

# Architectural Decoration of the Imperial Agora's Porticoes at Iasos

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# ASMOSIA XI

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# ARCHITECTURAL DECORATION OF THE IMPERIAL AGORA'S PORTICOES AT IASOS

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## Abstract

The present study deals with the decoration patterns, the craftsmen and the different marbles used in the porticoes of the Agora of Iasos. The recent discovery of a large white marble quarry district at Milas and a gray banded one at Euromos has suggested that previous hypotheses on the origin of marbles used in the Iasos Agora must be verified. For this purpose, several architectural elements in white and grey veined marbles were sampled and submitted to archaeometrical analyses (EPR, trace analysis and carbon and oxygen isotopes) in order to define exactly their provenance. These analytical results exclude the use of Aphrodisias and Stratonikeia marbles and confirm that of other local and extra-regional white marbles from Milas, Euromos and Proconnesos. This new evidence allowed the reconsideration of the origin of the decorative patterns and of the craftsmen working at Iasos during the mid imperial period.

## Keywords

Iasos' agora, architectural decoration, craftsmen, archaeometric identification

## Introduction

Iasos, a city on a rocky peninsula on the Gulf of Mandalya in Caria, underwent an intense building activity during the first centuries of imperial age. A new district was planned on the southern slopes of the hill and a new aqueduct was built while some of the public Hellenistic monuments were embellished, like the stage fronts of the theater and of the Bouleuterion, or completely reconstructed, like the porticoes of the central agora. In particular the reconstruction is perfectly dated between 136 and 138 AD by the inscription written on the architrave.<sup>1</sup>



Fig. 1. Iasos (Turkey), general view of the Agora from the North-East corner

Up to now only the porticoes of the agora (Fig. 1) and the Bouleuterion were studied, by Elisabetta Pagello<sup>2</sup> and Roberto Parapetti<sup>3</sup> in the 1980s but they dealt only with the general architecture of both monuments without considering their decorative aspects, ornamental patterns and the provenance of the craftsmen. The marble provenance of the agora's porticoes was generally assumed to be from Aphrodisias, Stratonikeia and Milas.<sup>4</sup> The exact identification of the origin of the marbles used in these porticoes is a relevant question because it concerns Aphrodisias marble, the use of which is generally connected to specific craftsmen and decorative patterns from the Carian city. Normally the use of this marble is connected to specific craftsmen related to the Carian marble of the city of Aphrodisias and so the hypothetical presence of this marble opens raises questions. But until now this specific problem has never been discussed, so that the

1 PUGLIESE CARRATELLI 1987, 151-154; TROTTA 2008.

2 PAGELLO 1987, 137-150.

3 PARAPETTI 1987, 105-136.

4 PAGELLO 1987, 140-141.

cultural provenance of the craftsmen who worked at Iasos is still an open question.<sup>5</sup> Macroscopically it could be noticed that for the entablatures, the column capitals and bases of the porticoes of the agora a white coarse grained marble was used, while for the column shafts, as well as the pedestals of the central row of the southern side, a coarse gray veined stepped marble was employed. For this reason, 14 elements of the South and East porticoes of the agora were sampled in order to determine on an analytical basis the marble provenance, which would be useful to define, together with stylistic evidence, the cultural background of the craftsmen involved.

### Marble quarries, decorative tradition and craftsmen: state of research

It is well known that in the 2<sup>nd</sup> century specialized workshops in Asia Minor created a well-defined architectural and decorative language. This was characterized by the use of particular ornamental motifs, such as pointed acanthus leaves, anthemion with palmettes decorating the sima of the cornices, and the modeling of the profile of the trabeation. All these elements became expressions of the so called Asiatic style that was rapidly disseminated not only in Asia Minor but also in other eastern and western Roman provinces by itinerant craftsmen.<sup>6</sup> They were linked to cities and/or quarries such as Aphrodisias, Ephesus, Pergamon, famous for their “architectural decorative schools”,<sup>7</sup> or directly to quarries, such as that of Proconnesos island. In particular the Marmara district had a chief role in the diffusion of the Asiatic style thanks to the export of completely and semi-finished elements and the related activity of their itinerant stonemasons.<sup>8</sup>

Although Iasos is located in Caria, a marble rich region, being on the coastline, with one harbor or more probably two, it could have been easily supplied with extra-regional marbles too. Therefore to ascertain the presence of itinerant Asiatic craftsmen it is necessary to analyze not only the ornamental motifs but also to determine the provenance of the marbles used to embellish and renew the monumental aspect of the cities in Asia Minor, in this case of Iasos, considering the close link between some white marbles and their quarries, stonemasons and patrons. The use of different marbles helps us fully to understand the building processes, restorations or reconstructions of monuments, casting light also on several economic, politic and social historical aspects.

### White marble quarries of Caria

The closest quarry to Iasos is that of Euromos, where from the mid-imperial age a coarse gray veined stepped marble was extracted on the top of the hill near the ancient temple of Zeus.<sup>9</sup> Also not far from Iasos are the quarries of Milas located on the slopes of Sodra Dağ north of the ancient city, where this white coarse grained marble was widely used from late classical times.<sup>10</sup> More than 30 km inland is the large quarry district of Stratonikeia, producing a white medium coarse-grained marble, which was used for the buildings of the Hellenistic and Roman monuments of this ancient city. The extent of the quarry testifies the widespread local use.<sup>11</sup> On the southern shores of Bafa Lake, the ancient Gulf of Latmicus, are the quarries of Miletos and Heracleia on Latmos producing both a medium grained, lightly grey marble used, as it is well known, since the mid-6<sup>th</sup> century B.C. in the nearby Heracleia and for the temple of Apollo at Didyma.<sup>12</sup> But the most important and famous quarry district is that of the so-called city quarries of Aphrodisias located only two kilometers north of the city and producing a coarse grained white grey marble employed

5 On the “quarry of city” ATTANASIO 2003, 162-165; ATTANASIO, BRILLI, OGLE 2006, 162-169; MONNA, PENSABENE 1977, 89-101; PONTI 1996; ROCKWELL 1996. The question about craftsmen involves both sculptural and architectural production: about “itinerant sculptors” FLORIANI SQUARCIAPINO 1940, 80-96; FLORIANI SQUARCIAPINO 1974, 167-170; LANDWEHR, ATTANASIO, BRUNO 2012-2013; on Aphrodisian School of decoration HEILMEYER 1970, 97-101; PENSABENE 2011, 52-54.

6 PENSABENE 2002a, 54; VANDEPUT 1997, 129-147, 155-158; WARD-PERKINS 1992, 85-105.

7 HEILMEYER 1970, 93-101; PENSABENE 2011; about the use of the word “school of sculpture” and its definition see BEJOR 2011.

8 ASGARI 1988; ASGARI 1990; ASGARI 1992; on the question in general PENSABENE 2002a, 50-64; PENSABENE 2002b, 203-205; WARD-PERKINS 1992.

9 PESCHLOW, BINDOKAT 1981, 211; GERMAN 1981, 226; BRUNO *et al.* in the same proceedings; BRUNO, BIANCHI 2015, 77-78.

10 Few information about MONNA, PENSABENE 1977, 117-119. Present quarry information, sampling and analytical data are based on a survey carried out by Attanasio, Bruno, Prochaska, and Yavuz in 2012 and in press.

11 BRUNO *et al.* 2009.

12 MONNA, PENSABENE 1977, 123-124; PESCHLOW BINDOKAT 1981; about analytic data on Miletos and Eracleia marble quarries see GERMAN 1981; ATTANASIO, BRILLI, OGLE 2006, 190-197.





Fig. 2. Iasos (Turkey), Agora, eastern portico, column shafts (from left to right nos. 1, 3, 2)



Fig. 3. Iasos (Turkey), Agora, eastern portico, frieze no. 5



Fig. 4. Iasos (Turkey), Agora, eastern portico, frieze no. 6



Fig. 5. Iasos (Turkey), Agora, northern portico, cornice no. 13

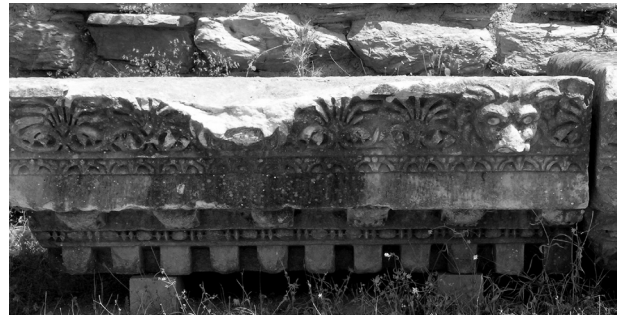


Fig. 6. Iasos (Turkey), Agora, northern portico, cornice no. 14

for sculptural and architectural productions<sup>13</sup>. The importance of these quarries is linked not only to one of the most relevant sculptural schools of imperial times but also to a specific architectural decorative tradition transmitted and disseminated by specialized craftsmen.<sup>14</sup>

### Analyses and provenance

Table 1 lists the fourteen architectural marbles that were sampled and tested at Iasos including 3 column shafts (Fig. 2), 4 friezes (Figs. 3-4), 2 cornices (Figs. 5-6) and 1 Corinthian capital (Fig. 7) from the eastern portico, 3 pedestals (Fig. 8) and 1 floor slab from the southern double

13 For the city and the sculptural and architectural decorative schools connected with the quarries, see note 5; for the other districts LONG, STEARNS 2009; BRUNO *et al.* 2009.

14 Related to Aphrodisias are the quarries of Göktepe, recently discovered 40 kilometers south-west of the city. They produce very fine grained black, which is the most important source of the so called *nero antico*, and white honey colored and translucent marbles, as well as a bichrome variety, which was used by Aphrodisias sculptors to produce statues of high quality from the end of the 1<sup>st</sup> century B.C. with an increasing production from the Hadrianic age until late antiquity. ATTANASIO *et al.* 2008; ATTANASIO, BRUNO, YAVUZ 2009; LANDWEHR, ATTANASIO, BRUNO 2012-2013.



Fig. 7. Iasos (Turkey), Agora, eastern portico, Corinthian capital no. 8



Fig. 8. Iasos (Turkey), Agora, southern portico, pedestal no. 11

No.	Location	Description	MGS mm	$\delta^{18}\text{O}$ ‰	$\delta^{13}\text{C}$ ‰	EPR Intensity %	EPR Linewidth %	Provenance	Relative Probability %	Absolute Probability %
1	East portico	Column shaft, stepped	1.75	-6.40	1.36	181.3	55.2	Euromos	98	84
2		Column shaft, stepped	1.1	-7.37	2.06	212.1	63.2	Euromos	93	63
3		Column shaft brecciated	0.7	-4.79	4.20	115.2	56.7	Unknown (Ephesos 1 ?)		
4		Frieze, white	0.7	-3.74	1.09	35.5	54.7	Milas	66	71
5		Frieze, white	0.6	-4.31	1.88	15.3	42.6	Milas	97	61
6		Frieze, white	0.4	-2.60	2.83	30.5	54.9	Milas	94	23
7		Frieze, white	0.8	-3.91	1.63	33.6	44.3	Milas	90	97
8		Capital, white	0.65	-4.16	1.70	12.0	50.9	Milas	88	71
9	South portico	Pedestal, stepped	0.9	-7.75	1.28	97.0	58.2	Euromos	92	68
10		Pedestal, stepped	0.7	-8.53	2.17	72.4	60.5	Euromos	61	12
11		Pedestal stepped	0.9	-7.49	1.52	131.8	56.6	Euromos	85	80
12		Floor slab, white	1	-1.33	1.61	4.6	52.7	Proconnesos	44	32
13	North portico	Cornice, white	md coarse	0.07	3.35	4.1	42.7	Proconnesos	58	12
14	portico	Cornice, white	md coarse	-1.98	3.14	18.3	43.6	Proconnesos	45	40

Table 1. Analytical and provenance data for 14 architectural marbles sampled at Iasos. Isotopes and EPR parameters are given ‰ o % with respect to the Pee Dee Belemnite and Dolomite N368 BCS standards, respectively. Statistical probabilities are defined in ATTANASIO, BRILLI, OGLE 2006

No.	Site, samples	MGS	$\delta^{18}\text{O}$ ‰	$\delta^{13}\text{C}$ ‰	EPR Intensity %	EPR Linewidth %
1	Euromos, 56	1.27	-6.25	1.73	118.9	55.6
2	Afyon, 65	0.86	-4.32	1.82	246.2	54.0
3	Altıntaş, 48	0.67	-5.38	2.27	158.3	57.7
4	Proconneso 1, 380	1.72	-2.08	2.65	6.0	57.8
5	Milas, 40	0.88	-3.49	1.97	45.5	48.7
6	Mileto, 56	1.49	-2.56	2.05	17.7	53.2
7	Efeso 1, 88	1.74	-4.42	3.81	60.0	56.4
8	Efeso 2, 38	1.71	-3.14	0.35	41.8	45.5
9	Herakleia, 51	1.61	-2.59	1.74	22.6	53.2

Table 2. Mean variable values for nine Asiatic fine - and medium-grained marbles considered to be possible sources for the Iasos samples and included into the database. Units are as in Table 1

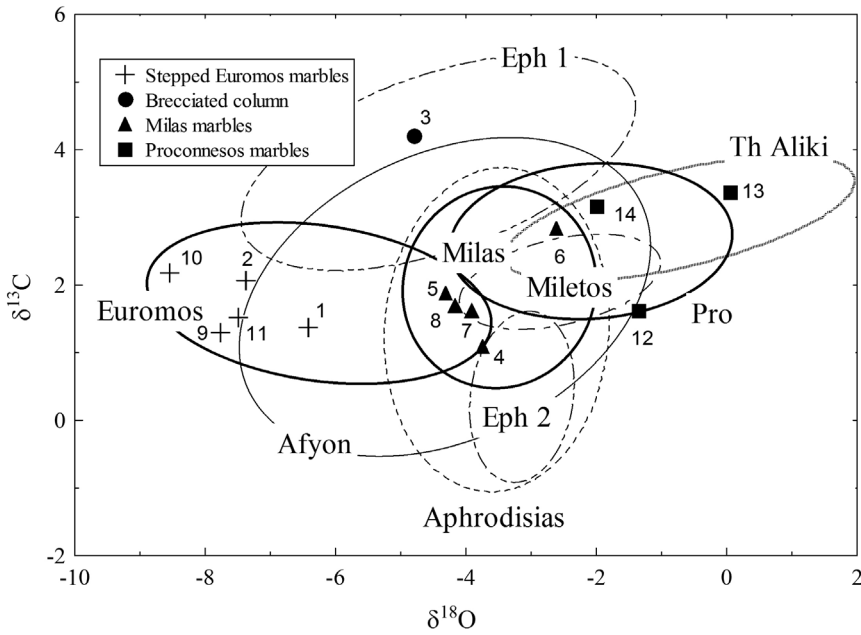


Fig. 9. Isotopic diagram of the 14 architectural marbles tested at Iasos



Fig. 10. Iasos (Turkey), Agora, eastern portico, Corinthian capital in white marble placed on the column shaft no. 2



Fig. 11. Iasos (Turkey), Agora, eastern portico, Corinthian capital in white marble placed on the column shaft no.1

portico<sup>15</sup>. The provenance was obtained following a well established procedure that uses statistical data analysis of isotopic, EPR and grain size measurements to obtain the most probable quarry of provenance among a set of sources deemed to be viable on the basis of archaeological considerations and analytical properties.<sup>16</sup> The same procedure was adopted also for stepped marbles originating from Euromos despite the fact that this variety can be easily and unmistakably identified by eye and has no

15 The two cornices are placed in the northern portico.

16 ATTANASIO, BRILLI, OGLE 2006.

likely alternatives among known ancient marble sources.<sup>17</sup> The database selection used for this work is shown in Table 2 where the main properties of single quarry sites are summarized using mean variable values. Results of the statistical analysis of provenance are listed in Table 1 using the probability parameters defined elsewhere<sup>16</sup> and are illustrated by the isotopic graph of Figure 9. With few exceptions all assignments and in particular the Milas quarry provenance of the friezes with people scrolls (nos. 4-7) and the Corinthian capital no. 8 appear to be clear

17 For the Euromos quarries, BRUNO *et al.* in this volume.



Fig. 12. Iasos (Turkey), Agora, northern portico, Corinthian capital in white marble placed on the column shaft at the North-East corner



Fig. 13. Iasos (Turkey), Agora, northern portico, architrave in white marble



Fig. 14. Iasos (Turkey), Agora, eastern portico, architrave with inscription in white marble

and unquestionable. The same is true for the Euromos provenance of all stepped marbles (nos. 9-11). The marble of column no. 3 is characteristically brecciated and was assumed at first to be a variety of Euromos marble. But this is not the case. However, as shown clearly by the analyses, the exact provenance of this stone could not be determined, despite the fact that the data are compatible with a possible Ephesos 1 origin. The isotopic values and the weak EPR intensity of the floor slab confirm the macroscopic identification as Proconnesian marble. Proconnesian provenance is also suggested for the two cornices nos. 13 and 14, though these artifacts exhibit some atypical parameter values that make their provenance less obvious.

### Architectural decorative patterns and craftsmen of the porticoes of Agora

We will proceed now to an analysis of the ornamental features of the architectural elements relevant to the agora of Iasos in order to define the ornamental patterns and the origin of the craftsmen. This analysis concerns the items of the northern and eastern porticoes, which are well preserved<sup>18</sup>.

The Corinthian capitals (Figs. 10-11) are generally characterized by slender and fan-shaped acanthus leaves, deeply drilled middle lobes of the leaflets, mid ribs of leaves flanked by deep drilled veins; the mid-ribs of the leaves of the upper row can go as far as the base of the *kalathos* or stop at the upper lobes of the middle leaflets of the lower row of acanthus leaves. The leaflets are separated by oblique almond-shaped eyelets, sometimes characterized by a straight long side and lower edges. Geometrical figures are created on the surface of the *kalathos* by touching pointed lobes of the lower adjacent leaflets. The caules are generally a simple triangular projection, the bracts are composed of two leaves separated by triangular eyelets, the lower one of which has a rather narrow and elongated shape. The drooping top leaves of the bracts touch the acanthus leaf placed above the overhanging top leaflet of the acanthus leaves of the upper row. Volutes and helices have a narrow and slightly concave ribbon, and the abacus is well shaped. The fluted-and-acanthus capitals (Fig. 12) pertinent to the inner colonnade of the northern portico have two rows of acanthus leaves wrapping the lower half of the *kalathos*, while the upper one is covered by flutes.

18 A few new architectural fragmented elements were discovered in the excavations made by the Italian archaeological mission directed by M. Spanu in 2012 and 2013, BERTI 2015; ROMAGNOLI 2012; SPANU 2012, 446-447; SPANU 2013, 2-3; SPANU 2014, 575-578.



Fig. 15. Iasos (Turkey), Agora, eastern portico, frieze with peopled scrolls in white marble



Fig. 16. Iasos (Turkey), Agora, northern portico, cornice in white marble. The anthemion is decorated with a Silenus head

The acanthus leaves are typologically identical to those of the Corinthian capitals; the flutes have a well shaped semi-circular upper edge.

The acanthus leaf of these two types of capital is comparable with that of the Corinthian and fluted-and-acanthus capitals of the temple of Zeus at Euromos<sup>19</sup> and of the City Gate of Mylasa both of the Hadrianic period<sup>20</sup>. The capitals of the temple of Hadrian at Ephesus<sup>21</sup> of the late Trajanic period show the basic pattern of this type of acanthus leaf, a pattern testified to also by the contemporary capitals of the portico of Labraunda<sup>22</sup> and by those of the second floor of the Agora Gate of Miletos of Hadrianic age, where probably Ephesian craftsmen also worked<sup>23</sup>.

19 PÜLZ 1989, 452-453, tab. 44, 1, 3-4.

20 VANDEPUT 1997, tab. 98, 1.

21 VANDEPUT 1997, 138, tabs. 87, 1.

22 VANDEPUT 1997, 136, tab. 94, 3.

23 STROCKA 1981, 31; KÖSTER 2004, 128-129, tabs. 89, 2; 132.

The architraves of the northern (Fig. 13) and eastern (Fig. 14) porticoes have canonical top moldings (anthemion, egg-and-dart, bead-and-reel) and are divided in three bands separated from each other by a “rope” and a bead-and-reel. The ionic kyma has eggs that are large and pointed, with frames by sloping edges, separated by darts. The bead-and-reel is composed of disc-shaped reels and globular beads or by oval beads and rhomboidal reels, the “rope motif” by oblique segments distinguished by a soft vein. The anthemion of the architraves of the northern portico is composed of palmettes of varied shapes, alternately open and closed with a U-shaped linking scroll, while that of the eastern portico shows palmettes alternately opened and closed, placed side by side and linked by additional eyelets. Quite uniform is the carving of the moldings with the exception of the anthemion: those of the architraves of the northern portico are characterized by a more or less soft or hard carving but generally the workmanship is of high quality;<sup>24</sup> the anthemion of the architraves of the eastern portico seems more flat and cut out on the background surface by drill work. The Ephesian Temple of Hadrian<sup>25</sup>, the Celsus Library and the Temple of Zeus at Euromos give the patterns for these moldings even if the Ionic kyma with enlarged frames is still limitedly used.<sup>26</sup>

The convex frieze of the northern portico, crowned by an Ionic kyma is smooth, unlike that of the eastern portico, which is overrun by acanthuspopulated scrolls (Fig. 3-4) in high relief. The pattern is formed by series of pairs of stems completely covered by leaves, rising by a populated acanthus bush. By the main stems, moving with sinuous movement on the convex surface of the frieze, the secondary stems detach, rolling up and ending in flowers or animals. The series of scrolls are linked (Fig. 15) by standing figures holding them in their hands. Shoots fill the empty surface between the scrolls so that the background is almost totally obliterated. Generally there are signs of drill work on the surface of the vegetal elements, small holes or deep veins being left, creating a well defined patterns of light and shade: in some cases the elements lose so much of their natural vitality that the final result is not

24 Only one item is completely different in carving by the other ones so that could be pertinent to a later restoring.

25 STROCKA 1981, 26; KÖSTER 2004, tab. 115.

26 This type of kyma will be more typical of the Hadrianic period, as items of the Temple of Zeus at Kyzicos and the Temple of Serapis at Ephesus testify, BARATTOLO 1995, 86, tab. 31, 1-2; STROCKA 1988, 303-305, tab. 47. The rope motif distinguishes the second fascia by the last one in the architrave of the trabeation of the second storey of Celsus Library; this motif is more used in the II century, KÖSTER 2004, 161, 164.

very plastic or dynamic, but in others, the figures and the acanthus leaves are soft and well modeled. The patterns of these friezes are those of the Celsus library (113-117 AD) and the Temple of Hadrian on Curetes Street (117-118 AD), which have been updated: the scrolls, covering the largest part of the available surface, reflect the further decorative development of the Hadrianic period<sup>27</sup>.

The cornices of the the northern portico have a cyma decorated by an anthemion composed of upright and pendent palmettes adorned in an acanthus-like-way too, with alternating lion and Silenus heads (Fig. 16). The corona below has concave flutes, the ceiling is supported by consoles with underlying acanthus leaves while the coffers are surrounded by an Ionic cyma and filled by flowers. The leaf-and-dart below crowns the dentils used as bed-molding. All the decorative elements are generally very well worked and in some cases characterized by a powerful undercut which makes them almost completely free of the background surface. The cornices (Figs. 5-6) of the eastern portico are different only in the type of anthemion decorating the cyma, separated by the smooth corona by the leaf-and-dart, while above the dentils is a bead-and-reel. The anthemion is composed of upright palmettes alternately open and closed of varied shapes linked by only one or two joined S-shaped horizontal tendrils ending with two small leaves, without melting into the lower side leaves of the palmettes. The vegetal decoration of the cyma and of the other parts of the cornice is generally flat, undercut much more deeply by the drill, the result being a hard and cold carving.

The cornices of the two porticoes generally reflect the Ephesian decorative architectural tradition of the late Trajan period: the flutes ornamenting the corona, the shape of the dentils, square or more rectangular, the leaf-and-dart with the midriff not yet divided into three parts and the cut top of the stirrup frame, the acanthus leaves of the consoles and the ionic cyma of the coffers are characteristic of the decoration of the Celsus Library and of the temple of Hadrian.<sup>28</sup>In particular the leaf-and-dart crowning the dentils or the corona is used in the cornice of the trabeation of the first and second storey of the Agora Gate at Miletos<sup>29</sup> and in the Ephesian monuments mentioned above. To these can be added

the cornices of the Nymphaion F3 of Perge of the Hadrianic period where bead-and-reel over the dentils is also used<sup>30</sup>. Despite the Ephesian basic patterns not that the type of anthemion as the carving quality of the cornices of North portico could indicate a gap of the construction of the porticos. In fact the anthemion is quite comparable with that of the cornices of Vedius gymnasium at Ephesus dated to the middle of the 2<sup>nd</sup> century<sup>31</sup>.

The analysis allows us to highlight first and foremost the spread of Ephesian models in Iasos and in its nearby towns: the capitals of the temple of Hadrian at Ephesus are the patterns of those of the temple of Zeus at Euromos and of the City Gate of Mylasa, both of the Hadrianic period; some aspects of the decoration of the Agora at Miletos reflects the same Ephesian ornamental tradition. This last one is well testified to also by the architectural decoration - capitals and entablature - of the porticoes of Iasos Agora. This tradition is transmitted not only by regional craftsmen, who had just worked in the cities of Euromos, Mylasa and Miletos but also directly by Ephesian masters. The carving quality of some friezes and of the cornices of the north portico of the agora suggests, in fact, the working of extra-regional-craftsmen.

## Conclusions

The archaeometric analyses of the sampled elements allow us to exclude the use of marble of Aphrodisias and to establish that of local origin from the Euromos and Milas quarries as well as that of Proconnessos. The analyses of the decoration have shown the use of Ephesian patterns at Iasos as well as in nearby towns, the work of regional and extra-regional craftsmen, in particular of Ephesian origin, and a gap in the construction of the porticoes of Iasos Agora. In fact, the two sampled cornices in Proconnessian marble of the eastern portico show a carving quality and an anthemion type different from those on the northern portico, and they are comparable with the cornices of the Vedius Gymnasium at Ephesus, dated around the mid-2<sup>nd</sup> century. One of the two inscriptions of the architraves of the eastern portico, pertaining to the North-East side of the trabeation, is dated to 136 A.D.; the other is dated to 138 A.D. and was visible in the central part of the colonnade. The first inscription recalls that Dionysios, son of Theophilos, paid for and provided the architectural elements of the portico, the stylobate, column bases and shafts and the relief decorative elements; the second inscription, pertinent to the central part of the colonnade, commemorates the Ierocles donation in order to complete the building of the Eastern portico. The earthquake of 139

27 STROCKA 1978, 896-899, tab. 286, 11-12; VANDEPUT 1997, 155; 156; tabs. 85, 2; 86, 2.

28 In particular for the use of flutes decorating the corona and the anthemion of the cyma see the decoration of the cyma and of the cavetto under the corona of the cornice of the lower storey of the Celsus Library, STROCKA 1978, 895, tab. 282, 3, and the cornice of the trabeation of the Hadrian Temple, KÖSTER 2004, t. 115.

29 KÖSTER 2004, 127-128, tab. 83, 2; 130-131, tab. 97, 1.

30 VANDEPUT 1997, tabs. 106, 2 and 107, 2.

31 VANDEPUT 1997, tab. 88, 1.

A.D. forced its construction to be completed rapidly, and the elements of the trabeation are undecorated in the southern end of the colonnade. To this last building phase belong the two sampled cornices in Proconnesian marble decorated in different ways.

The preliminary study of architectural decoration of some elements of the trabeation of the northern and eastern porticoes of the agora has shown the link with the Ephesian patterns disseminated by itinerant craftsmen in the Carian region in the Hadrianic period. The architectural decoration of the porticoes of the agora at Iasos is another expression of this cultural environment. Decorative and carving types reflect not only the different quality levels of the craftsmen, both regional and extra-regional, who worked all together in the Iasos agora, producing its architectural ornament, but also the building history of the porticoes. In fact, the agora of Iasos, thanks to the inscriptions of the eastern portico is a fixed point of the knowledge of architectural decoration of the Hadrianic period in Asia Minor and of the diffusion of Ephesian patterns in the Carian region.

## BIBLIOGRAPHY

- ASGARI N. 1988: "The stages of workmanship of the Corinthian capital in Proconnesus and its export form", in *ASMOSIA I*, 115-125.
- ASGARI N. 1990: "Objects de marbre finis, semi-finis etinachevés du Proconnèse", in M. WAELEKENS *et al.* (eds.): *Pierre éternelle du Nil au Rhin. Carrières et fabrication*, 106-126.
- ASGARI N. 1992: "Observation on two types of quarry items from Proconnesus", in *ASMOSIA II*, 247-252.
- ATTANASIO D. 2003: *Ancient white marble: analysis and identification by paramagnetic resonance spectroscopy*, Rome.
- ATTANASIO D., BRILLI M., OGLE N. 2006: *The isotopic signature of classical marbles*, Rome.
- ATTANASIO D., BRUNO M., YAVUZ A. B., ELÇI E. 2008: "Aphrodisias and the Newly Discovered Quarries at Göktepe", in: R. R. R. SMITH, J. L. LENAGHAN (eds.): *Roman Portraits from Aphrodisias. Exhibition Catalogue*, Istanbul, 217-227.
- ATTANASIO D., BRUNO M., YAVUZ A. B. 2009: "Quarries in the Region of Aphrodisias: the Black and White Marbles of Göktepe (Muğla, Turkey)", *JRA* 22, 312-348.
- BARATTOLO A. 1995: "The Temple of Hadrian-Zeus at Cyzicus. A new Proposed Reconstruction for a Fresh Architectonic and Ideological Interpretation", *IstMitt* 45, 57-108.
- BERTI F. 2015: "La *stoà* occidentale dell'agorà di Iasos in età romana", *Studi classici e orientali*, 61, 2, 5-22.
- BEJOR G. 2011: "Produzioni e scuole: uno sguardo alla questione", in F. D'ANDRIA, I. ROMEO (eds.): *Roman Sculpture in Asia Minor*, 32-36.
- BRUNO M., ELÇI H., YAVUZ A. B., ATTANASIO D. 2009: "Unknown Marble Quarries of Western Asia Minor", in *ASMOSIA IX*, 562-572.
- BRUNO M., BIANCHI F. 2015: *Marmi di Leptis Magna*, Roma.
- FLORIANI SQUARCIAPINO M. 1940: *La Scuola di Afrodizia*, Roma.
- FLORIANI SQUARCIAPINO M. 1974: *Sculture del Foro Severiano di Leptis Magna*, Roma.
- GERMAN K. 1981: "Lagerstätteneigenschaften und herkunftstypische Merkmalsmuster von Marmoren am Südwestrand des Menderes-Massivs (Südwestanatolien)", in *PESCHLOW-BINDOKAT 1981*, 214-235.
- HEILMEYER W. D. 1970: *Korintische Normalkapitelle. Studien zur Geschichte der römischen Architekturdekoration*, Heidelberg.
- KÖSTER R. 2004: *Die Bauornamentik von Milet, Teil 1, Die Bauornamentik der frühen und mittleren Kaiserzeit*, Berlin – New York.

- LANDWEHR C., ATTANASIO D., BRUNO M. 2012-2013: "The sculptural marbles of Caesarea Mauretaniae (Cherchel, Algeria)", *JdI* 127-128, 227-260.
- MONNA D., PENSABENE P. 1977: *Marmi dell'Asia Minore*, Roma.
- PAGELLO E. 1987: "Il foro romano imperiale. Considerazioni preliminari", in *Studi su Iasos di Caria. Venticinque anni di scavi della Missione archeologica italiana*, Roma, 137-150.
- PARAPETTI R. 1987: "Il bouleuterion. Aspetti architettonici e decorativi", in *Studi su Iasos di Caria, Venticinque anni di scavi della Missione archeologica italiana*, Roma, 105-136.
- PENSABENE P. 2002a: "Il fenomeno del marmo nel mondo romano", in M. DE NUCCIO, L. UNGARO (eds.): *I marmi colorati della Roma imperiale*, Venezia, 3-67.
- PENSABENE P. 2002b: "Le principali cave di marmo bianco", in M. DE NUCCIO, L. UNGARO (eds.): *I marmi colorati della Roma imperiale*, Venezia, 203-265.
- PENSABENE P. 2011: "Su alcuni aspetti produttivi delle "scuole" di scultura di Docimio, Afrodizia e Nicomedia", in F. D'ANDRIA, I. ROMEO (eds): *Roman Sculpture in Asia Minor*, 37-61.
- PESCHLOW-BINDOKAT A. 1981: *Die Steinbrüche von Milet und Herakleia am Latmos*, *JdI* 96, 158-235.
- PONTI G. 1996: "Ancient quarrying at Aphrodisias in the light of geological configuration", *Aphrodisias Papers* 3, 105-110.
- PUGLIESE CARRATELLI G. 1987: "Le due dediche della stoà orientale", *Studi su Iasos di Caria, Venticinque anni di scavi della Missione archeologica italiana*, Roma, 151-154.
- PÜLZ S. 1989: "Zum Zeus tempel von Euromos", *IstMitt* 39, 451-453.
- ROMAGNOLI G. 2012: "Scavi nella *stoà* settentrionale dell'agorà di Iasos. Campagna 2011", *Bollettino dell'Associazione Iasos di Caria* 18, 10-14.
- SPANU M. 2012: "Iasos 2011", *Kazı Sonuçları Toplantısı*, 34, 2, 445-454.
- SPANU M. 2013: "La campagna 2012 a Iasos", *Bollettino dell'Associazione Iasos di Caria* 19, 2-6.
- SPANU M. 2014: "The 2012 and 2013 excavation and research campaigns at Iasos", *Kazı Sonuçları Toplantısı* 36, 3, 575-596.
- STROCKA V. M. 1978: "Zur Datierung der Celsusbibliothek", in E. AKURGAL (eds): *The Proceedings of the X<sup>th</sup> International Congress of Classical Archaeology*, Ankara-Izmir 23-30/IX/1973, 2, Ankara, 893-900.
- STROCKA V. M. 1981: *Das Markttor von Milet*, Berlin.
- STROCKA V. M. 1988: "Wechselwirkungen der stadtrömischen und kleinasiatischen Architektur unter Trajan und Hadrian", *IstMitt* 38, 291-307.
- TROTTA F. 2008: "A proposito delle due dediche della stoà orientale", in *Iasos in età romana. Miscellanea storico-archeologica*, Ferrara, 7-15.
- VANDEPUT L. 1997: *The Architectural Decoration in Roman Asian Minor. Sagalassos: a Case Study*, Katholieke Universiteit Leuven.
- WARD PERKINS J. B. 1992, "Nicomedia and the Marble Trade", in H. DODGE, B. WARD PERKINS (eds): *Marble in Antiquity*, London, 61-105.