreanism

Titus Livius (59 BC – 17 AD), *Ab Urbe condita libri CXLII*, translated by Mauritius Mueller, W. Weissenborn. H. J. Müller, Leipzig, Teubner, 1884, books 21-30, https://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.02.0171 (accessed on 21/05/2024).

Tobias Dantzing, *Number: the Language of Science*, New York, Macmillan, 1930.

Vinassa de Regny Paolo, *Dante e il simbolismo Pitagorico*, Milano, Fratelli Melita, 1988.

Virgil (70 BC – 19 BC), *Aeneid,* translated by A. S. Kline, Poetry in Translation, 2002, book 6, v. 1–55, ('You'd have shared largely in such a work, Icarus, if grief had allowed, he'd twice attempted to fashion your fate in gold, twice your father's hands fell.'), https://www.poetryintranslation.com/PITBR/Latin/VirgilAeneidVI.php (accessed on 21/05/2024).

Virgil (70 BC – 19 BC), *Georgics*, translated by A. S. Kline, Poetry in Translation, book 4, v. 559–566, ('Then was I, Virgil, nursed by sweet Parthenope,...'), Poetry in Translation, 2002, https://www.poetryintranslation.com/PITBR/Latin/VirgilGeorgicsIV.php (accessed on 21/05/2024).

Vitruvius, *De Architectura*, in *Vitruvius Ten Books on Architecture*, translated by Ingrid D. Rowland & Thomas N. Howe, Cambridge, Cambridge University Press, 2001.

Wittmann A., *The Obliquity of the Ecliptic*, «Astronomy and Astrophysics», 73 (1979), pp. 129–131.

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The city of the sun and Parthenope: classical astronomy and the planning of Neapolis, Magna Graecia

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ABSTRACT

This paper investigates what may have been the cosmological and religious inspirations for the plan of the city of Parthenope-Neapolis (the historic centre of Naples, Italy), which was founded in the early fifth century BC by Greek colonists. Neapolis anticipated the strict orthogonal Hippodamian street grid plan. We argue that its geometry and geographical orientation was chosen so that Neapolis could be recognized as the city of *Helios/Apollo* (the sun-god of the Greeks) and *Parthenope*, the deified royal ancestor and/or the siren after whom the city was named. In fact, Neapolis's streets were cosmologically oriented using a sixteen-rayed hexadecagram geometry to emphasize Apollonian/solar cults. The city was also planned using a Pythagorean decagram/pentagram design with golden section proportions and inscribed geometries to symbolize the Harmony of the Spheres. These geometries were apparently inspired by the specific paths of the sun seen from the city on the solstices. Moreover, a sort of celestial light show on the spring and autumn equinoxes connected the sun, the Somma-Vesuvius volcano complex, Sant' Elmo hill, the constellations of *Taurus*, *Virgo/Parthenos* and *Aquila* with the cult of Sebethos and Parthenope, the parent gods of Neapolis. Finally, Vitruvius's ideal city design appears to indicate that the novel and advanced planning of Neapolis served as a prototype for subsequent Greek and Roman cities.

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Highlights

- Investigates the cosmological-religious inspirations for the street plan of the city of Neapolis, Magna Graecia.
- Determines that Neapolis's streets were arranged according to hexadecagram, decagram and pentagram geometries.
- Argues that the city's orientation was determined by the sun's paths on equinoxes and solstices.
- Provides evidence that the city's orientation also served to emphasize the cult of Parthenope.
- Suggests the influence of a Pythagorean Apollonian sun-centred cosmology on the city's plan.

The author

Nicola Scafetta graduated in Physics from the University of Pisa and obtained a PhD in the same field from the University of North Texas in 2001. From 1998 to 2014, he carried out scientific research in the USA in the Physics Departments of the following centres: the University of North Texas, Duke University, the University of North Carolina in Chapel Hill, the University of North Carolina in Greensboro, and Elon University. At the above locations, he also held courses in physics and astronomy. Moreover, he was a member of NASA's associated Active Cavity Radiometer Irradiance Monitor (ACRIM), which focuses on the study of solar radiation. He is currently a Professor at the Department of Earth, Environmental and Resource Sciences of the University of Naples Federico II in the disciplinary sector GEO/12 (Physics of the Atmosphere and Oceanography). He is the author of several monographs and of more than 160 scientific articles published in international journals. His studies focus mainly on complex systems and statistical physics, with applications to climatology and the interaction between solar variability and climate. He has also authored works on biophysics, econophysics, sociology, and archaeoastronomy.

Society of Naturalists in Naples

In November 1881 a group of university students established the Club of Aspiring Naturalists which in 1885 began to publish the Rivista Italiana di Scienze Naturali. Since 1887 the association assumed its current name of Society of Naturalists in Naples and the name of the magazine changed to Bulletin of the Society of Naturalists in Naples. The Society's task has always remained the same: to contribute to the progress of Natural Sciences through all possible tools, such as publications, conferences, debates, excursions, and explorations.

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in Napoli

Cavoliniana, 5

This essay delves into the most intimate secret of Naples through an archaeoastronomical inquiry. It demonstrates that religious and philosophical motivations were central to the urban planning of its ancient Greek centre, Neapolis, constructed in the 6th-5th centuries BC by Cumaeans and other Greek colonists. The design of the city's streets and its distinctive geographical-astronomical orientation evoked the cults of Apollo (the Greek Sun-god) and Parthenope (the local Numen, who reminds the mythical Sibyl of Cumae) on solstices and equinoxes. Neapolis' street grid was also inspired by Pythagorean cosmology, as it was designed with golden ratio and decagonal proportions. These elements combined to make Neapolis a perfect microcosm, or better yet, a temple-city centred on the cult of the Sun and Parthenope. Finally, the city's religious traditions likely increased the public impact of the martyrdom of Saint Januarius, facilitating the Christianization of Naples in the 4th century AD. Naples' ancient streets, culture, and Cathedral still preserve the legacy of Neapolis' solar traditions in their geometries, symbols, hymns, sweets, mosaics, and relics.

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