THE POLYCHROMY OF THE PARTHENON

—A reconstruction study on its meaning and system—

パルテノンの多彩装飾

—その意味と体系に関する復原的研究—

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The suggestion that the logic and details of the Doric order was copied from earlier wooden construction is open to question because some scholars reject it as invalid hypotheses. Thus, this paper tries to interpret the meaning of the Doric elements from the mythological or philosophical point of view and confirms that the symbolism of the Parthenon is implied in the correspondence between the forms and their colours. A restored model (scale: 1/10) of the north-west corner of the Parthenon was manufactured as an effective method to understand such reality of the polychromy.

Keywords : *Doric order, Parthenon, Polychromy, Symbolism, Greek myths, Greek Philosophy*
ドリス式、パルテノン、多彩装飾、象徴性、ギリシャ神話、ギリシャ哲学

1. Introduction

There has been much discussion regarding the origin of the elements of the Doric order. The most widespread suggestion is that it represents the translation of a wooden construction method into a stone technique. The triglyphs are said to represent the ends of beams which stretched across the interior; the metopes, the panels in between; the mutules, the projecting rafter feet; and the guttae, the pegs used to connect the different timbers. As Vitruvius took such view (4, 2),¹⁾ there is wide variety of explanations of this sort covering the logic and details of the Doric order.²⁾ But all this is hypothetical; there is little archaeological evidence of the gradual development from wood to stone that this would imply.³⁾ R.Carpenter makes it clear that no construction in wooden beams, planks, and pegs was ever put together in any sort of correspondence with the detailed articulation of the Doric order;⁴⁾ J.J.Coulton who also refuted that the elements of the Doric order derives directly from wooden structure, supposes that it was the invention of a builder or a number of builders in the north-east Peloponnese who, around the middle of the 7th century B.C., were trying to create a monumental style in architecture.⁵⁾

A Greek historian, E.Koukoura interprets the meaning of the elements of the Doric order from the mythological point of view.⁶⁾ She explains that the pediments would represent the heaven where the Olympian gods headed by Zeus reside; the mutules, the clouds which Zeus gathers; the guttae, the drops of water; the triglyphs, the falling rains; the architrave, the

earth; and the columns, Atlas who supports the world. This suggestion from a different angle interests me. According to Homer and Hesiod, the Olympian gods are assigned the care of the elements of the cosmos: Zeus is the god of the aether or the sky; Poseidon of moisture in all its forms; Hades of the dark underworld. The earth is common to them all or perhaps the old fertility-daemons, Gaia.⁷⁾ The various symbolic forms – myth, ritual and imagery – in which the Greek mind presented its experience of reality, must be originally all closely linked together and be mutually interdependent; therefore it is quite within the bounds of possibility that a conception of the Homeric mythological space is reflected in the Doric order. On this supposition, I would like to read the symbolism of the building elements and its polychromy of the Parthenon as Doric style.

2. Symbolism of the Architectural Forms

Tympanum : The tympanum, the recessed inner area of the pediment, was filled with pedimental sculpture completely in the triangular space, and unconnected structurally with the architecture, which formed a frame around it. Vitruvius refers particularly to the ratio for tympanum of temples (3, 5); in Latin the word *tympana* is derived from the greek word *tympanon*, which originally meant the percussions as drum or timbrel. The *tympanon* was used especially in the worship of the Mother Goddess and Dionysus.⁸⁾ If so, why was the triangular space called the *tympanon*? The next example from Euripides' tragedy, *The Bacchanals* furnishes an illustration of

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the origin or the original character of the *tympanon* as percussions.

In the prologue, Dionysus states 'The timbrels are native to the Phrygia, great Mother Phea's device and mine'; and then as the chorus enter waving the thyrsus-wands and clashing their timbrels, Bacchanals sing the song about the god they adore:

O cavern that rang when Curetes sang,
O bower of the Babe Zeus' birth,
Where the Corybants, dancing with helm-crests glancing
Through the dark halls under the earth,
This timbrel found whose hide-stretched round
We smite, and its Bacchanal mirth
They blent with the cry ringing sweet and high
From the flutes of the Phrygian land,
And its thunder, soaring o'er revel-shouts' roaring,
They gave unto Rhea's hand... (Bacchanals, 120ff.)⁹⁾

This part of myth is allegorical because the origin of the timbrel is just at the same time and place as Zeus' birth, and the timbrels clashing is compared to the thunder roaring, namely 'Zeus the loud-thunderer.' (*Homeric Hymn to Demeter*, 3,334,459)¹⁰⁾ According to Homer, Zeus is chief deity of the pantheon, a sky and weather god. He is regarded as the sender of thunder and lightning, cloud, rain and winds, and his traditional weapon is the thunderbolt. The thunderbolt, the thunder and the lightning, are an indivisible entity which is Zeus himself. Zeus resides in the heaven located on the summit of Olympus with the other members of the pantheon, who are subject to his will. Zeus sits on his exalted position atop Mount Olympus, there he summons the council of the gods. Clouds gather around the mountain of Zeus and thunder breaks forth. So let us look at the pedimental sculptures of the Parthenon.

In the east, tympanum represented the birth of Athena from the head of Zeus, with attendant deities, on the basis of the Pausanias' Description and the Madrid relief which has been supposed to throw light on the central figures disappeared. In this relief Zeus is seen seated on a throne, grasping the thunderbolt in his right hand. In front of him Athena, armed with helmet and shield, is advancing to the right. Between her and Zeus is a figure of Victory flying with a wreath to place on Athena's head.

The west tympanum, according to Carrey's drawings, had the contest of Athena and Poseidon for domination of Athens, again in the presence of other deities. In the center were Poseidon and Athena, starting back from each other; beside Athena were two horses; seated and reclining figures occupied the rest of the tympanum. On an Attic red-figure hydria from Pella is represented the scene of the same contest. (Photo1) In the center of the scene is depicted Zeus' great thunderbolt, above a small olive tree; at the left is Athena and a Nike who is about to crown the tree. To the right of the thunderbolt is Poseidon, with his trident and the horse, his gift to city.¹¹⁾ On this mythological scene E.Simon proved logically the existence of the thunderbolt as hurled by Zeus to terminate the confrontation of Athena and Poseidon above their figures in the Parthenon tympanum.¹²⁾ In both tympanum of the east and the west, the Athenians must have imagined the roaring sound of the thunder by the name of *tympanon*. The *tympanon* was a metaphor of the thunder as Zeus. The triangular space as Doric style would have derived its name

tympanon from Homeric conception of the cosmos ruled by Zeus' will.

Mutule and Gutta : The soffit of the cornice is regularly divided up by thin flat projections (mutules) with 18 (3 by 6) guttae, which reflect the spacing of the triglyphs below but at twice the rhythm. In older Greek religion the rain plays a far greater important part than the sun, because it is in Greece sparsely meted out. To Zeus, the god of rain, men turn when rain is wanted; he lives on the mountain-tops, namely Olympus and there they pray for rain. Then the sky is covered with cloud, the roar of the thunder is heard, the rain pours down, and therefore also grants fertility. Accordingly Zeus in Homer is called at various times, as weather deities, 'the cloud-gatherer', 'lord of the dark clouds', 'the rain of him', 'he who sends the autumn rain', and 'the farmer'.¹³⁾ M.Nilsson gives an example that 'on Lykaion, the mountain of Zeus in Arcadia, there was a well called Hagno. When there was a drought the priest of Zeus went to the well, dipped a twig into its waters, and stirred them up. At once a mist was seen to rise from the well; it thickened into a cloud, and there was rain all over Arcadia';¹⁴⁾ in Aristophanes' *The Clouds* the chorus is sung as follow:

Clouds of all hue,
Rise we aloft with our garments of dew.
Come from old Ocean's unchangeable bed,
Come, till the mountain's green summits we tread,
Come to the peaks with their landscapes untold... (Clouds, 275ff.)¹⁵⁾

The song in praise of the clouds may reflect the rite of such rain-magic in Arcadia. When Homer described the bedroom scene of Zeus with Hera on the heaven in the 14th book of *The Iliad*, it was represented as

Therein lay the twain, and were clothed about with a cloud, fair and golden, wherefrom fell drops of glistening dew. (Iliad 14, 350ff.)¹⁶⁾

This is a Homeric ideal of the cloud. If we premise a conception of the Homeric mythological space, the mutules and the gattae should be regarded as symbolic figures of the clouds and the drippings. Needless to say, *Gutta* in Latin and *Stagon* in archaic Greek, means 'drop'.

Triglyph : Each triglyph consists of one block, the front of which is carved to simulate three contiguous upright bars, chamfered on the sides so that each presents three facets; *triglyphos* in Greek meant originally 'thrice-cloven', and the *aichme triglyphos* was three-pronged spear, the trident (*triainan*), i.e., Poseidon's symbol.¹⁷⁾ According to Homer, Poseidon rules the sea, and taking his trident in his mighty hands, shakes the earth, and breaks the rock asunder. He embodies primitive power – the power of the untamed, the brutal, the wild. Therefore it is presumed that the triglyph would have assumed the shape of the trident as metaphor for Poseidon's power. The following examples from Euripides' tragedies will support this suggestion. First in *The Bacchanals*, Agave comes back to the palace of Cadmus carrying the head of Pentheus which she imagines to be lion's, and she says:

A ladder's stair against the palace-wall, that to the triglyphs he may nail this head, this lion's head that I from hunting bring. (Bacchanals, 1213ff.)

The lion's head from hunting, was nailed on the triglyphs,

as a sacrifice to Poseidon, because they were regarded as the tridents keeping guard over the palace. In addition to this example, it seems that 'the triglyphs' in Euripides' *Orestes* (1372ff.) and *Iphigeneia in Taurica* (133ff.),¹⁸⁾ also had talismanic value to protect the palace.

Though Poseidon is naturally the sea-god for the seafaring Ionians, his sphere of activity is far wider. In Thessaly he opened the Vale of Tempe to the river Peneus. In the Peloponnese, where the river often follows their course in subterranean channels, he is 'the one who drives underground'.¹⁹⁾ When Poseidon and Athena were competing to win possession of Athens, he had caused a spring by striking the Acropolis with his trident. At many places in ancient Greece, water was stored underground, in a spring-chamber or a cistern. The wall above a spring-chamber at Corinth, as built about 500 B.C., was the right triglyph wall which were painted blue and the metopes white, but topped with a blue band.²⁰⁾ This is best evidence showing that triglyphs are so strictly bound to water and Poseidon as the god of the element.

Taenia and Regula : In the Doric order, a band separating the architrave from the frieze, the taenia encircles the whole temple, and below it places the regulae with the guttae on the lower side. On the parthenon, the taenia enriches with a yellow gold meander pattern, and the fillet of the regula, with a gold lotus and palmette pattern applied.

In Greece rain is often all too rare during the summer, so water is a much-desired gift. According to R.Graves, at Athens girls went out under the full moon at midsummer to gather dew for sacred purposes; the festival was called the Hersephoria, or 'dew-gathering'.²¹⁾ The Athenian King Cecrops had three daughters, Agraulos, Herse and Pandrosos; their names mean Shining, Dew and All-dewy, which look like references to life-giving moisture. They are connected with a much interesting ritual called the *Arrhephoria* that was preliminary to the *Panathenaea*.²²⁾ In Homer's *the Iliad* he uses a simile which says that

And his heart was gladdened even as the corn when with the dew upon the ears it waxeth ripe, what time the fields are bristling.

(*Iliad* 23, 597ff.)

This example gives a vivid account of the good grace of the dew. Accordingly I suppose that the taenia represents the border of the earth's surface; the regula and its guttae, the moisture and the dew on the ground. The meander pattern on the taenia and the anthemion patterns on the regula which will be mentioned later.

Architrave and Column : The entablature is made up of three basic parts: architrave, frieze and cornice, the lowest division is the architrave consisting of the main beam. It is formed by large rectangular blocks joined exactly in the middle of the column, and divided from the frieze by the taenia. The Doric column, consisting of a fluted shaft with a more or less marked entasis curving taper, generally begins directly at the stylobate. It is connected to the architrave by means of a capital, always consisting of a lower part in the form of a spreading convex moulding (echinus) and of an upper part in the shape of a square, flat slab (abacus). The architectonic form of architrave-column looks like figures posed as if supporting great weight. As Coulton says that the original purpose of entasis 'may have been to give life and resilience to the column, making it seem to react to the load

placed on it', the refinement of the entasis would have been used in order to emphasize the weight-bearing features rather than to correct optical illusions. In fragments of Aeschylus' Danaids, Aphrodite speaks as follows:

The holy heaven yearns to wound the earth, and yearning layeth hold on the earth to join in wedlock; the rain, fallen from the amorous heaven, impregnates the earth, and it bringeth forth for mankind the food of flocks and herds and Demeter's gifts; and from that moist marriage-rite the woods put on their bloom. Of all these things I am the cause.

(Aeschylus' *Fragments*, 25)²³⁾

These lines – the Bridal of Heaven and Earth – are a magnificent allegory of the interplay between rain and soil that makes plants come to life and grow.²⁴⁾ Therefore the architrave can be seen as a symbolic representation of the earth that is fertilized by the rain; and the columns, of the pillars of heaven and earth that are supported by Atlas. In Aeschylus' *Prometheus bound*, Prometheus says that

I am distressed by fate of my brother Atlas, who, towards the west, stands bearing on his shoulders the pillar of heaven and earth, a burthen not easy for his arms to grasp.²⁵⁾

Carving and Decoration : On the Parthenon are found some notable mouldings and enrichments. They are the gold meander pattern beneath the mutules, and underneath it, the abnormal carved the astragal mouldings (bead-and-reel) over the triglyphs and metopes; the gold meander pattern on the taenia; the double meander in gold and beneath it, the cyma reversa moulding (leaf-and-dart), on the cornice over the Ionic frieze of the pteroma; the ovolo moulding (egg-and-dart) and the astragal on the capital of the antae; and the coffered ceiling of the peristasis which has the frames decorated with gold meander, the astragal and the ovolo mouldings, the coffer lids with radial and anthemion patterns in gold. (Fig.1)

The meander also called fret is a geometric ornament consisting of repetitions of straight lines usually connected at right angles and forming a band; it occurs on ancient Greek painted pottery from the Geometric period onwards (for example on belly-handled amphora of the 8th century B.C.), and it was widely used, in painted or carved form, on flat-profile architectural mouldings.²⁶⁾ Its name is derived from the Maeander (*Maiandros* in Greek) River of Caria in Asia Minor, known for its winding course, which is found in Homer's *the Iliad* (2,869) and Hesiod's *Theogony* (339). On the Minoan-Mycenaean religion, M.Nilsson speaks again 'There is a Carian word, *labrys*, which means "double axe". At Labranda in Caria, Zeus Labrandeus, the god with the double axe, was worshipped in historical times. Since the original population of Crete and that of Caria were undoubtedly related, it is a natural supposition that the god with the double axe was worshipped also in Crete. His nature is determined more closely by comparison with the Hittite god of the sky, Teshub, who is represented with the double axe and the lightning.²⁷⁾ Therefore he supposes the double axe is the thunderbolt, if so, *labrys* would have been the same etymology as *Labyrinthos*, (which is the term for the palace-Labyrinth consisting of numerous halls connected by intricate and tortuous passages), and the Maeander River noted for its windings must have a close relation to the Labyrinth and the god represented with the double axe and

the lightning.

In Hesiod's *Theogony*, he tells us that Zeus set free, from their deadly bonds the brothers of Uranus, the Cyclopes:

And they remembered to be grateful to him for his kindness, and gave him thunder and the glowing thunderbolt and lightning: for before that, huge Earth had hidden these. In them he trusts and rules over mortals and immortals. (*Theogony*, 503ff.)²⁸⁾

The Cyclopes were storm genii, as their names indicate: Brontes, the Thunder; Steropes, the Lightning; and Argos, the Thunderbolt.²⁹⁾ When the Titans revolted against Olympus' gods, Zeus defeated them outright by using the three weapons as given from the Cyclopes. *Maindros*, accordingly, would have come to the name of a pattern symbolic of the lightning, because the flashes of lightning not only zigzagged across the sky, but also the winding Maeander and the Labyrinth was a metaphor of Zeus in a pre-Greek.

The Ionic order originates, generally speaking, in the western Asiatic world, in the coastal area of Asia Minor known as Ionia in the 7th century B.C., and reached its full maturity in the 5th century B.C. in Athens. For example, the most elaborate leaf-and-dart, bead-and-reel, egg-and-dart mouldings can be seen on the anta capital of the Erechtheion.

It has been said that the egg-and-dart and leaf-and-dart mouldings probably originated in imitation of leaf patterns and evolved from more rudimentary Egyptian mouldings.³⁰⁾ But there is every possibility that they are given a new meaning, just the thunderbolt with the worship of Zeus in Ionia. The bead-and-reel mouldings are the carved enrichment consisting of a pattern of round or elliptical beads alternating with disks. In Aristophanes' *The Clouds* Socrates who regards thunderbolt as not Zeus but a natural phenomenon in 'a Vortex of air', he explains as follows:

When a wind that is dry, being lifted on high, is suddenly pent into these, it swells up their skin, like a bladder, within, by Necessity's changeless decrees: Till, compressed very tight, it bursts them outright, and away with an impulse so strong, that at last by the force and the swing of its course, it takes fire as it whizzes along. (*Clouds*, 404ff.)

If we look carefully at their mouldings on the basis of the Socrates' speech in which Ionian philosophy reflected, we will be able to see that the dart represents the head of the thunderbolt; the eggs on both sides of the dart, the swelling up clouds; the leaves, the bursting clouds. Since he declares further that the thunder occurs 'as the clouds roll through the air' (*the Clouds*, 373), the bead-and-reel is therefore supposed to visualize the roll of thunder. Or the bead may look like a drum and the reels, like cymbals. In a word, it can be seen that the Parthenon embodies a mythological world view of the following song in Aristophanes' *the Birds* by employing the above patterns,

Blaze of the lightning, so terribly beautiful, Golden and grand!
Fire-flashing javelin, glittering ever in Zeus's right hand!
Earth-crashing thunder, the hoarsely resounding, the Bringer of showers!
He is your Master, 'tis he that is shaking the Earth with your powers!
(*Birds*, 1748ff.)³¹⁾

Incidentally, I suppose that the volutes of Ionic capital represent the very 'Vortex of air'.

3. System of the Colour Scheme

On the Parthenon, the sculptural decoration of the pediments and the metopes represent mythical events, and also the other architectural ornaments are mythical or symbolic; it is worthy of notice that they were created in a philosophic age, when religion is tempered with the spirit of reflexion, as the philosophical explanation of the meteorological phenomena – rain, thunder and so on – in Aristophanes' *the Clouds*.³²⁾ Anaxagoras of Clazomenae, who was associated with the Athenian statesman Pericles, brought from Ionia the new practice of philosophy and the spirit of scientific inquiry; Diogenes' *Lives of Eminent Philosophers* writes on his explanation of the physical universe as follow:

His moving principle was Mind; of bodies, he said, some, like earth, were heavy, occupying the region below, others, light like fire, held the region above, while water and air were intermediate in position. For in this way over the earth, which is flat, the sea sinks down after the moisture has been evaporated by the sun.³³⁾

The conception of the three great world-masses of fire, earth and water (or air) became an intellectual concern among the cultured classes in Athens towards the end of the 5th century B.C., though the cosmogony proper was in direct opposition to the popular belief of the peasant. In the 4th century B.C. Aristotle describes the arrangement of the elements and the stratification of the atmosphere or the universe. According to his *Meteorologica* (1, 3) the universe consists of five elements: earth, water, air, fire and an element in the celestial regions, namely aether. In the terrestrial sphere the four terrestrial elements are arranged in concentric spherical strata, with earth at the center and water, air and fire in the order; fire is contiguous with aether, and air contiguous with fire.³⁴⁾ In his *On Colours* he explains the variety of each colour of the elements as follows:³⁵⁾

Those colours are simple which belong to the elements, fire, air, water and earth. For air and water are naturally white in themselves, while fire and the sun are golden. The earth is also naturally white, but seems coloured because it is dyed. (791a)

That light is the colour of fire is clear. (791b)

When what is black is mixed with the light of the sun and fire, the result is always red, and black things when burned always change to the colour red. (792a)

Cloud appears to be black when it is very thick. It is just the same with water and air when the light does not entirely penetrate them. (791a)

Drops of water appear golden when light is reflected from them. (793a)

Where the light fails, there, being penetrated by darkness at this point, it appears dark blue. (794a)

In addition to the above quotations, it should be noted that Homer says *ydato leyko* (brightly white water), *krene melanydros* ('a fountain of dark water'), *kyanee nephele* ('dark cloud'), and *pyrsoi* ('brightly red fire') in *the Iliad* (23, 282; 9, 14; 5,345; 18,211). In short, the Greeks have recognised that the colour of fire was yellow gold or red; of water and air, white (transparent), black or dark blue; and of earth, white. I think that Aristotle explained logically the experiential sense of each colour, as physical phenomenon.

Now, the colour range of the Parthenon is limited; the important colours are red on the tympanum ground, dark blue on the mutules and the triglyphs, pale ochre on the architrave and the columns, and yellow gold on those of the details or

The thunderbolt, the contest between Poseidon and Athena.

Photo 1. The scene on a hydria from Pella.

Photo 2. Model, the Parthenon from the northwest.

Photo 3. Model, the northwest corner of the Parthenon.

PEDIMENT

ENTABLATURE

COLUMN

STYLOBATE

ACROTERION

SIMATIUM

SLANTING CORNICE

TYMPANUM

CORNICE

MUTULE

FRIEZE
(TRIGLYPH
METOPE)

ARCHITRAVE

ABACUS

ECHINUS

SHAFT

The meander, the cyma reversa over the Ionic frieze.

The ovolo, the astragal on the anta capital

Fig 1. The Ionic mouldings of the Parthenon.

The roof tiles, the antfixa above the cornice.

The lion's head, the gold anthemions on the simatium.

The mutule and the guttae, the meander, the astragal.

The triglyph, the taenia, the regula.

Photo 4. Details of the architectural elements.

the patterns. It seems to me that the system of the colours presents a microcosm as Aristotle's point of view: The colour scheme symbolizes – yellow gold for aether or blaze, red for fire, dark blue for air and water, and pale ochre for earth. There is also a close correspondence between the mythological and the philosophical world view. Fire comes in the form of lightning from aether, the bright sky or pure upper air that is the natural place of Zeus. Fire has belonged to the heaven ruled by him, before Prometheus brought it down to the earth. Air and water are life-giving by Poseidon. Earth is partner to the fertilizing rain that falls from the sky, the birth-place of the corn that Homer says is 'the bounteous earth'. (*The Iliad* 8, 74) As the great 5th-century B.C. dramatists used the myths as examples, but amended their traditional situations and brought them up to date,³⁶⁾ the architects of the Parthenon took the traditional motifs of myths for the colour scheme, but subjected them to new kinds of interpretation by natural philosophy and reorganized them into a new and more coherent world of the polychromy.

By the mid-19th century the notion of systematic polychromy in Greek architecture was widely accepted; the definitive approach was presented in F.C.Penrose's observations on material from the Acropolis, and in his work was published a restored proposal for the colouring of the Parthenon and the Propylaea.³⁷⁾ After that, the subject of the polychromy has been studied by A.Michaelis, G.Semper, A.Bötticher and F.Brommer;³⁸⁾ A.K.Orlandos reexamined their result of preceding researches, investigated the Parthenon for himself, and offered a reconstruction of the polychromy.³⁹⁾ It is the most accurate study at present, so I manufactured a scale model (1/10) of the northwest corner of the Parthenon on the basis of the study by Orlandos in the main. (Photo3,4) Thus, I will try to investigate minutely each painted decoration and its meaning according to the model.

Remembering the above mentioned colour symbolism we may now describe the polychromatic treatment of the Parthenon. Of course the stylobate received no colour treatment at all, but it seems that an oxalate-rich coating (oily matter) was applied to there in the same way as the greater part of the temple.⁴⁰⁾ This problem will be treated together with the subject of the pigment in the next chapter. The columns and the architrave were uniformly coloured pale ochre, however, the capitals, the taenia and the regula received a minimum amount of decorative treatment. The annulet, a small flat fillet repeated under the echinus of the capital, are alternately red and dark blue. The taenia is enriched with a yellow gold meander pattern; the fillet of the regula, with the golden anthemions. The guttae on the regulae are uncoloured. The pale ochre is the major colour of Greek Mother Earth consisting of, in particular, limestones, sandstones, marls and conglomerates. Therefore the meaning of the colour decoration can be interpreted as follows: Atlas' columns support the architrave as the earth, and over it the meander, Zeus' lightning is flashing. Or it may be a snake because in the mythological representation of a god, Zeus Ktesios appears in the likeness of a snake.⁴¹⁾ It should be noted that the golden anthemion patterns on the regula are placed upside down different from the usual style, that is, the anthemions, the leaves of the corn get wet with dew and shine, and for the guttae, the drops fall from its ears.

The triglyphs of the frieze are dark blue, and the band over the metopes that links the triglyphs is the same colour, serving to unite them. The mutules are dark blue to match the

triglyphs, while the guttae on the mutules are uncoloured. The viae between the mutules are red, which colour extends also in the underpart of the cornice. The soffit of the cornice between the mutules at the angles of the temple is adorned with a complex pattern of gold anthemions on a red background.⁴²⁾ The meander below the mutules is yellow gold on a red. The abnormal carved astragal over the triglyphs and metopes may be gold, if it is based on that the coffered ceiling of the peristasis has the flames enriched with gold meander and astragal, and also the capital of the antae decorated with egg-and-dart and astragal in gold. The background of the metopes are less certain. Thus, regarding this subject I would like to hold a reconstruction in suspense: The dark blue mutules with a red background, Zeus' dark clouds come from the celestial region of fire or aether; the gold meander and astragal, the lightning is flashing and the thunder is rumbling; the dark blue triglyphs, Poseidon taking his trident rules water and air of the terrestrial regions and keeps guard over the temple itself.

The hawkbeak moulding of the corona, the square projection in the upper part of the horizontal cornice is consisted of alternating leaf decorations in red and dark blue. The antefixae fixed along the above of the horizontal cornice, in palmette form, also have their leaves of alternating red and dark blue with edgings of gold, while the gargoyles in the form of lion's heads are gold. The cornice seems to form the boundary between the celestial and terrestrial regions; the colour scheme alternated with red and dark blue may have represented that fire is contiguous with water and air, or the natural world is dominated by the opposed powers of the different materials, such as fire and water, as Anaximander who was one of the pre-socratic philosophers envisaged.⁴³⁾

The tympanum ground, from which the Olympian gods' statues stand detachedly, is red. The upper part of the slanting cornice is adorned with a pattern of heart-shapes (red on a dark blue ground); and the crowning member of the cornice, the corona or the simatium, with gold anthemions on a plain ground. According to Orlandos' restoration, the decorative finials crowning the apex and lower angles, the acroterions are large floral compositions with palmettes in gold; floral elements appear quite early on, in variations of the palmette motif and predominate as central acroteria even after the establishment of marble as the standard sculptural material.⁴⁴⁾ The part of the pediment is Olympus as the celestial region from which fire comes to the terrestrial region. In Aristotle's *On the Cosmos*, he quotes the following passage from Homer's *Odyssey* (6, 43ff.),⁴⁵⁾

To Olympus, where they say the gods' dwelling stands always safe; it is not shaken by winds, nor drenched by showers of rain, nor does snow come near it; always unclouded the air spreads out, and a white radiance lies upon it.

and explains 'we rightly call "heaven" (oyranos) because it forms the uppermost boundary (oros ... ano) or "Olympus" because it shines brightly all over (ololampes) and is removed from all darkness and disorderly motion such as occurs among us when there is a storm or a violent wind'. Therefore, the gold anthemions on the simatium and the acroterions can be seen as the radiant whiteness hovering over Olympus. The colour treatment thus accorded with the form intent, becoming more glorious as the apex is approached and producing that normal 'flower out' effect at the top which so

well accords with Homer's conception of the cosmos. It is supposed even that the polychromatic treatment of the Parthenon must have been inspired Aristotle with his natural philosophy.

4. Pigments in the Painting

Ochra : On the Parthenon, the orange-brown, sometimes yellowish, accretions are found on the columns, on the architrave, on the cella wall and on the steps of the stylobate; they are essentially the same as those on the sculptures and architectural pieces in the British Museum. According to a recent study by I.D.Jenkins and A.P.Middleton the present analytical results on them clearly indicate that they are not simply accumulations of iron oxide deposited in the course of the weathering of the marble but that they are oxalate-rich coatings. It has been suggested, therefore, that these coatings represent the remains of an ancient treatment applied to protect and / or tone the marble surface.⁴⁶⁾ More recently, at this assignment K.Kouzeli et al. have examined and analysed with physicochemical methods, samples of the orange-brown skin from the south and west columns of the Parthenon, and come to the conclusion that the colour of the skin is due to the presence of iron oxides and should be attributed to seatings.⁴⁷⁾ In other words the accumulations of iron oxides have not resulted from minerals leached out of the stone but the skin itself, because the Pentelic marble employed for the Parthenon does not generally contain iron. Moreover, Orlandos draws our attention to make a distinction between the orange-brown, sometimes opaque surfaces and the dense creamish areas on the columns of the west front of the Parthenon.⁴⁸⁾ The results of some analyses of several pigment samples from the Parthenon and other monuments carried out by M.Landerer, have been published by R.Rangabé in 1842; Landerer examined a range of colours including a yellow which was found to contain iron, clay and calcium carbonate, leading to the conclusion that for this colour yellow ochre (a friable clay with an admixture of limonite - $\text{Fe}_2\text{O}_3 \cdot \frac{1}{2}\text{H}_2\text{O} + \text{Al}_2\text{O}_3 + \text{SiO}_2$) had been used.⁴⁹⁾ So we should again note that Penrose went on to consider Vitruvius' reference (7, 7) to use of Attic ochre i.e. *Ochra* from the silver mines at Laurium as a colouring agent.⁵⁰⁾ Moreover, since it is possible that the applied *Ochra* was deliberately mixed with lime or chalk,⁵¹⁾ the columns and architrave of the model were coloured in pale ochre, as Penrose' supposition that this tone would not have produced more than the difference between fresh Pentelic marble and ivory. (Munsell HVC of the restored colour: 2.5Y 9/2)

Kyanos : On the traces of dark blue on the triglyphs and mitules of the Parthenon, the recent examination of the samples through X-rays in conjunction with a electronic microanalysis have elucidated that they are the blue pigments known as Egyptian blue frit (a crystalline of calcium-copper silicate - $\text{CaCu}[\text{Si}_2\text{O}_7]$).⁵²⁾ This was an artificial frit made by heating together silica, a copper compound, calcium carbonate and natron.⁵³⁾ Theophrastus refers to a material that he calls *Kyanos*, which he says was invented in Egypt, that was probably this blue frit,⁵⁴⁾ and Pliny says that Vestorian blue made from the finest part of Egyptian blue is called *Kyanos*.⁵⁵⁾ Vitruvius, too, states that the Egyptian blue frit which he calls caeruleum was made by fusing together sand, copper filings and natron. (7, 11) Though he says it was invented at Alexandria, it was known more than 2,000 years before Alexandria was built.

In Homer *kyanee nephele* means a 'dark cloud' (*Iliad* 5, 345; 20, 418); *kyanochaita*, usually 'the dark-haired god', Poseidon (*Odyssey* 9, 536); and the son of Cronos, Zeus is also called 'lord of the dark clouds' (*Iliad* 6, 267). That is, *Kyanos* would have looked as the very colour of the dark cloud sending rain or the depths of water, and metaphor for Poseidon's power. Therefore its colour is dark blue or nearest black. Theophrastus says also that *Kyanos* was made in imitation of the colour of lapislazuli (*Lapidibus* 31). According to Homer, *Kyanos* was especially used to adorn armour and prow of ship (*Iliad* 11, 24; 15, 693); in the *Odyssey* the wall of Alcinous' house was surmounted by a cornice of *Kyanos* (7, 87); and also Pausanias describes that the throne of the Temple of Zeus in Olympia is surrounded by screens like walls, 'of these screens the part opposite the doors is only painted with *Kyanos*.'⁵⁶⁾ These examples suggest that each object are defended by *Kyanos* as Poseidon's strength.

Dr.E.Kato of my collaborator confirmed that the Egyptian blue frit or the dark blue pigment could be reproduced by mixing and heating together calcium carbonate (CaCO_3 : 20g), basic copper carbonate ($\text{CuCO}_3 \cdot \text{Cu}[\text{OH}]_2$: 44g) and powdered silica (SiO_2 : 56g), the dark blue crystals being formed at a temperature of about 1050 °C. But the result has not as yet been possible to determine the formula exactly, so that the experiments are continuing now. The triglyphs and mitules of the model were coloured in the tone of the dark blue pigment obtained, which was verified by the traces of dark blue on the Lefkadia and the Vergina tombs.⁵⁷⁾ (Munsell HVC of the restored colour: 2.5PB 3/8)

Miltos : As red pigments Theophrastus lists cinnabar, realgar and red ochre, the latter in three shades, dark red medium red and pinkish;⁵⁸⁾ among them red ochre was much used as a decorative paint pigment in ancient Greece. Pliny speaks particularly that as evidenced by Homer, for as far back as Trojan times red ochre (ruddle) was highly valued as a distinguished colour for ships, and the Greek name for it is *miltos* (33, 38). This has been used because pictures in that colour took only a amount of trouble to preserve, and its colour was not harsh.⁵⁹⁾ In the *Iliad* Odysseus captain, the peer of Zeus in counsel, leads twelve ships with bows painted *miltos* (2, 636ff.); In Aristophanes' *the Ecclesiazusae* Chremes says that

And O, dear Zeus, the fun it was to see the way they spattered the *miltos* round.
(*Ecclesiazusae*, 376ff.)⁶⁰⁾

A rope dripping with *miltos* was used to drive loiterers out of the Agora to the public place of assembly near the Acropolis, namely the Pnyx. These examples suggest that *miltos* was employed not only to attach importance to the durability, but to represent Zeus' power or blazing strength in red.

The so-called red ochre is described as either natural, or of artificial origin from the roasting of yellow ochre; the former is red ochres (hydrated oxides of iron), the latter is red iron oxides (anhydrous oxides of iron, hematite - $\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3 + \text{SiO}_2$). *Miltos* as natural red ochre would have been imported to Greece from Egypt where a good quality ochre of a deep-red shade occurred. Pliny says that the most useful red ochre for builders are the Egyptian and the African varieties (35, 15). The colour tone of the model was restored according to the traces of red at the Lefkadia and the Vergina tombs. (Munsell HVC of the restored colour: 7.5R 4/8)

5. Conclusion

It was the Greeks who first used the term 'symbol' (*symbolon*) to express the concept that one thing may be a token or sign, often secret or sacred, of something else. I have confirmed that the symbolism of the Parthenon is implied in the correspondence between the architectural forms and their colours. From this it will be seen that the polychromy was, in spite of the mythical, a logical, ordered, systematic procedure, and perfected in exactly the same way as had been the forms. The restored three-dimensional models were manufactured as an effective method to understand such reality of the polychromy of the Parthenon.

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和文要約

序：ドリス式オーダーの起源については、ウィトルウィウス以来、木構造の各要素が石造化したものとする説が流布している。つまりトリグリフは天井梁の端部、ミューチュールは垂木の末端、グッタエは木くぎを模倣したとする解釈などであるが、その考古学的証拠はほとんどないので、R.Carpenter はそれらを単なる憶測にすぎないものとして全面的に否定している。また同じ立場の J.J.Coulton は、その原型が木造だったとしても、それはあくまでもモニュメンタルな様式を創ろうとした工匠の発明だったと主張している。このような反省から、本研究はパルテノンのドリス式としての建築的要素と部分的に採用されているイオニア式細部装飾の意味と配色の原理・体系を、古代ギリシアの神話あるいは自然哲学の観点から解明しようと試みたものである。

建築的形態の象徴性：オリュンポスの神々の像が立つテュンパヌムはギリシア語のティンパノンに由来し、この語は元来太鼓を意味する。エウリピデスの『バクスの信女』によれば、太鼓はクレタ島の洞窟でゼウスの誕生と時を同じくして作られたとあって、雷神ゼウスの雷鳴に比擬されている。そしてパルテノンの東のテュンパヌムの中央には雷鐸を右手に持ったゼウスが座していたし、西のそれにもアテナとポセイドンの頭上に放たれた雷鐸があったと推定されているから、オリュンポスを象るこの空間には雷鳴が轟いていると想像されたはずである。ティンパノンはそのことの暗喩であろう。古代ギリシア人は太陽よりむしろ雨の恵みを渴望した。ホメロスにおいて雷神ゼウスは「黒雲を集める神」「雨の神」と呼ばれ、雨乞いの儀式が行なわれた。またアリストファネスの『雲』の中で雲は「露に光る姿」と唄われる。故にミューチュールは雲、グッタエは雨滴を表していよう。トリグリフの語源トリグリフォスは「三つに裂いた」を意味し、エヒメ・トリグリフォスは三つ又の戈のことで、それは水の神ポセイドンのシンボルである。前500年ごろのコリントの聖なる泉の水槽はトリグリフの壁で造られているし、エウリピデスの劇中、カドモスやアトレウスの王宮の壁面もトリグリフで飾られていて、それは護符のような力をもっていたらしい。したがってトリグリフはポセイドンの戈で神殿を囲繞し守護することを表し、その下のアーキトレーブはホメロスのいう「ものみな養う大地」であって、この天と地をアトラスを象る柱が支える。ヘシオドスの『神統記』によれば、雷神ゼウスの武器は雷鐸と雷光（稲妻）と雷鳴であるが、前出の『雲』の中で、哲学者ソクラテスは雷をゼウスではなく、空気の渦という自然現象と見なし、雷鐸は膨張した雲（空気）の爆裂、雷鳴は雲の廻転、そして稲妻は雲と雲の摩擦によって起きると説明している。イオニア式モールディングにはこの哲学的自然観が反映されている。すなわち柱頭の渦巻装飾はまさに「空気の渦」、卵舌文や葉舌文の舌形は雷鐸、卵形は膨張した空気、葉形は空気の爆裂を表し、そして連珠文は雷鳴の視覚的表現であろう。したがってミューチュール下のメアンダーの帯と連珠文は黒雲に閃く稲妻と轟く雷鳴を表している。アーキトレーブの上のタエニアのメアンダーも地上を走る稲妻で、それは穀物の実りを促すものである。なおメアンダーは幾何学様式時代（前9-8世紀）の垂絵に現れるが、その呼称は小アジア・カリアの屈曲の多いマイアンドロス川に由来し、この地方やクレタ島におけるゼウス信仰と深い関係がある。メアンダーはまさに雷文なのである。ギリシアの夏期の雨はきわめて稀である。そこでアテナイでは夏至の満月のころ、ヘルセーボリア（露あつめ）と呼ぶ祭りがあった。またアテナイの王ケクロプスの三人の娘アグラウロス、ヘルセー、パンドロソスはそれぞれ「輝かしい」「露」「すべて露に濡れた」を意味した。故にタエニア下のレグラ（下向きにアンテミオンが描かれている）とグッタエは穂先に宿る露を表し、かくしてアーキトレーブは豊穡

の大地となる。

配色の体系：アリストテレスの『気象論』によれば、宇宙は同心円をなす五つの要素、すなわち地上界の大地（土）・水・空気・火、そして天上界のアイテール（清浄にして白熱の領域）から構成され、各要素はその接するところで常に相互変化するというが、この理論の基礎はペリクレスと親交のあったアナクサゴラスによってすでに唱えられていた。またアリストテレスは各要素の色について、土は基本的に白、水と空気は白であるが、深い水と濃い空気は暗青色、火は赤または黄金色と認識している。彩色復原模型（縮尺：1/10）にしたがって配色の概要を記せば、柱と大地にあたるアーキトレーブは淡い黄土色（アイボリー）、水と空気の層にあたるフリーズのトリグリフとミューチュールは暗青色、グッタエは大理石の白色である。メアンダーと連珠文は黄金色。メトープの背景の色は不確定なので塗色を留保した。水平コーニスと天上界と地上界の境界のように見える。そのコロナの赤と暗青色の葉形が交互に並ぶ装飾は火と空気・水が相互変化することを表しているのかもしれない。軒端のアンテフィクサも同様であろう。テュンパヌムの背景は赤色、火はプロメテウスによって地上にもたらされる前はオリュンポスに属していた。そしてペディメントの最頂部、傾斜コロナ（キュマチウム）の黄金色のアンテミオンと妻飾りの黄金のアクロテリオンはまさにアイテールの白熱の炎を象っているのであろう。前5世紀の偉大な劇詩人たちが神話を題材として用いながら、その中の状況に修正を加え、それを時代に適合したものにしたように、パルテノンの工匠たちも神話の中の伝統的な主題を採りながら、自然哲学によってそれらに新しい解釈を与え、より論理的な多彩装飾の世界に再構成したのである。（写真2, 3）

塗装の顔料：パルテノンの彫刻を含む全体に塗られていたとされる茶褐色の付着物の成分が硫酸を多く含有するところから、それは透明なワニスのような塗料であろうと考えられている。しかし最近の調査では、パルテノンの柱表面の茶褐色の被膜は酸化鉄を含む塗料によることが確認されているから、前者とは区別されるべきものである。そこで、これまでの調査研究を再吟味し、使用された顔料とその色調を次のごとく想定した。すなわち柱とアーキトレーブの淡い黄土色はウィトルウィウスのいうアッティカ産の良質の黄土（含水酸化鉄＋粘土）のオヒラであろう。それはギリシアの母なる大地の色である。暗青色はエジプト青と呼ばれる人工的顔料（銅とカルシウムの珪酸塩）のキアノスで、ウィトルウィウスがいうカエルレウムがこれに当たる。テオフラストスによればラビスラズリの色に似せられたものという。ホメロスの『イリアス』には、鎧や楯の溝、軍船の舳先がこの色で飾られたことが見える。またキアノスは形容詞として「黒雲」と「黒髪の子」すなわちポセイドンを意味する。トリグリフがキアノスで塗られたと推定されるゆえんである。復原模型のその色調は試作した顔料とヴェルギナとレフカディアの墓室の塗色とを照合した上で決定された。プリニウスは、赤土はホメロスが語るトロイア時代から尊重され、ギリシア語でそれをミルトスという、と特に言及している。赤色顔料である赤土には含水酸化鉄を主成分とする天然の代赭と焼成黄土（無水酸化鉄）があるが、ミルトスは前者である。軍船の船首部分の両側はこの顔料で塗られたが、この色もゼウスの威力を表徴するものであったらしい。

結語：象徴（シンボル）という語をはじめて用いたのはギリシア人である。本研究はパルテノンの象徴性には形態と色彩のあいだの一致が含蓄されていることを確認し、その多彩装飾が神話的であるにもかかわらず、形態と同様に論理的で体系的であることを立証した。精確な立体模型はそれを理解するための有効な方法として製作された。

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