The Agora of Asia Minor: the shaping of the non-material by the material in urban space

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Materiality to the Milesians was the ultimate state of being. To be was to be material and matter was the complete key to the nature of things. The Pythagoreans however, thought that mathematics and formulas could be applied to explain everything in the physical world and some tried to build the physical world out of spatial points. This article proposes to investigate the agora of Asia Minor, the birthplace of Milesian materiality, by considering the material, geographical motivation for its creation and ultimate demise, by investigating the abstract ratios and figures of non-material space as shaped by material form and structure and by commenting on Greek spatial intention. It further aims to offer a Pythagorean corrective to Milesian materialism through sensitivity to order and form.
Key words: Milesian materialism, Pythagorean formulas explaining matter, urban spatial ratios, urban squares

Die Agora van Kleinasië: die vorming van die nie-materiële deur die materiële in stedelike ruimte
Materialiteit was vir die Milete die uiteindelike wesenstoestand. Om te wees was om materieel te wees en materie was die volledige sleutel tot die aard van dinge. Die Pythagoreane het egter gedink dat wiskunde en formules toegepas kon word om alles in die fisiese wêreld te verduidelik en sommiges het probeer om die fisiese wêreld uit ruimtelike punte te bou. Hierdie artikel neem voor om die agora van Kleinasië, die geboorteplek van Miletiese materialiteit, te ondersoek deur die materiële, geografiese motivering vir sy skepping en uiteindelike verval in ag te neem, deur die abstrakte verhoudings en figure van die nie-materiële ruimte te ondersoek soos wat dit deur materiële vorm en struktuur gevorm word en en deur kommentaar te lewer oor Griekse ruimtelike bedoeling. Dit beoog verder om 'n Pythagoreaanse korrektief tot Miletiese materialisme aan te bied deur sensitiwiteit tot orde en vorm te skep.
Sleutelwoorde: Miletiese materialisme, Pythagoreaanse formules om materie te verduidelik, stedelike ruimtelike verhoudings, stedelike pleine

The concept of materiality first originated over two and a half thousand years ago in Miletus, which was a bustling harbour town on the west coast of Anatolia in modern day Turkey. The first evidence of settlement stems from the Neolithic times, but since around 1000BC Ionian Greeks resettled there under Neileos, making it the first settlement of the East Ionian grouping of the Hellenic civilization and an important city that endured past the time of the Roman Empire. When choosing a site for a settlement the ancient Greeks considered all the geographical elements of hillside, river, defence, natural hazards and human enemies. Geography affected every step of daily life in ancient Greece. The tides, the stars and the hills were objects of importance that required close attention (Brumbaugh 1970: 9).

The material: geography

The site of Miletus was located near Monondendri and Mount Mykale where the founder Neileos performed the first religio-political act by erecting shrines to Poseidon and Demeter respectively. The main shrine of Athena was intimately connected to the inland Apollo and Artemis shrines of the nearby Branchidae-Didyma sanctuary that predates the founding of Miletus. The favourable geography was an important reason for settling in Miletus and as such

included access to the Aegean, the protected bay, surrounding mountains and proximity to the Greek mainland and it was an ideal trading location relative to the existing Anatolian societies. The city became one of the traditional twelve Ionian cities, with Priene and Myus on the other sides of the protected bay. Ironically, the geography that prompted settlement around the bay also caused the ultimate demise of these cities. The Meander River ran into the eastern part of the bay where its mouth created a delta carrying alluvium into the gulf. Although Miletus was once one of the most famous ports of the Classical world with its harbour at the southern entry of the large bay, the gulf silted up over the centuries and by the Roman era both Priene and Myus lost their harbours and by the early Christian era Miletus itself became an inland town. All three cities were abandoned to ruin as their economies were strangled by the lack of access to the sea.

Figure 1 shows the location of Miletus, Priene and Myus along the ancient bay. The Meander River mouth to the east of the bay caused the marooning of these cities by the alluvial delta. The map shows the evolution of silting in the Miletus bay by comparing the approximate antique shorelines of the Hellenistic and Roman periods with the shoreline of late antiquity and the current shoreline. The map also shows Samos, the birthplace of Pythagoras, on Samos Island to the west. Ephesus is 30km north of Priene. (In this article the English names of towns Miletus, Myus and Ephesus will be used to conform with source material, and not the original Hellenic Miletos, Myos and Ephesos in which they were founded.)

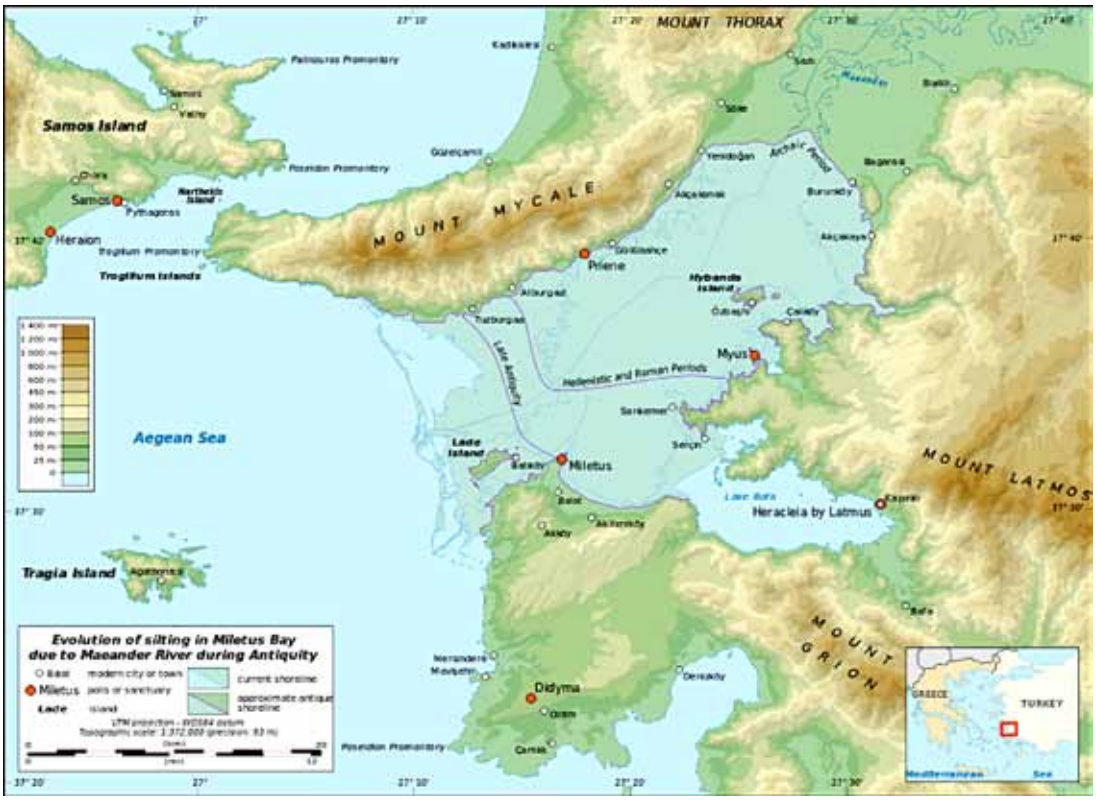

Figure 1
Evolution of silting in Miletus bay
(source: http://en.wikipedia.org/wiki/Miletus).

Before materialism

In the pre-atomist Greek world, the Greek dark ages, mythology was still the only method available to record history or explain nature. The mythological world was an anthropomorphic world. When Greek philosophy began it took its origin from a world in which there was no

accurate history, no science, no pure mathematics and the distinction between mind and matter, subject and object, animate and inanimate things, miracles and natural causes did not exist. Instead of history there was a body of legends, instead of science there was nothing at all (Brumbaugh 1970: 5).

The ideas of matter, physics, science and philosophy had to be discovered and to be discovered, mythology had to be abandoned. Philosophy is the attempt to find a single system of reality that will synthesise and hold together the many facets of our specialised knowledge and specialised social structure (*ibid*, 11, 13).

Milesian materiality

In the 6th century BC, Miletus was the site of origin of the Greek philosophical and scientific tradition, when Thales, followed by Anaximander and Anaximenes (known collectively, to modern scholars, as the Milesian School) began to speculate about the material constitution of the world, and to propose speculative naturalistic (as opposed to traditional, supernatural) explanations for various natural phenomena.

Thales and Anaximander were the first to discover a new world of natural science and philosophy but they were still bound by ancient mythological ways of thought. The psyches of Thales and the goddess Dike of Anaximander were responsible for change in the world. Anaximenes, the third philosopher from Miletus, broke through this last trace of myth. He discovered that change in nature could be explained mechanically (Brumbaugh 1970: 26). Anaximenes thought that all change was the result of changes in density brought about by condensation and rarefaction. This new idea gave scientists experiments, models and physical explanations of change and their cause, which is still our way of thinking. He believed that change and collision kept the system shifting (*Ibid*, 27). His system of nature needed no souls or deities but only matter in motion. This spinning world remained the key model for astronomy and natural philosophy through the following ten centuries.

Hippodamus of Miletus, the father of city planning

The art of town planning in Greece probably began in Athens but the architect to whom ancient writers ascribe the first step was Hippodamus of Miletus (c. 407 BC) who has been dubbed the "Father of City Planning" (Haverfield 1913: 10). He seems to have worked in Athens and in connection with Athenian cities, under the auspices of Pericles. Aristotle tells us that Hippodamus planned Piraeus, the port of Athens (figures 2 and 3). The Hippodamian, or grid plan, was introduced for the first time in Piraeus and became the basis for subsequent Greek and Roman cities (Haverfield 1913: 10). A characteristic of Greek town planning was that the grid was often rigidly imposed over the topography, creating steep streets and steps. The site of the amphitheatre was typically chosen for its position on the slope of a hill so that only the seats had to be carved out.

According to Crouch (2004) the Greeks chose sites for their colonial towns that resembled the geological context of their native country, confident of their ability to adapt their familiar town-planning and water management practices to suit these conditions. The political organisation was one of city-states, a decentralised pattern that developed naturally and was well suited to the geography of the Greek mainland. On the coast of Asia Minor this provided a relatively unstable form of organisation. The cities of Asia Minor could not cooperate effectively enough

to avoid conquest one by one by Persia and the political histories of Samos and Sicily showed that at times there was a strong dictatorship, at others a rather loosely organised democracy (Brumbaugh 1970: 9-10).

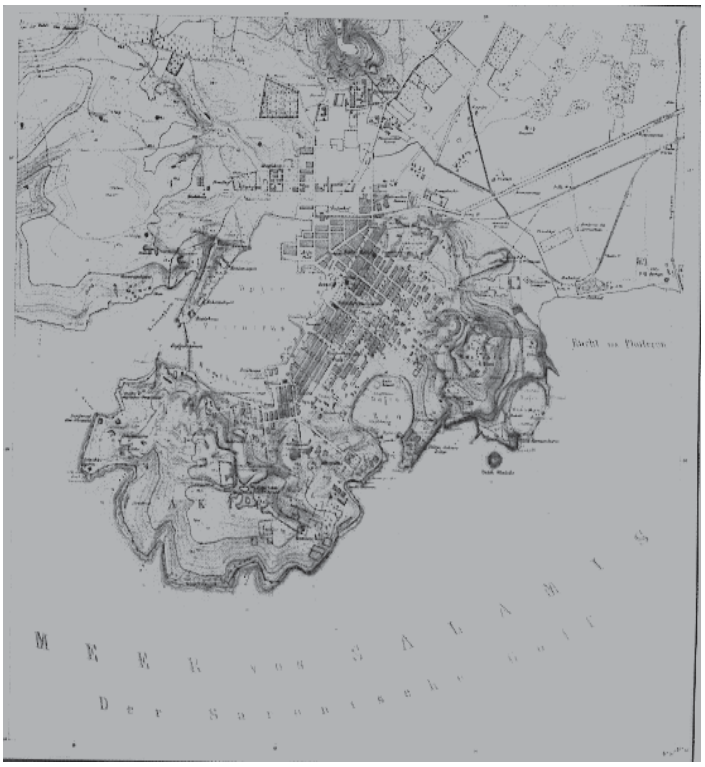

Figure 2
Map of Piraeus by Kaupert (1881)
(source: http://www2.rgzm.de/Navis2/Harbours/Athen/Piraeus/PiraeusAbb3.htm).

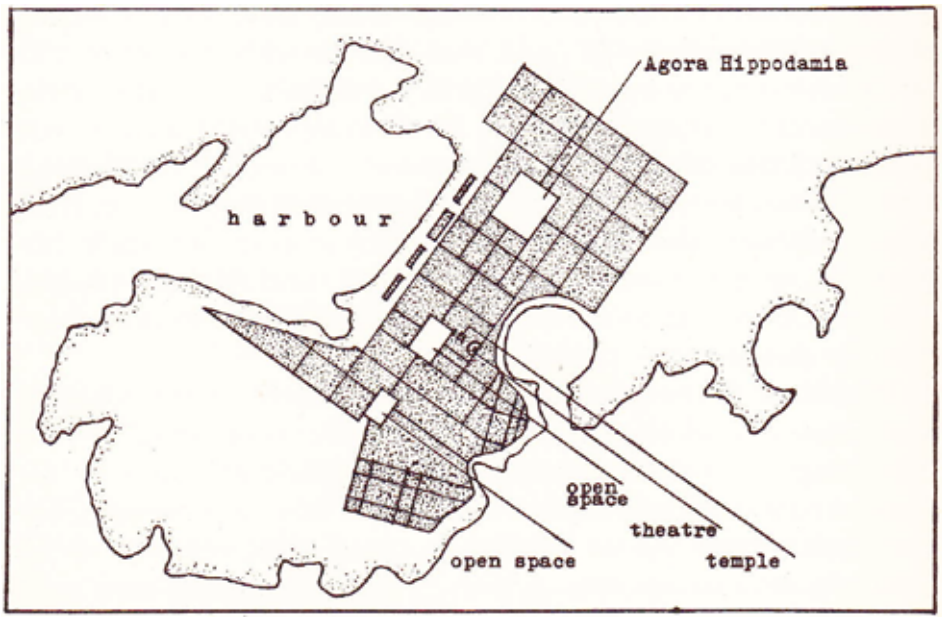

Figure 3

Piraeus after Milchhoefer
(source: Martienssen 1964: 26).

The great temples remind us that the colonists felt themselves poised on the edge of nowhere and tried to hold on and intensify the religion that they brought with them. Probably the sense of adventure on the frontier was a necessary component in the emergence of Greek science and philosophy.

The city wall, streets and houses all followed the grid. Aristotle and Hippocrates recommended that houses be built on south-facing slopes. The grid stepped to follow the slope. Public spaces and public buildings were created on levelled slopes.

The town plan of Priene (figures 4, 5 and 6) on Miletus bay has also been ascribed to Hippodamus. It is worth mentioning here because excavations have revealed the town plan without changes by later Roman interventions and it demonstrates how the Hippodamian grid was applied over the geology in the layout of a Greek colonial town (Haverfield 1913: 10). The grid is a rational (or cultural) construct and the Greeks copied the grid as design system, probably because it was what separated civilisation from barbarism. Haverfield (1913: 6) argues that ancient remains that show long straight lines or several correctly drawn right angles date from a more civilised age.

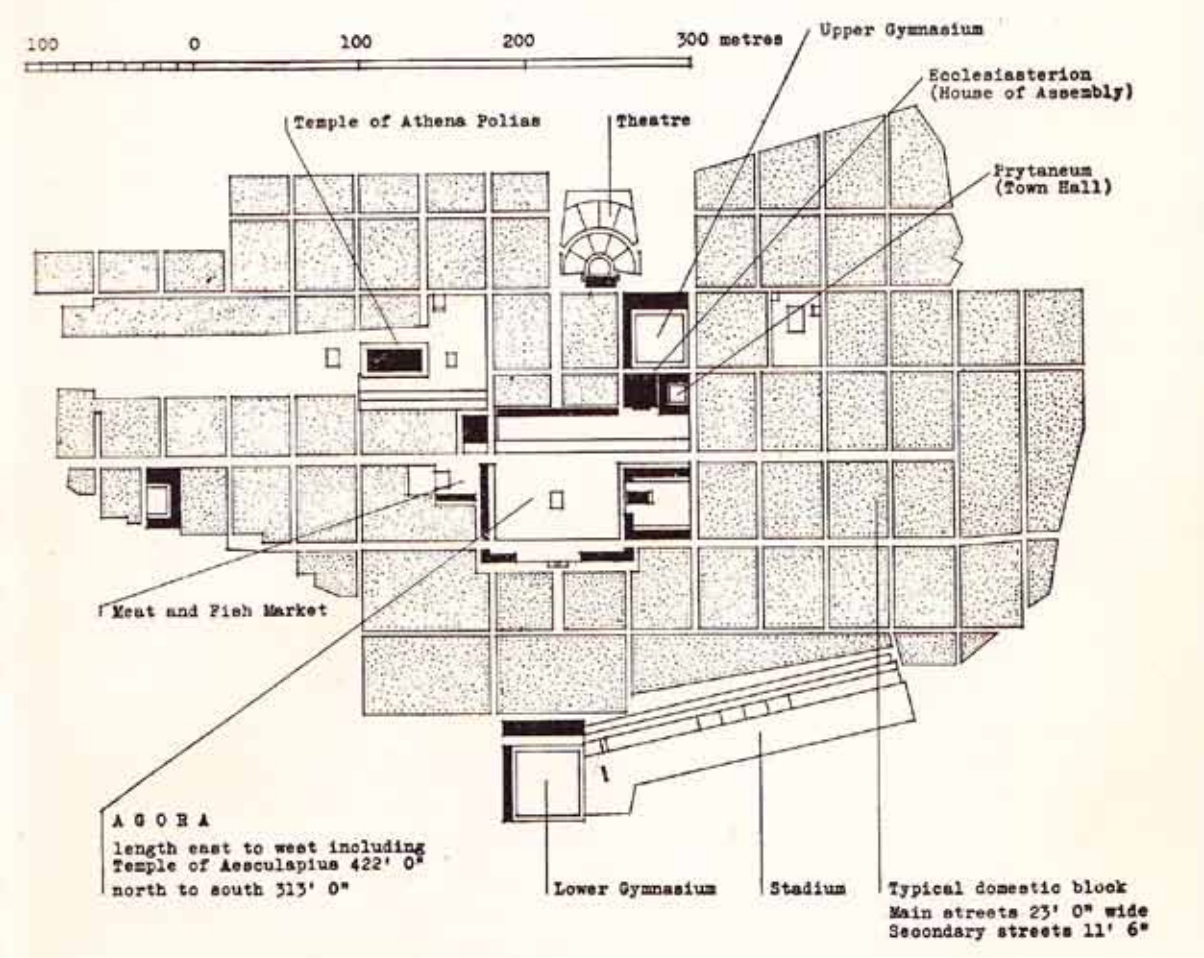

Figure 4
Plan of Priene
(source: Martienssen 1964: 39).

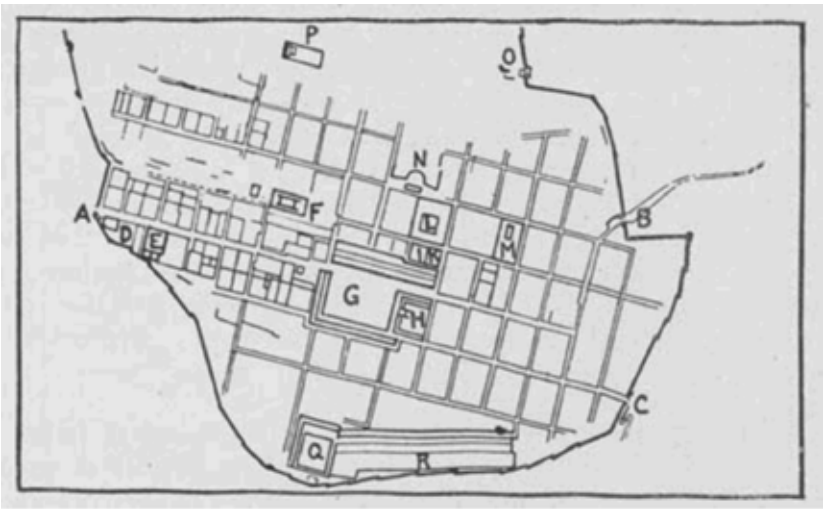

Figure 5
Priene, Asia Minor – a planned city from the 4th century BC. General outline of Priene: A, B, C. Gates. D, E, F, H, M, P. Temples, G. Agora, Market. I. Council House, K. Prytaneion. L, Q. Gymnasium. N. Theatre, O. Water-reservoir, R. Race-course
(source: Haverfield 1913: 16).

Figure 6
Priene, Asia Minor –The grid street plan was laid out across a hill, and all buildings were aligned accordingly
(source: Haverfield 1913: 16).

In a similar vein Bergquist (1967: 1-2) comments on modern surveys of early Greek sanctuaries that are described as irregular and disordered, if not chaotic, accidental and plan-less, because they do not follow a strict rectangular grid. "There exists a strong tendency to label a not strictly geometric arrangement as irregular and irrational, unplanned and accidental." Although she believes that these descriptions are erroneous, she continues to provide examples of the change that *temene* (temple complexes) have gone through from early to late Archaic times. In the early Archaic examples there seemed to be a lack of intention and structures were isolated with no orthogonal relations either to each other or to the enclosure. Middle Archaic examples were planned and composed by orthogonal means although it was not too strictly applied and in late

Archaic examples there was a clearer composition, although it was still not achieved through consistent and systematic relations. Bergquist touches on intention, which will be investigated later in the article (1967: 1-2). Whether the early *temene* were planned or not, there is no doubt that the Hippodamian grid in town planning was a design system. And from there sprouts the agora, on which this article will focus. If temple complexes often had irregular shapes, the agora invariably was rectangular, although in early times the agora was an irregularly shaped area at the intersection of important streets. It was only in the growth of the corporate idea of a city that it assumed formality. This formal agora had its origin in Ionia and was introduced into Greece by Hippodamus. The agora was placed centrally in the city plan, although in the case of seaports the agora was usually situated near the harbour.

Figure 7 shows the Hellenistic town of Miletus, with its Hippodamian grid and three agoras (south, west and north). The north agora was near the harbour, the favourable geography determining its location.

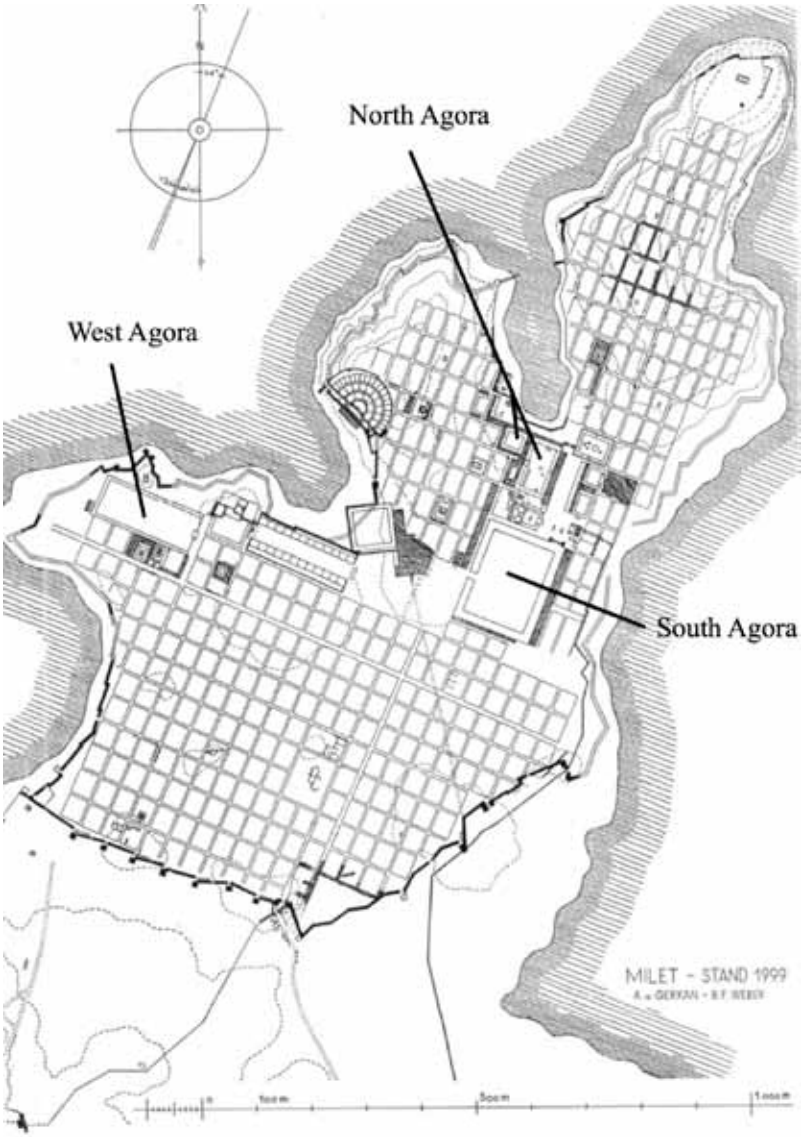

Figure 7
Plan of Miletus after von Gerkan, notes by Author
(source: http://www.travellinkturkey.com/aegean/miletus/miletus-plan.jpg).

The public square (agora)

Historically, public places have played an important role in cities in many cultures. Public spaces such as the Greek agora provided a place for markets, celebrations and civic life to flourish. The agora in ancient Greece was a central spot in city-states. The word literally means 'gathering place' or 'assembly'. It was the centre of athletic, artistic, spiritual and political life of the city. The best know example is the agora of Athens, which was also the birthplace of democracy.

In Hellenistic times there were two types of agoras: i) Assembly places where rulers' proclamations were heard and ii) meeting places for public or private business transactions. The initial political function was modified in time into an economical one but at all times it remained a place of pleasure and recreation, sometimes criticised by politicians and philosophers as an abuse of the space.

It consisted of a large, open, rectangular or trapezoidal area, surrounded by *stoai*. The *bouleuterion* and *prytaneum* were often grouped in the vicinity. The commercial agora was surrounded by shops and stalls (Martienssen, 1964: 31).

Martienssen (1964: 3) describes the horizontal plane as the first essential in any system of formal arrangement that tended to embrace the activities of organised or collective life. He argues that human beings' sensory equipment demands the visual stability, which level surfaces offer. "The plane surface is a deliberate structural means to negate the irregularity of existing topographical conditions. Even primitive dwellings have level forecourts where the ground has been beaten to a hard platform, which not only performs a practical function but also satisfies the intuitive demand for repose. In antiquity a more permanent and durable treatment of level surfaces was achieved by laying large stone slabs, which also satisfied the requirements of geometric accuracy."

Pythagorean mathematics

One of the things that Western thought owes to the Pythagoreans is the awareness that form and structure give things their individual identities (Brumbaugh, 1970: 30). The concept of form and the Greek word *eidos*, which finally came to express that concept, have a complicated history. At first *eidos* meant the look of a thing or the face. In mathematics *eidos* was a near synonym for schema or shape and referred to the mathematical structure. The idea of good form was important in athletics and dancing to suggest that form is a standard of value. Plato and Aristotle tried in different ways to bring these two senses of form, the mathematical and the ideal, together (Ibid, 31).

That numbers are things extends the notion of reality well beyond the Milesian idea that to be is to be material (Ibid, 31). They discovered that mathematical formulas can be applied to explain the physical world and from this discovery they generalised to the philosophic thesis that the ultimate nature of reality is mathematical. Just as the Milesians thought that matter was the complete key to the nature of things, the Pythagoreans thought that mathematics was the whole of philosophy. These two suggestions challenged subsequent Greek philosophers to reconcile the claims of both form and matter as the constituents of reality. They were curious about the nature of number and figure as such and this curiosity was needed to discover that numbers, figures and relations have a reality of their own and to the philosophical doctrine that numbers are things. The Pythagoreans found that they could think about shapes in the same way (Ibid, 32).

Much of the new Pythagorean mathematics was impure: it still depended strongly on pictures and imagination. Numbers had shapes and even personalities. Like the concept of matter in the Milesian school, the concept of numbers had to develop from intuition and postulation (Brumbaugh 1970: 33). Both the notion that nature prefers symmetry (Pythagoras was a gem-engraver) and that qualitative differences, such as those between earth and fire, might be explicable by particles differing in shape, could be dated as early as Pythagoras himself and find some experimental support (*ibid*, 217). The Milesians had recognised the sphere of physical reality and in addition thereto the world of numbers has real relevance to human interests and problems, since these abstract ratios and figures give science the tools it needs for understanding nature. The mixture of imagination and abstraction made it easy to also link numbers with shapes and objects. Some members of the Pythagorean School tried to build the physical world out of spatial points (Brumbaugh 1970: 34). Each number had its own personality, masculine or feminine, perfect or incomplete, beautiful or ugly.

The importance of right proportion had been a central theme in Greek architecture (Brumbaugh 1970: 38). There was no limit to the power of number and ratio to penetrate the innermost nature of things. Pythagorean order had three aspects: political, religious and ethical (*ibid*, 39). The Pythagorean political ideal was small communities with common property, women were given equal opportunities and education, and interest in music and mathematics was shared as part of regular social life. Admission to the order was selective on the basis of intelligence and character. But Pythagorean policies ran counter to other powerful parties and Pythagorean communities were wiped out. Pythagoras thought that the study of mathematics and music was the best way of achieving harmony of soul and purification, thus breaking with traditional religion. The ethics that he taught, centred around and the idea of harmony in the soul. A good soul has a proper order among its impulses and standards of value and the aim of education was to instil a love of harmony (*ibid*, 41). We become harmonious persons through appreciation of and contact with the beauties of music, the orderly abstractions of mathematics and the concrete sublime system of the stars. The common presence of harmony and order was criteria for truth and beauty in both the natural and the human sphere. The conquest of pure mathematics gave the West its most valuable tool of explanation. To philosophy their new sensitivity to order and form offered a corrective to Milesian materialism (*ibid*, 42).

This article proposes to connect philosophy with physical reality. The material constitutes the build environment but it is the abstractions of mathematics, the power of ratio and number, measurable scale, geometry and proportion that provides harmony and relation between the solids, as was so passionately advocated by the Pythagoreans.

Change according to Heraclites

Heraclites was born in 353 BC in Ephesus, modern day Turkey, on the coast of Asia Minor. He called the Immortal Principle fire and introduced change and motion as part of this principle. He said the world exists as a conflict and tension of opposites (Pirsig 1974: 372). Central to Heraclites's writings was the ever-living restless fire, *pyr*, which added a new dimension to philosophy. It was neither simply Milesian material stuff (the material nature of *aer* was not yet established), nor was it simply a symbol for incessant transformation. The living fire that supplies the driving force of a universe in endless change is a physical cause, at the very least (Brumbaugh 1970: 48). Perhaps the simplest way of explaining it is to say that Heraclites was trying to express both the tensions that lead to harmony and the tremendous energy that flows through reality in his fire imagery. It is energy and not matter that is important to him (*ibid*, 49).

Today we can recognize as a genuine possibility a process philosophy in which physical reality is not matter, but power (*ibid*, 49). When reason becomes enchanted by mechanical models or mathematical maps and forgets the concrete fact of change, the strife and individuality, the stuff of our experienced world, is forgotten. Heraclites, like his predecessors, began by looking for the one stuff underlying the changing world we observe all around us but he falls neither in the Milesian nor Pythagorean group. Reality for him consists of motion, process, power, strife and flow (*ibid*, 43). The Roman stoics thought that they were following Heraclites. They identified logos with God and combined materialism and pantheism, the view that all things are part of God (*ibid*, 46).

The agoras of Miletus

There were three agoras in Miletus: the North, South and West agoras (Figures 7 and 8). The North agora is the oldest of the three, dating back to the 5th century BC and became the main agora, located just south of the Harbour of Lions. The rectangular public square measured approximately 42m x 84m, thus with an x:y ratio of 1:2 and 90 degree angles. It was blocked to the east by a wall with a *propylon* or monumental gate in the centre giving access to the space from the Sacred Way, but this was later changed to shops and on the west there was a *peristyle* or open colonnade with shops (figures 9 and 10).

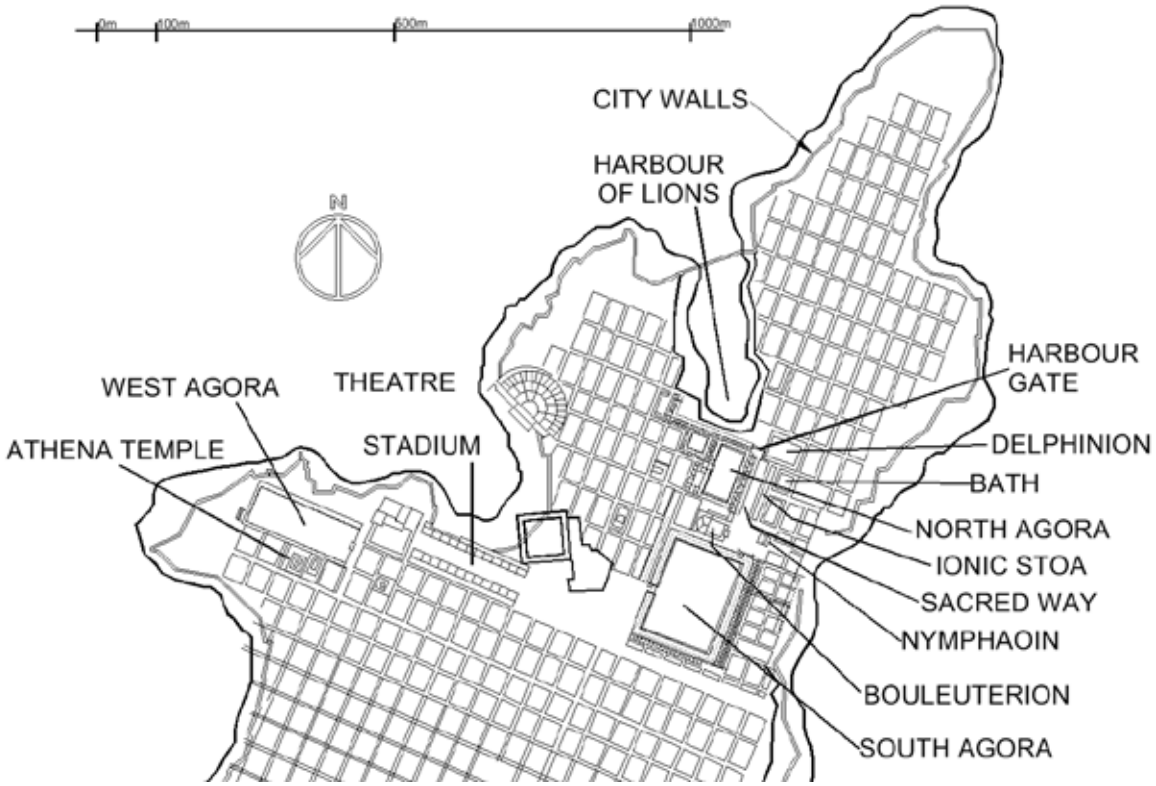

Figure 8
Plan of ancient Miletus
(source: drawing by author after http://www.ntimages.net/Miletus-harbor-stoa-agora-tns.htm).

Figure 9
North Agora, Miletus, model from Pergamon Museum, Berlin
(source: http://www.livius.org/a/turkey/miletus/miletus_model.JPG).

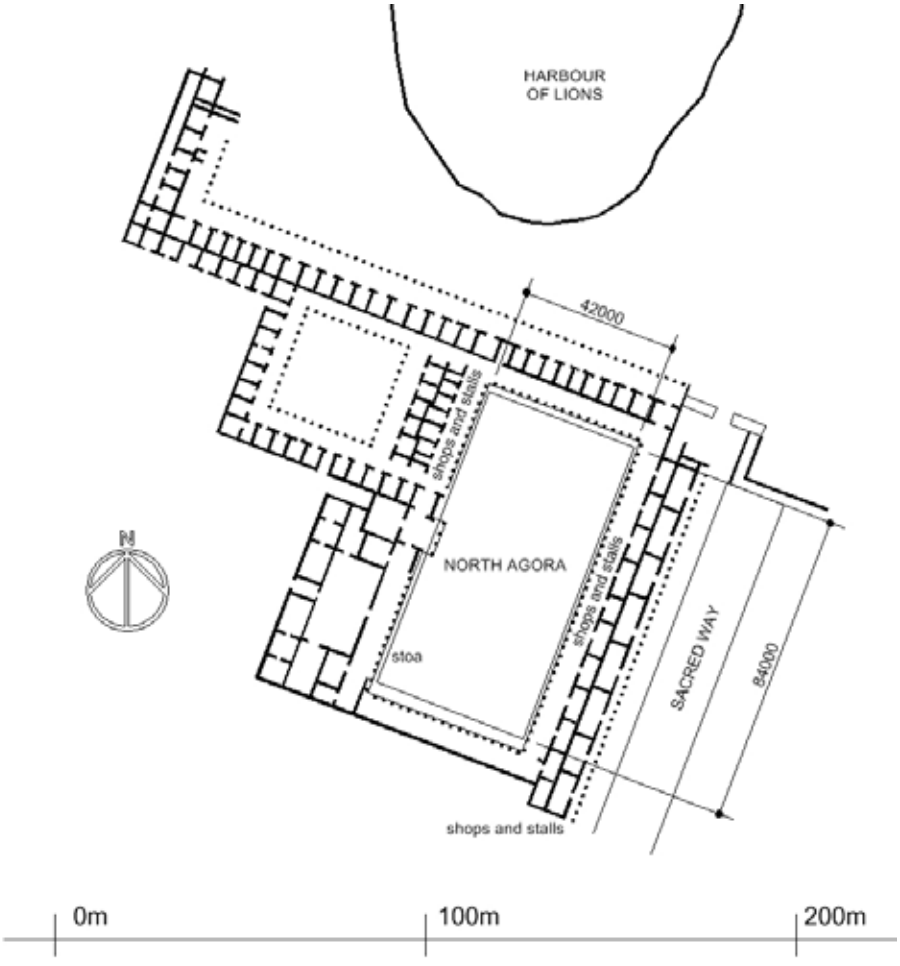

Figure 10
North Agora, Miletus
(source: drawing by author after http://www.fhw.gr/choros/miletus/en/photos.php).

Most Greek agoras that originated as gathering places later became market places, with merchants' stalls or shops amid the colonnades. From this twin function of the agora as a political and commercial space came the two Greek verbs *agorázō*, "I shop" and *agoreúō*, "I speak in public". The word agoraphobia, the fear of open spaces or public situations, derives from the meaning of agora as a gathering place. The *Prytaneion,* where the *prytaneis* or executive convened, was on the south-western corner. It was an important building in ancient Greek cities where official visitors were accommodated and officials met, similar to the seat of Government. The North Agora underwent several changes in the Hellenistic period. A Doric portico surrounded the sides of its open-air space and an Ionic temple was build at the centre of the western portico. In the Roman Period the open-air space of the Agora was defined by a two storey Ionic portico, thus increasing the height and on the eastern side a double row of rooms was added.

The South Agora (figure 11) dates from the 3rd Century BC and around 120 houses had to be demolished to create this planned public space to accommodate political, economic, religious and social events in the city. The open-air space measured 122m x 158.6m (x:y ratio 1:1.3 with 90 degree angles) and was one of the largest *agoras* in ancient Greece, surrounded with *stoai* and shops. Its east *stoa* measured one stadium long and consisted of a Doric colonnade of columns. Behind the colonnade and parallel to it stretched a series of three-room shops, which could be accessed both from the agora through the *stoa* and from the outside. Later a colonnade of Ionic and Corinthian columns was added to the interior of the single aisled *stoa*, turning it into a two-aisled *stoa*. Statues were placed in front of the interior colonnade. The north, south and west sides also had two-aisled *stoa* and the south wing also housed single-room shops with access from both sides. Entrance to the agora was through its west, south and north sides. The west gate was a simple opening near the centre of the west side and the south gate was on the south-eastern corner which, in Roman times, was a simple wide vaulted entrance. Up to the late Hellenistic times the north gate of the South agora consisted of a *stoa* with Doric columns and three gates, but in Hadrian's era (117-138AD) it was adorned with a monumental two storey *propylon*, which was regarded as such an important archaeological find, that the *propylon* was taken to Germany piece by piece, re-erected there and today forms part of the Pergamon Museum in Berlin (figure 12). The South Agora occupied the equivalent of sixteen *insulae*.

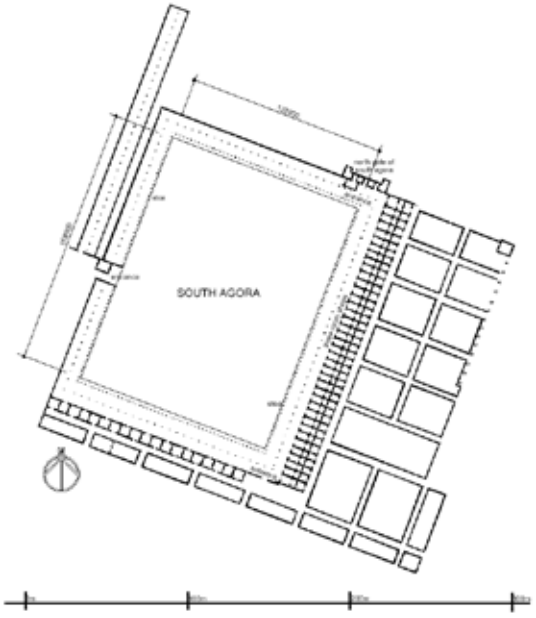

Figure 11
South Agora, Miletus
(source: drawing by author, after http://www.fhw.gr/choros/miletus/images/mil_notiaAgoraRoman1.jpg).

Figure 12
North Gate of South Agora, Propylon of Miletus, Pergamon Museum, Berlin
(source: http://commons.wikimedia.org/wiki/File:Market_Gate_of_Miletus.jpg).

The West Agora (figure 13) was built in the 2nd Century BC south of the theatre harbour and was the latest of the three agorae of Miletus. Measuring 180m x 60m (x:y ratio 3:1 with 90 degree angles) it consisted of a huge rectangular open space and was surrounded on three sides by a *stoa* or covered walkway with an Ionic colonnade. The entrance was on the east side, accessible through the *propylon* on the main axis of the square.

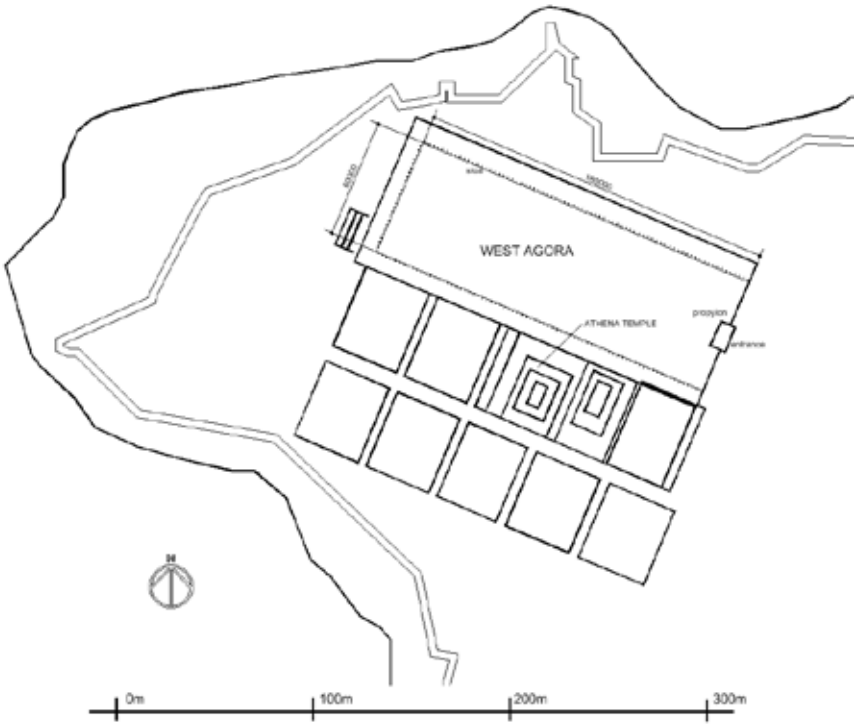

Figure 13
West Agora, Miletus
(source: drawing by author after http://www.fhw.gr/choros/miletus/images/mil_WestMarket1.jpg).

The agoras of Ephesus

There are two agoras in Ephesus (figure 14), the Commercial agora and the State agora. The Commercial agora is known as the square agora and measures 110m x 110m (x:y ratio 1:1 with 90 degree angles). It arose in the Hellenistic period, in the 3rd Century BC and was surrounded completely by columns, but the ruins date from the reign of Caracalla. There were three gates,

one from the front of the theatre on the northeast, one from the opening to the harbour on the west and the third from the Celsus library. The north side was left open and a portico with a row of shops inside surrounded the other three sides. It was the most important trade centre in Ephesus and had a water clock in the centre.

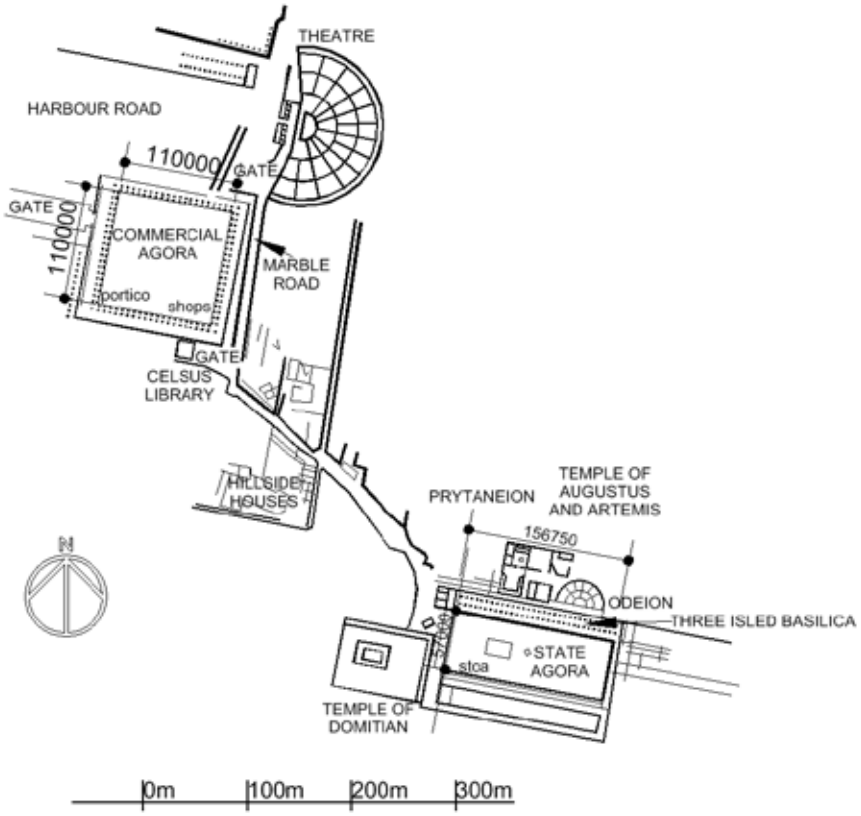

Figure 14
Ephesus plan
(source: drawing by author after http://www.kusadasi.tv/history-ephesus-turkey.html).

The State Agora's original design was also Hellenistic. During this first building phase, the complex's open-air square was bordered by simple *stoai* along the north and south sides. The agora as we see it today dates from Roman times, from the age of Augustus. The transformation from Hellenistic agora to Roman forum can be seen in the rectangular design (measuring approximately 156.750m x 57m, x:y ratio 2.75:1) and clearly defined edges. Along the northern side, from west to east, the *Prytaneion,* the temple of Augustus and Artemis and the *odeum-bouleuterion* were arranged. In front of these buildings there was a three-aisled basilica, which formed the complex's northern side (figure 14).

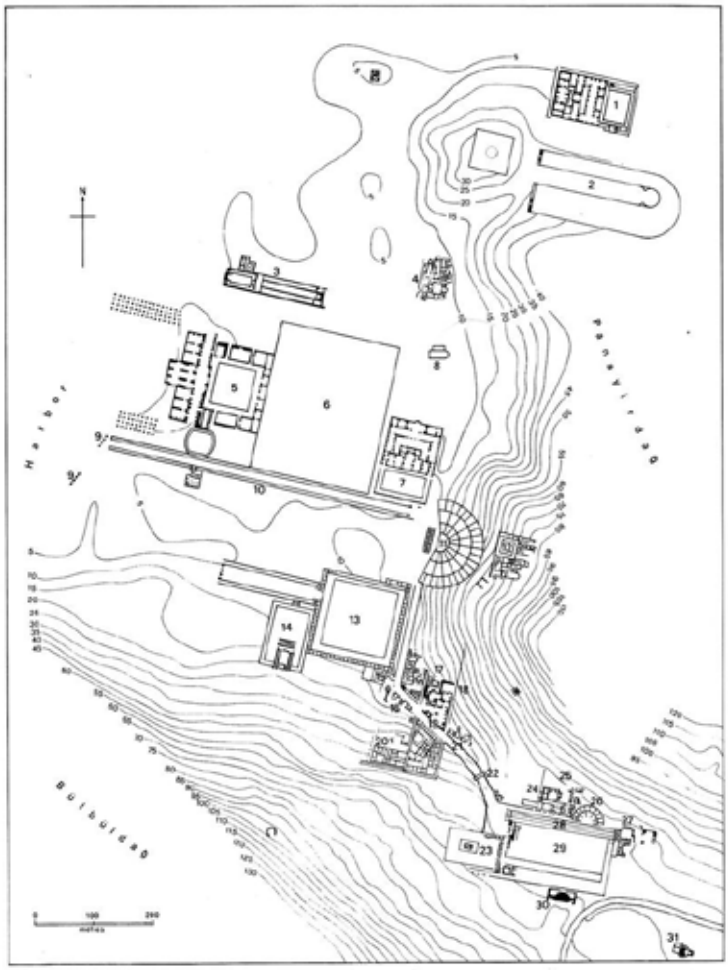

Fig. 12. Plan of late antique Ephesus. 1, Gymnasium of Vedius; 2, Stadium; 3, Church of St Mary; 4, Governor's Palace; 5, Baths of Constantius; 6, ruined Palaestra, eventually covered with houses; 7, Theater Gymnasium; 8, possible synagogue; 9, Harbor gates; 10, Arcadiane; 11, Theater; 12, villa above Theater; 13, Agora; 14, Temple of Serapis; 15, Library of Celsus; 16, Roman monuments; 17, private dwellings; 18, Baths of Scholasticia; 19, Temple of Hadrian; 20, apartment houses; 21, Embolos; 22, arch; 23, Temple of Domitian; 24, Prytaneum; 25, houses; 26, Senate House; 27, Bath of Varius; 28, Basilica; 29, Upper Agora; 30, Nymphaeum; 31, 'Tomb of St Luke'. (Redrawn after *Forschungen in Ephesos* Suppl. XII, Plan 1)

Figure 15
Plan of Ephesus
(source: http://ephesus.biz/img/ephesusmap.jpg).

The agora of Priene

Priene demonstrates a unifying process in its constituent elements and the architectural expression of its institution has crystalized into significant forms, making it a typical Hellenistic city. The streets are laid out with almost mathematical precision and extreme uniformity of arrangement (figure 4). The main east to west street passes to the north of the agora and at a right angle to this is the principal cross street, which serves the commercial west side of the agora (meat and fish market), the south gymnasium and stadium and the precinct of the temple of Athena Polias. On the centre line of the Agora is another street that links the agora with the theatre and on the east boundary of the Agora is an important street that links the temple of Asclepios, the *Prytaneum* and the northern gymnasium. The main streets were approximately 7m wide and the secondary streets were 3.5m wide. Any wheel traffic would normally be restricted to the main east west street, which connected the public space and market with the city gates. The agora dominates the whole city and is virtually central. It measures about one fifth of the length and one fifth of the breadth of the city. It occupies the equivalent of two *insulae* and provides the focal point for civic activities and grouped with it are public buildings (Martienssen 1964: 38-41).

Encircling the main area was a continuous *stoa* on the east, south and west sides (figure 16). On the west side were shops and beyond these a small market. To the north lay the principle *stoa*, which extended beyond the limits defined by the other colonnades. It was used for festivals or ordinary activities of everyday life. In the *stoa*, the column system retains its purpose as a screen in that columns define a visual plane and yet allow a penetration of space between them, but the defined area of use, the agora is open to the sky (Martienssen 1964: 41 - 43).

A flight of steps, uninterrupted for its full length of 144.17m, lead up to a broad terrace 6.4m deep, before the north *stoa*. A further flight of three steps leads directly into the *stoa*. The north *stoa* is 11.6m deep and fronted by a Doric colonnade of 49 columns with an inter-column measurement of 2.28m and a shaft height of 5.2m. The pavement level of the *stoa* is 1.83m above that of the agora. According to Martienssen the agora of Priene underlines the Greek ideal that man is the measure of all things, but rather than accentuating the individual, the scale of the construction is proportioned to the shared demands of the group (Martienssen 1964: 46 - 47).

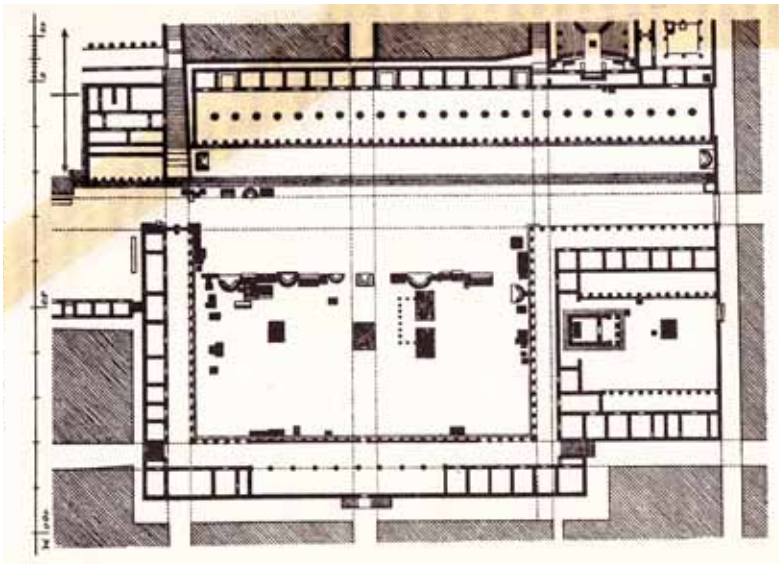

Figure 16
Agora of Priene after von Gerkan
(source: Martienssen 1964: 39).

The idea of space

In the section above an attempt was made to create an awareness of the form and structure of the chosen agoras of Asia Minor and by doing so, these urban spaces were given individual identities. According to the Pythagorean philosophy that the ultimate nature of reality is mathematical, proportion and ratios were applied to explain their physical existence. This is not the first attempt to seek geometrically based rationality in Hellenic architecture.

In 1937 Doxiadis attempted to show that Greek sanctuaries and markets, from Archaic to Hellenistic, were laid out according to a polar co-ordinate system of a viewpoint (the entrance) and the angles of vision, (the angles between the lines of sight from the entrance to the corners of the buildings and to the space between the buildings) alleging also that the angles were divisible by a tenth of the circle in layouts with Ionic architecture and that the buildings were situated at distances of round numbers of feet (Bergquist 1967: 3). In 1949 Scranton analysed some Hellenistic market places from the point of view of 'space form,' which is the shape and arrangement of the volumes created among themselves by various buildings and of 'block

form', the shape and arrangement of the buildings and monuments themselves and concluded that several types of 'space form' were developed, while one type of block form was employed (Bergquist 1967: 3). In 1964 Martienssen explored the Doric temple and the relation its elements had to one another. He maintained that:

> the Greeks had permanent rules that underlie all events and changes in nature and in human life. They always sought for one Law pervading everything and tried to make their life and thought harmonise with it. This theory of Greek philosophy was deeply connected with Greek art and poetry for it not only embodied rational thought but vision, which apprehends every object as a whole and which sees the idea in everything (Martienssen 1964: 156).

Martienssen concluded that sites were so arranged as to be able to provide the visitor with a comprehensive perception and cognisance of the volume of the temple firstly by means of a succession of different views obtained from viewpoints changing as to distance, angle of vision and level and secondly that in the Greek arrangement of sites there is a fusion of the absolute and abstract with the local and the practical, a fusion of variables with the constant (Bergquist 1967: 4).

Bergquist's 1967 study of the Archaic Greek *temenos* and its relations to the whole and its parts attempted to explain the intention of early Greek builders and argues that these complexes were planned and not the result of chaotic assembly of parts. She attempts to investigate the archaeological evidence and to analyse the structure, which reveals how the Archaic Greek sanctuaries were arranged and the function which reveals why they were given the arrangement they had.

But other authors are sceptical, claiming that the Greeks were not conscious of spatial relations and that they did not intend the outcome. Such a statement was made by Smithson in his 1958 critique on Martienssen's *The Idea of Space in Greek Architecture*. He maintained that there is no conscious space in Europe until after the sixteenth and seventeenth centuries (Martienssen 1964: xix). The critique came after Martienssen's death in 1942 and in a response Heather Martienssen claimed that both the artist and the spectator experience space at the subconscious level. "That the Greeks did not invoke the spatial effects of the sophisticated post-Baroque generation is not to say that the spatial effects are not there. Martienssen probably did not mean to propound that the Greeks planned the placing and relationship of their buildings with a wholly conscious and rational working out of what the spatial effects would be. It is more likely that he gave the Greeks credit for such an intuitive awareness of their own activity in relation to their monuments that the two facets in placing worked together to produce the final result." Martienssen would probably not have agreed that all the insight and consciousness should be credited to modern man who does the assessment of a Greek site and that none should go to the builders of Greek civilisation. A Greek site with its total integration of buildings, movements and near and distant presence of natural growth and geology is far from the unrelated chaos that contemporary man usually accepts as his environment.

It seems that previous investigations of relationship between space and structure were focused more on sacred areas (*temenos* and temple), whereas this article investigates the same in the urban square or agora.

Spatial intention - Conclusion

Was there a conscious decision to create the square / public space according to mathematical ratios and geometry? Although authors differ on this matter, Lawlor (1989: 5) expounds in his *Sacred Geometry* that all our sense organs respond to the geometrical or proportional and not

the quantitative. Similarly, we do not hear quantitative differences in sound wave frequencies, but rather the proportional differences between frequencies, (as was formulated by Pythagoras centuries ago). In our human consciousness, we have the ability to perceive the relationships contained in insubstantial forms of a geometric order and the changing forms of our actual world. The content of our experience results from an immaterial, abstract, geometric architecture, which is composed of harmonic waves of energy, nodes of relationality and melodic forms springing forth from the eternal realm of geometric proportion. Lawlor further maintains that in nature, proportions exist *a priori* without a material counterpart, as abstract, geometric relationships. The architecture of bodily existence is determined by an invisible, immaterial world of pure form and geometry.

Martienssen maintained that the level plane in ancient Greece is an external extension in the conscious arrangement of structural forms for spatial definition. The space shaping cubes restrict the normal visibility of natural surroundings. This type of restriction offers a key to the problem of adjusted surroundings and it evidences the fundamental and predominant geometrizing tendency of thinking humans, the tendency to envelop their activities in a framework of visual stability, of known and expressed dimensions (Martienssen 1964: 4-6).

There is a similar shift today away from the assumption that substance (particles) is the fundamental nature of matter, towards the concept that the fundamental nature of the material world is knowable only through its underlying patterns. Our organs of perception and the phenomenal world we perceive seem to be best understood as patterns or as geometric structures of form and proportion. Many ancient cultures examined reality through geometry and music. What we perceive as various qualities of matter, are actually differences in periodicity.

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