

# OBSERVATIONS ON THE PARTHENON FRIEZE IN THE BRITISH MUSEUM

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We extend our warmest thanks to the British Museum for officially granting permission for this work and for facilitating our investigation in many ways.

## Introduction

The intervention carried out in 1937-38 constitutes a regrettable chapter in the history of the Parthenon sculptures in the British Museum.

However in our view it is advisable to make a scientific record of the extent of the damage, in accordance with the intentions of the museum authorities in charge at the time [letter from Harlech to Forsdyke, 1 December 1938 'Sooner or later it will have to come out which are the individual pieces which have been damaged and I would greatly prefer more frankness and definition...' and 3 December 1938 '...There will be a long and slow investigation by the expert world as you say' and Letter from Sir Charles Peers to Forsdyke, 3 December 1938 '...It seems to me that what is principally entailed on the Trustees is to order the preparation of a careful report on each piece of sculpture which has suffered, so that any student studying these marbles in the future may be safeguarded against mistakes arising from the condition of the damaged carvings. This is our real duty to Knowledge...'] (Jenkins I.)

To a large extent our examination confirmed earlier observations and conclusions as for example those made by C. Brandi, which apparently did

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<sup>1</sup>The names of the authors are in alphabetical order

not appear to receive the attention they deserved (Brandt C.).

The results of the examination are revealing, demonstrating the extent of the damage. All the south metopes, the greater part of the frieze and at least four pediment figures were subjected to the destructive and misguided treatment. Systematic correlation of previous information concerning the "cleaning" with the present first-hand observations has demonstrated (to a greater degree than previously) the rationale, the scope and the methods of intervention. The aim of the 1937-38 operation was, unquestionably, to enhance the contemporary appearance of the Parthenon sculptures influenced by certain aesthetic preconceptions of the time, analyzed in detail by W. S. Clair (St. Clair W.). The intervention was intended to impart to the sculptures the desired whiteness and gloss. This initiative originated exclusively from Lord Duveen, the private donor, (who employed unauthorized masons using destructive methods in order to achieve his aim) with the degree of participation by officialdom and the museum authorities being ambiguous (and led to dramatic, irreversible alteration of the sculptures).

Methods employed.

The examination of the surface of the sculpture included:

1. Extensive macroscopic observation.
2. In situ microscopic observation (10 X, 30X).

3. Estimation of the roughness of the surface by hand<sup>2</sup>
1. Comparison of the present state of preservation with the plaster casts of 1838 and with photographs by Boissonas F. - Manswell W. A. (Collignon M., Boissonas F.) And Smith (Smith A.H.) In 1908 and 1910 respectively.
2. Precise characterization of the surface colours and comparison with analogous measurements taken on the Parthenon using a portable spectrophotometer. The method is based on the measurement of spectral reflectance within the visible spectrum of wavelengths from 400 nm to 700 nm.
3. Photographic documentation.

### Summary of damage

In the course of treating the sculptures to whiten them, the tawny yellow patina, which had covered extended areas on the west and the south frieze as well as on some of the south metopes and the east pediment sculptures, was removed. Since this patina was not considered to be a genuinely original component of the sculpture but rather a hindrance to aesthetic appreciation, it was therefore systematically obliterated. The patina on the Acropolis monuments is mainly of phosphatic nature, while oxalates are occasionally detected. The layer is 100-200  $\mu$  (microns) thick and the underlying marble is in excellent condition when the patina has been preserved. It bonds perfectly with the marble penetrating between the crystals (Kouzeli K., Beloyannis N., Tolias C., Dogani Y., 1988,

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<sup>2</sup>This examination has been influenced by the fact that the marble surfaces were impregnated with PEG 6000 solution during the treatment of 1968, thus giving them a slightly different texture from the untreated ones (Oddy A.)

Kouzeli et al, 1989, Papaconstantinou E., 1994, Kouzeli K., Tolia C. 1996). Our experience indicates that the removal of the patina also affects the marble crystals. Consequently scraping away the patina, especially when the marble is not in pristine condition, leads to actual loss of the marble itself. The scraping created variegated surfaces, which, according to the aesthetic requirements of the time, had to be further treated to acquire a uniform appearance. The process of smoothing over the irregularities on the background and on the figures themselves intensified the irreversible destruction.

Pitted surfaces, which had been exposed to severe weathering conditions and were consequently not covered by patina, mainly in the north frieze, were also subjected to the intervention. The surfaces were ground down to such an extent that the characteristic shape and depth of the pits have been considerably changed. The same effect applies in areas where thin flakes have broken off.

The final smoothing of the surface was done with an abrasive material, possibly carborundum (St Clair W.), a substance processed as bars, sheets or powder. Carborundum is an extremely hard substance (hardness 9.5 in the scale of Mohs), which is used to grind down steel tools and granite.

The in situ microscopic observations proved to be especially illuminating in regard of the type of tools used confirming some of the information given by the sources. Traces of bronze tools used for scraping off the patina or for smoothing the surfaces were observed both on the frieze and on the metopes. Oxidation of the bronze produced strikingly large green

accumulations occurring mostly in the crevices where the relief joined the background. In the past far more of these green traces must have been visible with the naked eye; these were probably removed during the cleaning of 1968. According to the (oral) information supplied by the British Museum this green oxidation product was identified as copper sulphate (Jenkins I.). Tool marks made by underlying the contours of the figures can easily be distinguished as well as the damage done to the marble as the tool struck it.

In spite of the original intention of achieving a homogenous appearance, the end result was affected by various limiting factors, altering the scope of the intervention. For example some of the relief surfaces were in a dangerously precarious state and the places where the marble tended to flake off generally obliged the masons to work more carefully, although in cases there is actual enlargement of the already existing damage (W.F.II, S.F.XIX). There are also cases where the masons showed an excess of zeal, for example with certain metopes, with Selene's horse or with the slab XIX of the south frieze, resulting in actual changes of the sculptural characteristics.

The detailed results of our examination of the frieze are as follows:

### The East Frieze

This is the only part of the frieze where the patina remains almost untouched. With the exception of a few mild and limited cleaning interventions the east frieze was not subjected to the scraping and smoothing to judge by a comparison of the old photographs with the

present state of the frieze slabs. The patina is still present as are salt depositions which only appear on the upper parts of the blocks.

On initial viewing it appeared that like the other blocks of this frieze, slab V B.M. (V.J.I.) was also untouched. However on the slab some analogous but less severe treatment was probably begun but not completed

Comparison of the present state of East V B.M. (V J.I.) with old photographs by Smith (Smith A.H., plate 36) and by Boissonas F. - Mansell W.A. (Collignon M., Boissonas F., plate 128) (fig.1) reveals the presence of patina on the upper bodies of the figures 37 B.M. (36 J.I.)<sup>3</sup> - 38 B.M. (37 J.I.) of Athena and Hephaistus in 1908-1910, which no longer exists today (fig.2).

The patina is preserved in excellent condition on the chiton around the lower body of figures 9 B.M. (9 J.I.) and 11 B.M. (11 J.I.) on slab III B.M. (III J.I.). The spectrophotometer measurements on the well preserved patina of East III are similar to those carried out on the patina on architectural members and sculptures of the Parthenon.

## The North Frieze

On the slabs of the north Frieze the surface covered by patina was very limited due to its more intense exposure. The typical pitted surface characterizes this part of the Frieze as previously described. Pitted areas were ground down so that the characteristic shape and depth of the

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<sup>3</sup>Conventions:

1. BM: enumeration according to British Museum's present exhibition.

2. JI: enumeration as in "the Parthenon Frieze" by Ian Jenkins.

pits have been considerably changed.

The treatment consisted of cleaning, removing the patina, abrasion and smoothing to varying degrees, with the exception of north V B.M. which was completely untouched and the gentler handling of north XXXI B.M. - XXXIX B.M., due to their severely weathered pitted surfaces.

According to our assessment of the scraping and the smoothing went up and beyond figure 74 B.M. (73 J.I.), which is not in full agreement with Brandi's observations. Two representative cases follow.

North Frieze XII B.M. figs 45 B.M. - 47 B.M. (XII J.I., figs 45 J.I. - 47 J.I.). It is one of the most characteristic examples of the over-emphatic treatment. It has been dramatically smoothed.

Although old photographs by Smith A.H. (Smith A.H., plate 45) and Boissonas F.- Mansell W.A. (Collignon M., Boissonas F., plate 115) clearly show the presence of patina in areas on the surface of the slab, today no trace of patina exists (fig.3).

The separation of the slab into two parts gives us the opportunity to compare the surface differences, since the upper torso of fig. 47 B.M. (47J.I.) is on display in the Acropolis Museum (no 3369), whereas the main part of the same slab is in the British Museum. The British Museum slab shows no evidence of patina; in the fragment in Athens however patina is present on the background, the neck and the preserved part of the helmet (fig.4), as in the past (Collignon M., Boissonas F., plate 115).

North Frieze XLII B.M., figs 130 B.M. - 134 B.M. (XLVII J.L., figs 132 J.I. - 136 J.I.). This slab contains a wealth of information showing the differing degrees, extent and results of the treatment of 1937-38. This is due both to the different state of preservation and the particular way the work was carried out by the mason concerned.

Patina where present was almost completely removed. According to old photographs (Smith A.H., plate 60, Collignon M., Boissonas F., plate 123) the presence of patina in the past on this slab was extensive: on the upper part of the background, the left hind leg of the right horse, on the left leg of fig. 134 B.. (136 J.I.) and probably on the right leg of this figure, on the left shoulder of fig. 133 B.M. (135 J.I.) and on the chlamys of fig. 132 B.M. (134 J.I.). Depending on the condition of the revealed marble surfaces were then further smoothed.

The pitted areas of the slab were also subjected to smoothing. Healthy surrounding marble was smoothed to obtain a uniform surface level.

Areas where thin pieces of marble had flaked off completely as well as the healthy surrounding marble in an effort to obtain a uniform level.

On the chlamys of fig. 133 B.M. (135 J.I.) observation with the magnifying glass reveals the presence of tiny fragments of patina on the whitened marble. On both these tiny fragments of patina and on the adjacent whitened areas green copper oxidation products can be observed, demonstrating clearly the way in which the copper tools were used for the removal of the patina. Traces of copper tools are also observed on the contours of the figures.



## The West Frieze

West Frieze I B.M. fig 1 B.M., (I J.I., fig.1). According to the old photographs by Smith A. H. (Smith A. H., plate 61) and Boissonas F. - Mansell W. A. (Collignon M., Boissonas F., plate 85) the surface of the slab was fully covered by patina, which was largely removed during the treatment of 1937-38 (fig. 5). Scattered traces of patina are preserved today mainly on the folds of the toga (fig. 6). During the conservation treatment of 1969 (Oddy A., Haynes A.R., Werner A.R.), all the slabs were coated with polyethylenoglycol 6000, in order to give the marble a better and uniform appearance. On the upper left of the slab drops of polythylenoglycol applied with a paint brush are visible (fig.7).

West Frieze II B.M., figs 2 B.M., 3 B.M. (II J.I., figs 2 J.I., 3 J.I). The appearance of this slab seems to confirm the British Museum's oral information that it was cleaned twice. The surface of both background and relief has been scoured intensively. The extended patina visible in the old photographs (Smith A.H., plate 62, Collignon M., Boissonas F., plate 85) is completely absent today. The neighbouring slabs (W.F. IV and W.F. VI) have been in the Acropolis Museum since 1993. Although these slabs remained on the building for another 170 years exposed to the weathering effects the patina is well preserved on extended areas. The spectrophotometric measurements, being the range of overcleaning, are in agreement with the macroscopic and microscopic observations.

Green traces of copper oxidation products can be observed mainly on the contours of the sculptures.

The presence of precarious areas combined with rough handling led to actual alteration in shape and enlarged the damage:

St. Clair's comments on this slab brought damage suffered by the marble as a result of rough handling. Two flakes have fallen from the rump of the first rider's horse. The areas of damaged marble have been merged and also enlarged. Our comparison of the photographs by Smith A. H., Boissonas F. and Mansell W. A. with those of Franz A. as well as the present state confirms this.

In another case the exfoliated area of horizontal crack (due to the presence of veins) on the left side of the background very close to the chest of the second rider's horse has been considerably enlarged. The comparison of the cast made in 1845 with the photographs of Boissonas F. and Mansell W.A. made in 1908 and the photographs taken by Robertson and Brommer in 1975-77 confirm the damage.

### The South Frieze

The patina on the south frieze was far better preserved than that of the north frieze since weathering effects on that side of the monument are less intense. The intervention on the south frieze was extremely drastic, given that the patina has either disappeared completely or is left in scattered traces all over the surface.

The widespread presence of these scattered traces of patina on most areas, which on the old photographs seem to be covered by patina

strongly support our interpretation of the old photographs.

South Frieze IX B.M., figs 24 B.M. - 25 B.M. (IX J.I., figs 24 J.I. - 25 J.I.). Comparing the photograph taken by Smith A. H. (Smith A.H., plate 76) and by Boissonas F. - Mansell W. A. (Collignon M., Boissonas F., plate 90) with the present condition of the slab the surface from which the patina has been abraded can easily be distinguished in part on the upper part of the horses' bodies and even on the fragile flaking surface on the body of the left horse. South Frieze X B.M., figs 26 B.M. - 28 B.M. (X J.I., figs 26 J.I. - 28 J.I.). According to the old photographs by Smith A.H. (Smith A.H., plate 77) and Boissonas F. - Mansell W.A. (Collignon M., Boissonas F., plate 91) the surface of this slab was almost fully covered by the layer of patina, whereas today only a few traces remain. In some areas the marks and the direction of the tools used are visible as for example around the hind right hoof of the horse of the fig. 27 B.M. (27 J.I.) (fig.8).

South Frieze XIX B.M., figs 47 B.M. - 48 B.M. (XIX J.I., fig. 49 J.I., fig 50 J.I.). This slab is markedly whiter than its neighbouring blocks.

The extensive patina clearly visible on the Smith A.H. (Smith A.H., plate 81) and Boissonas F. - Mansell W.A. (Collignon M., Boissonas F., plate 94) (fig.9) photographs has almost completely disappeared (fig. 10)<sup>4</sup>

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<sup>4</sup>The well preserved patina existed mainly: on the background (especially on the left of the back of fig. 48 B.M. (50 J.I.), between the right leg of fig. 47 B.M. (49 J.I.) and the leg of his horse, between the front legs of the same horse and beneath the tail and the belly of fig.'s 48 B.M. (50 J.I.) horse), on the chlamys of fig. 48 B.M. (40 J.I.) and on fig.'s 48 B.M. (50 J.I.) horse.

Remains of green copper tools are visible under the microscope (for example in a recess of the exfoliation in the right leg of figure 47 B.M. (49 J.I.) and in the extreme left fold on the chlamys in figure 48 B.M. (50 J.I.), where some traces of patina are also present).

Apart from the removal of the patina the level of smoothing was so intense that it led to actual alteration of the marble surface:

Firstly in the right arm of fig. 48 B.M. (50 J.I.) some details in relief (possibly patina and/or exfoliation) visible in the old photographs are absent today (figs 9,10).

Also there seems to be some alteration in relation to the old photographs in the bottom part of the left fold of the toga of fig. 48 B.M. (50 J.I.) (figs. 9,10).

Furthermore the present shape and size of the exfoliated surface on the background next to the back of fig. 48 B.M. (50 J.I.) is visibly different in the old photographs (figs 9,10). Finally the relief of a horse's tail, apparently unconnected here, but belonging to a horse on the adjoining block clearly visible in the old photographs (fig.9) is significantly reduced (fig. 10).

#### Further questions

Before the intervention of 1937-38 most of the blocks had already received thorough cleaning. For more than 120 years the sculptures suffered from the smoke and air pollutants emitted by burning coal in the

London area and inside the British Museum. From 1856 until 1934 the marbles were often cleaned with water, absorbent clays and controversial chemicals in order to remove the coating of black grease covering the surfaces. Although we have no detailed knowledge of how each cleaning process affected the marble during these years, nevertheless it is obvious that until 1910 the patina had been preserved to a significant degree.

There are some differences between photographs taken by Boissonas in 1910 and Smith in 1910, which imply some form of intervention at that period of time about which no documentation has so far emerged.

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Fig.1: East Frieze V, figs 37 B.M. (36 J.I.), 38 B.M. (37 J.I.) (Collignon M. - Boissonas F., Plate 128).

Fig.2: East Frieze V, figs 37 B.M. (36 J.I.) - 38 B.M. (37 J.I.) (1999)

Fig.3: North Frieze XII B.M. (XII J.I.) (1999).

Fig. 4: the upper torso of fig 47 B.M. (47 J.I.) (part of North Frieze XII) on display in the Acropolis Museum (no. 3369)

Fig. 5: West Frieze I (Smith A.H., plate 61)

Fig. 6: West Frieze I (1999)

Fig. 7: West Frieze I (drops of polyethylenoglycol applied during the conservation treatment of 1968).

Fig. 8: South Frieze X (detail, 1999). The marks of the tools used to remove the patina are visible.

Fig. 9: South Frieze XIX (Smith A.H., plate 81)

Fig.10: South Frieze XIX (1999).



