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The background of the page features three large, horizontally aligned marble relief sculptures of human faces. The faces are carved with detailed features, including eyes, noses, and mouths. The marble has a warm, aged tone. Below the faces, there are faint traces of other sculptures and inscriptions in Greek characters.

ABSTRACT

The Sculptures of the Archaeological Museum of Thessaloniki Characterization of Marble and Workshops

Theodosia Stefanidou-Tiveriou – Emmanuel Voutiras – Dimitris Tambakopoulos –
Yannis Maniatis

This combined archaeometric and archaeological study complements the Catalogue of Sculptures of the Archaeological Museum of Thessaloniki. The systematic archaeometric analysis of 96 sculptures using a combination of optical, isotopic and spectroscopic techniques has shown that in Thessaloniki and in central Macedonia the marbles used in Antiquity for sculpture came predominantly either from quarries in Thasos Island and mainland Macedonia or from quarries in southern Greece, especially Mount Penteli and Paros; marbles from Asia Minor were also occasionally used. Based on these results we investigated the sculptural production of Macedonia from the beginning of the 5th century B.C. to the beginning of the 5th century A.D., taking into account a number of sculptures whose marble could be identified either macroscopically or using the results of earlier analyses. The stylistic analysis suggests that the local workshops could use not only local but also imported marbles. We have also been able to show that ready-made works of sculpture were imported to Macedonia and that immigrant artists produced sculptures using not only imported but also local Macedonian marbles as well as from the island from Thasos.

KEYWORDS

Thessaloniki, Northern Greece, ancient sculptures, workshops, marble provenance, isotopes, Electron Paramagnetic Resonance Spectroscopy, grain-size, Thasos, Penteli, Vermio, Paros, Proconnesos, Göktepe, Afyon/Dokimeion

The Sculptures of the Archaeological Museum of Thessaloniki

Characterization of Marble and Workshops

Introduction

¹ The recent completion of the four-volume »Catalogue of the Sculptures of the Archaeological Museum of Thessaloniki«¹ also affords us the opportunity to present the results of the scientific analysis of marble samples aiming to the determination of marble provenance, conducted in the context of a more comprehensive study and understanding of these sculptures. The archaeometric analysis carried out by the Laboratory of Archaeometry of the National Centre for Scientific Research »Demokritos« was part of the research program »Sculpture and Society in Roman Greece: Political, Economic and Religious Context under the Aristeia (Excellence) II Action of the Operation Program »Education and Lifelong Learning«« (NSRF 2007–2013) sponsored by the General Secretariat for Research and Technology².

² The Catalogue of Sculptures contains 1203 sculptures belonging to all categories, mainly originating from Thessaloniki and Macedonia in general and also from Thrace, albeit to a lesser extent. At this point, we have to note the archaeological collection of Raideostos, on the northern shore of the Sea of Marmara (present-day Tekirdağ), formed during the second half of the 19th century and the early 20th century, the largest part of which was incorporated into the collection of the Archaeological Museum of Thessaloniki³. There are also several sculptures of unknown provenance, most of which most likely originate from Northern Greece. The sculptures cover a broad period of time, from the early 5th century B.C. to the early 5th century A.D., and almost all are made of marble. Determining the origin of marble using a properly documented and reliable

¹ The following applies for the photographs presented in this article: The rights to the depicted monuments belong to the Greek State and the Ministry of Culture and Sports (Law 4858/2021). The monuments are under the jurisdiction of the Archaeological Museum of Thessaloniki. © Archaeological Museum of Thessaloniki, Hellenic Ministry of Culture & Sports – Hellenic Organization of Cultural Resources Development. The inventory number with the abbreviation ATME refers to photographs from the Photographic Archive of Sculptures in the Cast Museum of the Aristotle University of Thessaloniki. For the catalogs see Despinis et al. 1997; Despinis et al. 2003; Despinis et al. 2010; Stefanidou-Tiveriou – Voutiras 2020.

² See Stefanidou-Tiveriou et al. 2014.

³ Adam-Veleni et al. 2016.

method involving a combination of scientific techniques is one of the key requirements for their substantiated study. However, in some cases pinpointing a single quarry of origin may be quite challenging as in some cases the parameters of quarries from different origins overlap. For this reason, the qualitative features of the marble as deduced by an in-situ examination of the whole sculpture are taken into account⁴. Based both on the experience of the researchers⁵ and on the sample bank kept at the laboratory the discrimination between like marbles of different origins can be improved. In addition, the archaeological/art-historical information by identifying the workshop where a sculpture or group of sculptures were created is also taken into account, which may be decisive when the scientific analysis reaches to two or more possible but indistinguishable origins. In most cases, sculptures can be distinguished on the basis of their typological and stylistic features, but also frequently through their iconography, into works produced by local workshops (which form the majority) and imported works. As a rule, imported sculptures were created by major workshops whose production was widely disseminated and is therefore, in many cases, easily recognizable. One typical example of imported sculptures standing out due to their high quality are Attic sarcophagi of the middle Imperial period⁶. For other sculpture categories, e.g., free-standing sculpture/statue, identifying the workshop of origin is not so trivial. But even in the cases of positive workshop identification, the assumption that major workshops only used marbles from the region where they were established should not be considered an absolute certainty. For example, we know that during the Imperial era Athenian sculptors used Thasian marble on occasion⁷.

³ With respect to local workshops, it may be considered highly likely that they used marble from quarries situated not very far from their premises. In the case of Northern Greece, the most important marble quarries that were exploited in Antiquity were, to our knowledge, those of Thasos Island and Vermio mountain in west Macedonia. According to all indications at hand, Vermio marble⁸ was the chief material used by the workshops of Veroia, especially in the Late Hellenistic and Early Imperial era. The stylistic characteristics of the Veroia workshops during this period have been thoroughly studied by Victoria Allamani-Souri in her book on the tombstones from Veroia⁹. In light of the style and the signatures by sculptors from Veroia, we conclude that during this time the Veroia workshops were active throughout central Macedonia and also in Thessaly. Determining scientifically that the marble of the sculptures attributed to the Veroia workshops on the basis of their typology and style originates from Vermio as far as the analyzed samples are concerned, makes it possible to attribute to these workshops, with a high degree of probability, Macedonian sculptures surviving in fragments or with a typology or stylistic features that cannot be easily identified.

⁴ The problem of attributing sculptures made of Thasian marble to specific workshops is more complex. On Thasos there are mainly two different kinds of marble that were extensively used in architecture and sculpture from the Archaic period until Late Antiquity. The fact that Thasian marble, especially of the dolomitic variety¹⁰, is relatively easy to identify macroscopically helped identify sculptures made of Thasian marble at numerous sites throughout the Roman empire¹¹. Sculptures made of Thasian

⁴ Tambakopoulos et al. 2019; Maniatis et al. 2021.

⁵ Ashmole 1970.

⁶ See e.g., Koch – Sichtermann 1982, esp. 350; Stefanidou-Tiveriou 2010, 155 n. 10–12 fig. 4; Tambakopoulos et al. 2019.

⁷ See Stefanidou-Tiveriou 2022.

⁸ Vakoulis 2000, 38–77; Vakoulis et al. 2002.

⁹ Allamani-Souri 2014.

¹⁰ See e.g., Attanasio 2003, 136–143; Herrmann – Newman 1999.

¹¹ Stefanidou-Tiveriou 2022, 17 f. with relevant literature.

marble both dolomitic and calcitic also have been found throughout Macedonia and Thrace, and it is clear that this material was used not only by the local workshops of Thasos but by several other workshops as well¹². It goes without saying that in such cases identifying scientifically the marble helps confirm or refute the empirical observations. Regarding the Late Archaic and Early Classical period, the relatively few sculptures made of Thasian marble of both varieties found in the region of Macedonia can be attributed with great probability to a Thasian workshop, on the basis of their good quality and stylistic homogeneity. Moreover, from the 4th century onwards and particularly during the Late Hellenistic and Imperial period, the wide dissemination and diversity of sculptures made of Thasian marble leads one to conclude that marble workshops in the broader area of Macedonia and Thrace had developed a preference for this material. One workshop that, as shown by archaeometric analyses, extensively used Thasian marble to manufacture local sarcophagi was that of Thessaloniki¹³. The accurate detection of Thasian marble using archaeometric methods can help identify with more precision the production of these workshops, as well as their geographical distribution.

5 Sculptures that cannot be shown to be products of local workshops on the basis of their style are often difficult to attribute to a specific workshop through archaeological analysis alone, with the exception of cases in which the marble is so obviously characteristic that its provenance can be determined macroscopically. This is why determining the provenance of the marble through archaeometric methods provides the only reliable basis that allows us to identify the workshop in combination with other features.

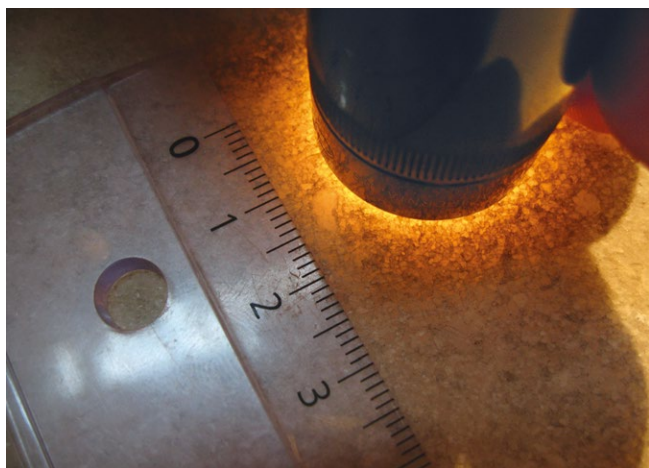
6 Another interesting question is related to the use of various marbles in different regions and periods. The confirmation of the provenance of marble through archaeometric methods enables us to identify with relative accuracy the geographical distribution of the production of local workshops, based on the assumption that they used marble from specific quarries. We can also monitor the fluctuations in the volume of production of these workshops over time, as well as the dissemination of imported sculptures in specific regions and during specific eras.

Materials and Techniques

7 The total number of marble objects examined and analyzed from the Archaeological Museum of Thessaloniki were 107. They included free standing sculptures, reliefs and architectural elements. However, the sculptures reported in this work are 96, the rest are mainly architectural pieces which will be reported in a future publication. The 96 sculptures analyzed and reported here are listed and described in Table 1. The missing sample numbers correspond to the architectural pieces not presented in this work. The sculptures belong to all categories, but are not representative of the frequency with which specific types of marble have been used in ancient Macedonia. The main reason for this is that some marbles, such as the Thasian (both calcitic and dolomitic), are relatively easy to identify macroscopically, which allowed us to limit the number of samples considerably. We took more samples from marbles that macroscopically show the characteristics of the Pentelic, given the relatively high frequency of sculptures imported from Attica. Also, several samples were taken from sculptures whose marble seems to have come from the Vermio mountain range, some 80 km west of Thessaloniki, as well as from sculptures for which there are indications that they are made in Par-

12 Maniatis et al. 2010; Stefanidou-Tiveriou 2014, 127–140. 149–155.

13 Maniatis et al. 2010; Stefanidou-Tiveriou 2014, 127–140. 149–155.



1



2

Fig. 1: Examination of the marble crystallinity and grain size with a light source and a mm rule of the whole object in situ

Fig. 2: Examination with a Dino-Light digital microscope

an or *Proconnesian* marble. Additionally, samples were taken from sculptures whose marble appeared to come from Asia Minor. Criteria such as the artistic quality and the historical significance also played an important role in the selection of sculptures for sampling. In the case of particularly interesting and outstanding works it was even more important to determine with the most complete possible scientific documentation the origin of the marble.

8 All sculptures selected for analysis were examined first in situ non-destructively and then were sampled and the samples were analyzed in detail at the laboratory.

In-situ Examination

9 The whole objects were examined at the Archaeological Museum of Thessaloniki prior to sampling. A cold light source, a millimeter scale and a magnifying lens 10x were used for measuring the Maximum Grain Size (MGS) and the Most Frequent grain Size (MFS), and characterizing the color, the marble structure and other qualitative features, such as the translucency, the veins and the inclusions (Fig. 1)¹⁴. This in-situ non-destructive examination is very essential as it allows the observation and recording of the physical characteristics of the marble in several parts of the whole object, obtaining in this way an overall and average assessment of the marble features, overcoming the limitations of the sample which is unavoidably small.

10 Furthermore, using a digital portable microscope (Dino-Light premium, magnification range 20–260x), surface details, such as remains of pigments or gilding were investigated and recorded (Fig. 2).

Sampling and Laboratory Examination and Analysis

11 A total number of 101 samples were received from the 96 selected sculptures. Some sculptures were consisting of more than one piece joined together or they were in separate fragments. In these cases, more than one sample was taken in order to check whether all pieces were made from the same marble. They are designated with letters (A, B, C, D) following the number of the sculpture (Table 2).

12 The samples were small and in the form of a few marble flakes obtained from a broken, or a non-worked surface of each object with a fine chisel. Hence, the sampling was practically non-invasive as regards the artistic, aesthetic or historical information of the object.

13 These flakes were used for the following laboratory examination and analysis:

1. Examination of the flakes under a stereoscopic optical microscope, qualitative examination of the marble crystalline features and comparing the Maximum Grain Size (MGS) with that obtained from the whole object.
2. Electron Paramagnetic Resonance Spectroscopy (EPR).
3. Stable Isotope Analysis (IRMS) for carbon and oxygen.

14 A description of the principles of these techniques and the methodology for provenance determinations can be found in the relevant literature¹⁵. Following the examination of the samples under the microscope they were prepared for EPR and Stable Isotope measurements.

15 For the EPR spectroscopy the samples were cleaned from dirt and weathering crusts mechanically and then chemically with weak HCl acid. The clean samples were then ground gently in an agate mortar, so that no grinding peaks were induced in the EPR spectrum¹⁶. The ground samples were sieved with US standard sieves and the fractions between 63 and 180 μm were used for EPR measurements as determined and discussed elsewhere¹⁷. As described in Polikreti and Maniatis (2002)¹⁸ and in Tambakopoulos and Maniatis (2017)¹⁹, three spectra were taken for each powder sample at different operating conditions using an X-Band EPR spectrometer (EPR BRUKER ER-200) operating at 9.47 GHz frequency. The parameters Mn^{2+} and Fe^{3+} , expressed in relative units (r.u.), and *Width*, expressed in Gauss, were measured. The percentage of dolomite *Dol* in a predominantly calcitic marble is measured from the low magnetic field peak of the Mn^{2+} sextet, as described by Tambakopoulos and Maniatis²⁰. A pure or almost purely dolomitic marble (e.g., the Thasian dolomitic) has a very characteristic spectrum, easily identified with EPR.

16 For Stable Isotope Analysis, aliquots from the prepared samples for EPR analysis, consisting of grain fractions < 63 μm , were further ground to a very fine powder and submitted for isotope analysis to the Department of Applied Geosciences and Geophysics, University of Leoben, Austria. A ThermoFisher DELTA V mass spectrometer was used, connected online to a ThermoFisher GasBench II and a CTC Combi-Pal autosampler. The samples were diluted with phosphoric acid (H_3PO_4) in a He-flushed atmosphere and heated to a temperature of 70°C (90°C for dolomites). The isotopic ratio values of $^{13}\text{C}/^{12}\text{C}$ and $^{18}\text{O}/^{16}\text{O}$ are normalized to the international standard PDB (Pee Dee Belemnite) and expressed as $\delta^{13}\text{C}\text{‰}$ (PDB) and $\delta^{18}\text{O}\text{‰}$ (PDB).

Databases

17 The results of analyses were compared with the data from known ancient marble quarries in Greece, Turkey, Italy, Portugal, Spain, and Morocco, accumulated over the last 30 years by measurements at the Laboratory of Archaeometry, NCSR »Demokritos«²¹ and with data published in the literature²². The database was specifically extended in the context of this work with isotopic analysis of 70 more samples from the quarries on Vermio mountain and 7 samples from Tranovalto (Kozani). They were all amalgamated in a single isotope database. The physical properties and qualitative crystalline features of the marble obtained from the in situ examination and the microscopic examination in the laboratory were also compared with the extensive sample bank of the above-mentioned quarry regions existing in the laboratory.

15 Craig 1957; Polikreti – Maniatis 2002; Attanasio 2003; Maniatis 2004; Attanasio et al. 2006.

16 Maniatis – Mandi 1992; Mandi 1993.

17 Mandi et al. 1992; Mandi 1993.

18 Polikreti – Maniatis 2002.

19 Tambakopoulos – Maniatis 2017.

20 Tambakopoulos – Maniatis 2017.

21 Mandi 1993; Polikreti 1999; Vakoulis 2000; Maniatis – Polikreti 2000; Polikreti – Maniatis 2002; Maniatis et al. 2012; Tambakopoulos – Maniatis 2012; Tambakopoulos 2013; Tambakopoulos – Maniatis 2017; Maniatis et al. 2021; Maniatis et al. (unpublished) b.

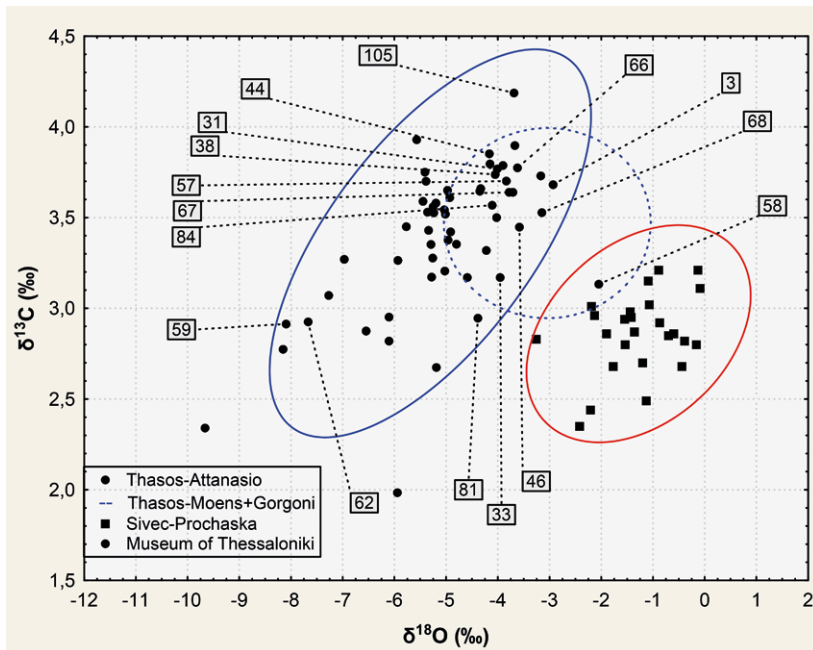
22 Herz 1987; Herz 2006; Pike 2000; Gorgoni et al. 2002; Bruno et al. 2002; Attanasio 2003; Attanasio et al. 2006; Attanasio et al. 2008; Attanasio et al. 2009; Prochaska 2013; Melfos 2015; Attanasio et al. 2015; Antonelli – Lazzarini 2015; Attanasio et al. 2016.

Results

18 The results of physical properties of the marble obtained from the in situ and microscopic examination at the laboratory, as well as the values of all measured parameters with IRMS and EPR spectroscopy, are presented in Table 2.

19 The parameters for the quarry samples (isotopes, EPR and MGS) are amalgamated from our own measurements and various publications in the literature, so extensive and up to date complete databases are created. However, not all parameters (isotopic, EPR and MGS) were measured on the same sample and hence, it is not possible to create a unified database with all parameters together, which would have

allowed us to use statistical tools such as principal component analysis (PCA) using all the measured parameters together. For this reason, the statistical treatment of the results from the archaeological samples were compared against two different databases separately: the isotope database and the EPR and MGS database. This was a deliberate decision because we considered more important to use extensive global databases, though separate, rather than using narrower ones for which we have measurements for all parameters in the same sample. Therefore, the approach to provenance consisted of comparing the samples against the two different databases using the exclusion principle and a stepwise approach, including also the physical and qualitative parameters of the marble.



3

Fig. 3: The dolomitic marble samples of the Thessaloniki Museum plotted against the known dolomitic marble quarries from Thasos (solid blue – Attanasio et al. 2006) and Sivec (red – Prochaska 2013). The dashed blue ellipse represents outermost borders of the Thasos dolomitic fields as published by Moens et al. 1992 and Gorgoni et al. 2002

Marble Samples

Dolomitic Samples

20 The EPR spectroscopic analysis of the samples detected 16 objects out of the 96 sculptures (101 fragments) analyzed that were made of almost pure dolomitic marble. They are indicated with a »100 %« value in the Dol% column (Table 2). The isotopic signatures of these samples were compared against the isotopic database of dolomitic marbles known to have been used in antiquity, namely the dolomitic marbles of Thasos Island quarried at two close-by locations, Vathy and Saliara, on the northeast side of the island²³ and the Sivec dolomitic marbles from the Roman period quarries near the city of Prilep in the territory of North Macedonia²⁴ (Fig. 3).

21 The Thasos dolomitic quarries have been sampled and analyzed by Moens et al. 1992, Gorgoni et al. 2002 and Attanasio et al. 2006²⁵. In Fig. 3, the solid line represents the statistical ellipse of the Attanasio et al. samples. Unfortunately, there are no numbers published in the Moens et al. and Gorgoni et al. papers, so we could treat them all together, but only field contours. Hence, the dashed ellipse is constructed using

23 Moens et al. 1992; Attanasio et al. 2006.

24 Prochaska 2013.

25 Moens et al. 1992; Gorgoni et al. 2002; Attanasio et al. 2006.

the outer boundaries of the quarry fields and archaeological sample contours as drawn by Gorgoni et al. 2002, combining also the Moens et al. 2002 fields. As can be seen in the plot of Fig. 3, all the dolomitic samples from the Thessaloniki Museum fall exclusively in the Thasian dolomitic isotopic field (solid ellipse)²⁶ and the Gorgoni-Moens combined field (dashed ellipse)²⁷. Only sample **no. 58** falls in the overlap of Thasos and Sivec quarries. However, its MGS (2.5 mm), excludes the possibility of a Sivec provenance since the MGS of Sivec dolomitic marbles is below 1.0 mm²⁸.

4

22 In summary, all the dolomitic marbles used for the sculptures tested in this work come from the Thasos Vathy/Saliara quarries. The extensive use of Thasian dolomitic marble in the city of Thessaloniki during Roman times has been also observed in previous analyses of sarcophagi and other sculpture²⁹.

Calcitic Samples

23 The identification of origin of the white or whitish calcitic marbles, which is the majority in the sculptures examined, is a much more demanding task, given the many quarries in different regions operating during the Hellenistic and Roman times. However, using the MGS as a first criterion one can divide the samples in groups of different MGS ranges and treat them statistically not against the global isotope database but against specific quarries that produce marble within the MGS range of each sample group. A second criterion for screening and eliminating irrelevant quarries is the color, translucency, veins, inclusions and other physical characteristics of the marble of each object.

5

24 The MGS of all samples analyzed are shown in a percentile distribution diagram in Fig. 4. One can discern different MGS groups. There is a group of 11 samples with MGS < 1.0 mm and particularly between 0.8 to 0.1 mm. Then there is a large group of samples with MGS = 1.0 mm and up to 1.6 mm. Then a group between 2.0 and 2.7 mm, and so on up to 5.0 mm and one single sample going up to 6.0 mm.

25 We take as an example for determining the provenance of the samples the group with very fine grain sizes (MGS < 1.0 mm). Fig. 5 shows the isotopic signature of these samples against the specific quarries compatible with this MGS range and marble

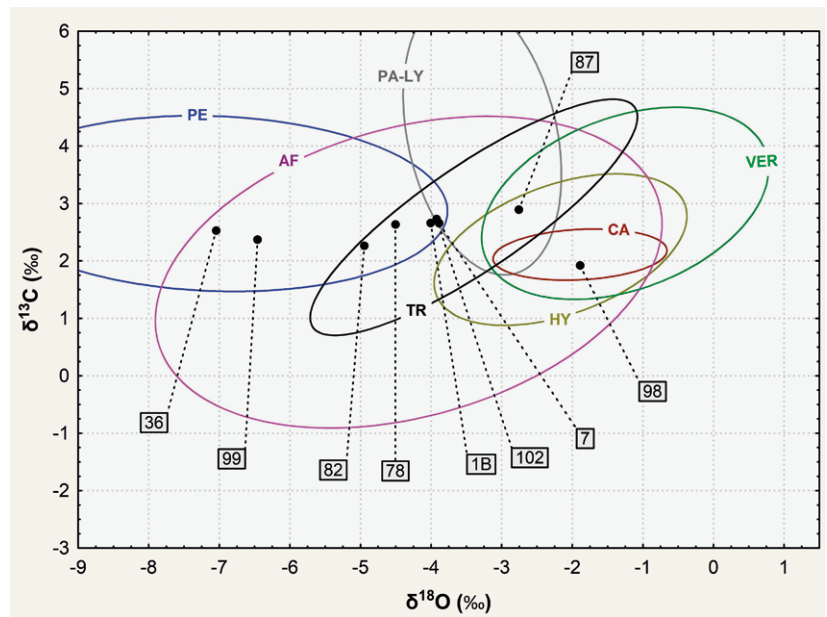
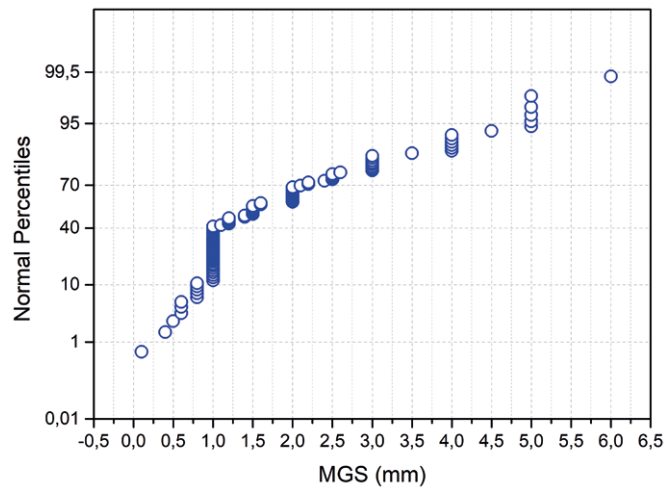


Fig. 4: The maximum grain size distribution of all calcitic samples

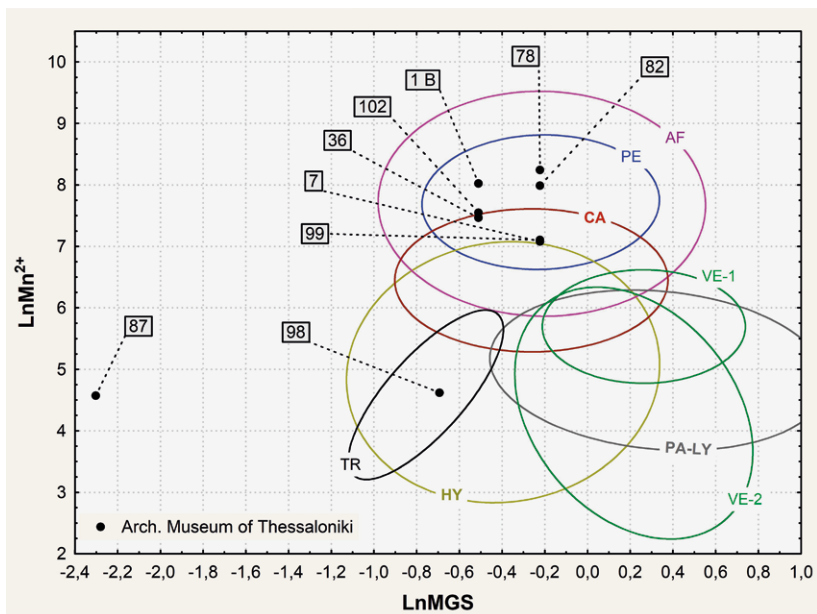
Fig. 5: Isotopic signatures of archaeological samples with MGS < 1.0 mm against isotopic fields of quarries compatible with MGS and marble physical properties. Samples no. 76 and 85 with MGS = 0.4 and 0.8 mm were not included as they will be treated separately in the Göktepe section. PE = Penteli; AF = Afyon (Dokimeion); PA-LY = Paros-Lychnites; TR = Tranovalto (Kozani); CA = Carrara; HY = Hymettos; VER = Vermio

26 Attanasio et al. 2006.

27 Moens et al. 1992; Gorgoni et al. 2002.

28 Prochaska 2013.

29 Maniatis et al. 2010; Tykot et al. 2002; Herrmann – Newman 1995; Herrmann – Newman 1999.



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Fig. 6: The logarithmic value of the Mn^{2+} intensity measured with the EPR vs. the logarithmic value of the MGS for the archaeological samples with $MGS < 1.0$ mm. Samples no. 76 and 85 with $MGS = 0.4$ and 0.8 mm were not included as they will be treated separately in the Göktepe section. PE = Penteli; AF = Afyon (Dokimeion); PA-LY = Paros-Lycnites; TR = Tranovalto (Kozani); CA = Carrara; HY = Hymettos; VER = Vermio

Fig. 7: Sample no. 87 (Thessaloniki, Arch. Mus. inv. 1034). Extremely fine-grained, opaque, with grey and white parallel striations characteristic at some Vermio locations

7

physical characteristics (Table 2). Additionally, the same samples are plotted statistically against the equivalent quarries in the database of the EPR parameter Mn^{2+} versus MGS (Fig. 6) both logarithmical³⁰. From the isotopic diagram (Fig. 5) it can be seen that samples **36** and **99** fall in the overlap of Penteli and Afyon (Dokimeion) fields. Samples **no. 82, 78, 1B, 102** and **7** also fall in the overlap of Penteli and Afyon but also in the Tranovalto (Kozani) field. Sample **no. 87** falls in the overlap of Afyon, Paros-Lycnites, Hymettos, Tranovalto and Vermio, and finally sample **no. 98** falls in the overlap of Afyon, Hymettos, Carrara and Vermio fields. Comparing the same samples against the $LnMn^{2+}$ vs. $LnMGS$ database (Fig. 6), it can be easily seen that for all samples, except **nos. 98** and **87**, the only quarries that are compatible with both databases are the Penteli and the Afyon ones. For sample **no. 98**, the only quarry compatible with both databases is Hymettos, however, given its whiteness and some irregular grey veins, we consider more probable to be from the Kozani (Tranovalto) quarries rather than Hymettos, without excluding entirely the second. Sample **no. 87** is extremely fine-grained, not well crystallized, opaque and outside any quarry in the $LnMn^{2+}$ vs. $LnMGS$ database (Fig. 6). It bears characteristic parallel fine striations (Fig. 7), observed in some Vermio quarry locations. Thus, its provenance can be securely assigned to Vermio, in agreement also with its isotopic signature. Now, for the majority of the samples in this very fine-grained group, whose provenance is narrowed to the Penteli and Afyon overlap (**nos. 1B, 7, 36, 78, 82, 99** and **102**), it is not possible to distinguish with the analysis alone which of the two quarries is more probable for each sample. However, the Pentelic marble has certain characteristic features which if present leave no doubt for its provenance. These are: the presence of foliation, a result of schistolithic veins of green, greyish or purple color³¹, abundance of pyrite inclusions, and occasionally large dolomite crystals. Thus, from this group, **nos. 1B, 78**, and most probably **82** and **99** (sometimes difficult to see due to weathering) exhibit foliation which determines their provenance to Penteli. For the rest, a first and second choice is given (Table 3) between these two quarries depending on the overall appearance and translucency of the marble.

30 Polikreti – Maniatis 2002.

31 Tambakopoulos et al. 2019.

26 If we now include in this interpretation the samples with MGS = 1.0 mm, there are a lot more samples that the above treatment with the two databases narrows their provenance down to the overlap of Penteli and Afyon/Altintas. Afyon and Altintas are two ancient quarry regions in Asia Minor, separated with a small distance and producing both fine-grained white and colored pavonazetto marble³². For these three quarry regions there are isotopic, EPR and MGS measurements on the same samples, so we can use Principal Component Analysis (PCA) for checking these samples focusing on this particular question. Fig. 8 shows the two-dimensional output plot of such an analysis for the samples with MGS

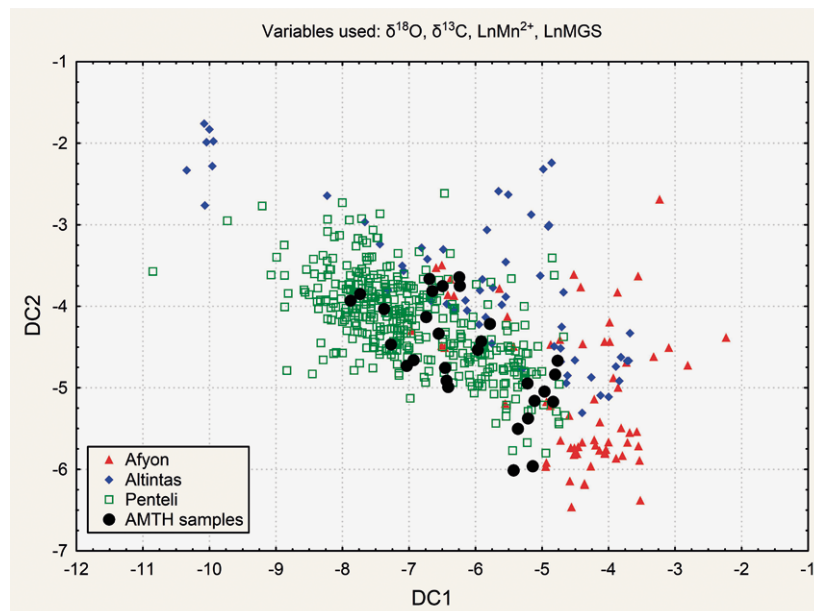


Fig. 8: Principle Component Analysis (PCA) of samples with MGS ≤ 1.0 mm that their provenance is narrowed down to Penteli or Afyon/Altintas, using the parameters $\delta^{18}\text{O}$, $\delta^{13}\text{C}$, LnMn^{2+} , LnMGS

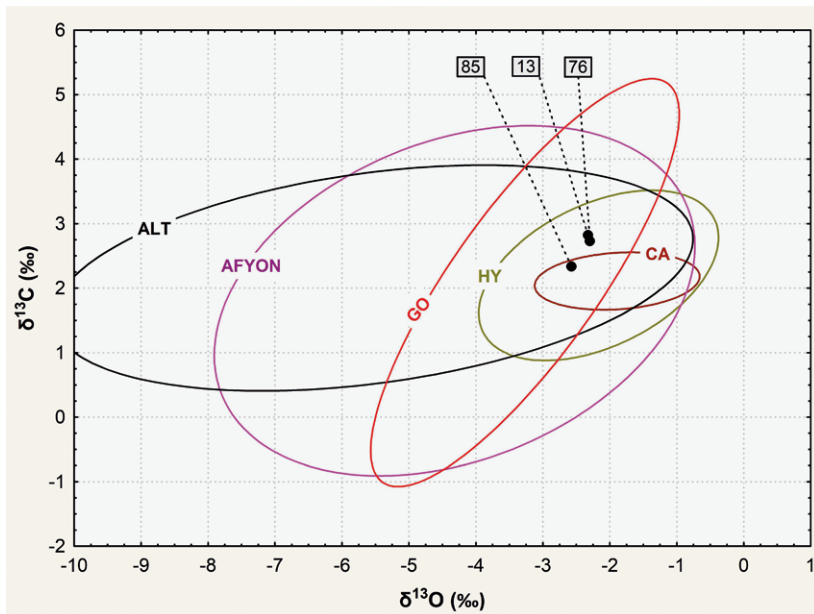
8 ≤ 1.0 mm that their provenance is narrowed by the two databases to the Penteli and Afyon/Altintas question. Although there is still some overlap between the samples from the three quarry regions, the separation is much better than the individual diagrams of Fig. 5 and Fig. 6. As it can be seen in the diagram of Fig. 8, the majority of the samples fall within the Penteli field-point distribution and the analysis gives probabilities above 60 % to be from Penteli than the Asia Minor quarries. Using this data and the marble physical features, we have assigned these samples to Penteli or Afyon/Altintas accordingly (Table 3). The 1st choice is with absolute certainty if not followed by a 2nd choice, with high probability if followed by a second choice, and very high probability if the 2nd choice has a question mark (Table 3).

The Göktepe Marble

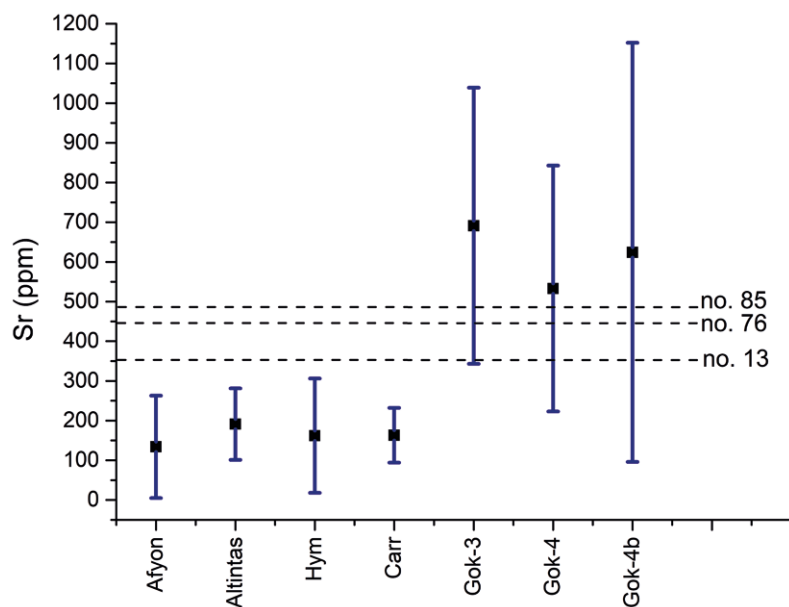
27 Among the fine-grained high quality white marbles are three samples which we suspected they may come from the relatively newly discovered Göktepe quarries. Göktepe is a quarry region near the imperial quarries of Aphrodisias in Asia Minor that produced white and black varieties of marble³³. The white variety is of very high quality, characterized by very fine grain sizes allowing polishing to a high degree, and in most cases exhibits high translucency. Its use has been verified mainly in Roman period portraits (busts) from the 2nd century A.D. onwards. Three samples from the Archaeological Museum of Thessaloniki sculptures, namely **nos. 13. 76** and **85** (very fine portraits of men and a woman, Fig. 71. 72. 73) exhibit specific marble qualities and have MGS = 1.0, 0.4 and 0.8 mm respectively. Furthermore, they are characterized by low Mn^{2+} and particularly low Fe^{3+} concentration (Table 2). Their isotopic signature is plotted against the Göktepe field as well as Afyon, Altintas, Carrara and Hymettos that exhibit fine-grained marble and also low Mn^{2+} values (Fig. 9). As it is seen in this diagram, the first two (**nos. 13** and **76**) fall isotopically in the overlap between the Göktepe field and the fine-grained quarries of Afyon and Hymettos, while **no. 85** falls also in the above overlap and additionally in the Carrara field. Furthermore, it has been shown that the Göktepe marble has very high strontium (Sr) concentration that distinguishes it from all other fine-grained quarries and additionally systematically low Mn and Fe concentra-

32 Attanasio et al. 2006; Tambakopoulos – Maniatis 2017.

33 Attanasio et al. 2021; Attanasio et al. 2015.



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Fig. 9: The isotopic signature of samples no. 13, 76 and 85 that have marble qualities compatible with the Göktepe marble plotted against quarries with very fine-grained marble. Afyon, Altintas, Hymettos, Carrara, Göktepe (GO)

Fig. 10: Strontium concentration of samples no. 13, 76 and 85 against the strontium range of the three possible quarry regions according to isotopes and MGS (Quarry Sr data from Attanasio et al. 2015 and 2021)

toponym *Sedoukia*. Finally, the quarries on Kamvounia mounts, located near the village of Tranovalto in the Kozani County, are nowadays extensive modern quarries but some indications of old exploitation exist in the wider area.

29 The above ›local‹ quarries have been surveyed, sampled and analyzed with EPR and optical microscopy in our laboratory within a Ph.D. project³⁷. Initial isotopic data on these quarries, together with crystallographic information on the kinds of marble was provided by B. Melfos³⁸. For the purpose of this work, we analyzed isotopically 70 more samples from Vermio mount and 7 more from Tranovalto, from all previously

tions³⁴. We measured the Sr level of these three samples³⁵ (no. 13 = 353 ppm, no. 76 = 447 ppm, no. 85 = 481 ppm) and compared with the Sr concentration range of the above four quarry districts³⁶. Fig. 10 shows the Sr results and as it can be seen the Sr concentration of all three samples is quite high and in the range of Göktepe white marble (regions 3 and 4) and above the ranges of Afyon, Altintas, Hymettos and Carrara. This clarifies the origin of the marble of these three samples (nos. 13, 76 and 85) undoubtedly to Göktepe. The dating of these sculptures to the 2nd century A.D. (Table 1) is also in agreement with the period of use of Göktepe marble, Trajanic period but mainly in Hadrianic period (2nd century A.D.).

The ›Local‹ Quarries

28 By the term local quarries, we define the ancient marble quarries on the mount massifs of Vermio, Pieria and possibly Kamvounia, which are at a distance of about 15, 30 and 70 km respectively from the city of Veroia, where ancient marble workshops were known to be operating, or 72, 92 and 126 km respectively from Thessaloniki. The Vermio quarries are located on the south end of the mountain and extend from the village of Koumaria northwards, along the Aliakmon River southwards, from the village of Kastania westwards and from the village of Georgianoi eastwards. The Pieria quarries are located between the villages of Vrya and Ritini, with the biggest of them bearing evident ancient quarry fronts given the

34 Attanasio et al. 2021; Attanasio et al. 2011; Attanasio et al. 2015.

35 Analysis kindly provided by Prof. Walter Prochaska at Leoben University, Austria.

36 Attanasio et al. 2015; Magrini et al. 2016; Attanasio et al. 2021.

37 Vakoulis 2000.

38 Melfos 2015.

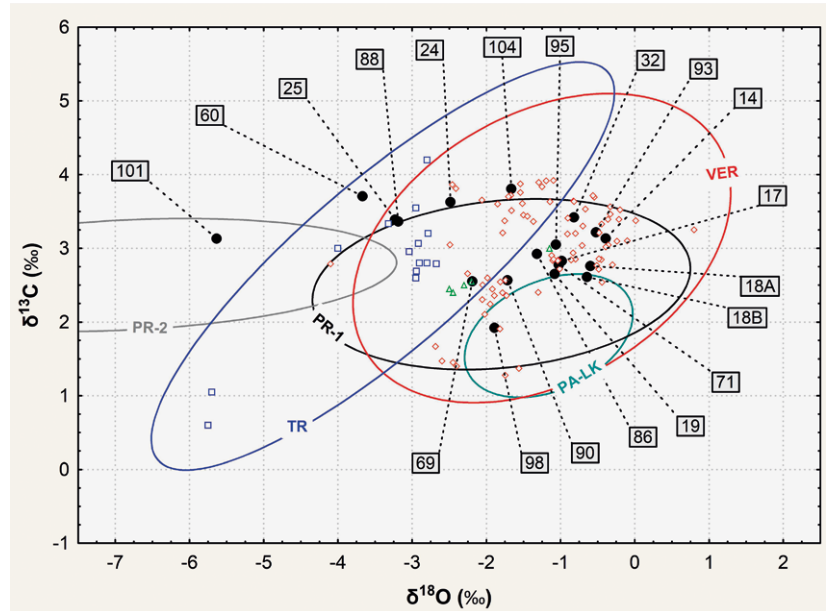
surveyed quarry locations on mount Vermio and Tranovalto, producing a sizable isotopic database.

30 We selected a number of generally fine-grained samples which, according to isotopes and marble characteristics, had a good probability to be from local quarries. These were checked against the enriched isotopic database of local quarries, including some other possible quarries (Fig. 11). Additionally, the same samples were tested also against the LnMn^{2+} vs. LnMGS database of the local quarries, and also with Proconnesos-1 and 2 that had a certain overlap in the isotopic database (Fig. 12). From the two databases, it can be seen that the samples nos. 18 (A&B), 17 (same slab as 18), 69, 71, 24, 90, 32, 86, 93, 95, 14, 19 and 88, fall in the Vermio and Proconnesos or Vermio, Tranovalto and Proconnesos overlap. Using qualitative marble features (Table 2), the Proconnesos origin must be excluded either entirely or left as minute second probability for a few of them. The features that exclude Proconnesos are: lack of fine grey parallel striations characteristic of the Proconnesian marble, stressed and fragmented grains for a number of them, white fine parallel veins – absent in Proconnesian marble but very characteristic of Vermio marble (see Fig. 7), extremely fine grain distribution for several of them, not observed in Proconnesian marble. Hence, all these samples are securely assigned to Vermio quarries, perhaps with a minute probability as Proconnesos (?) for a few of them in the cases where the features are not entirely clear. A note on sample no. 88 should be made: this sample has $\text{MGS} = 3.0$ mm which is a bit high for Vermio, but nevertheless, 3.0 mm grain size has been observed in certain Vermio quarries³⁹. This rather high MGS plots this sample outside the Vermio ellipse and inside the Proconnesos-1 in the LnMn^{2+} vs. LnMGS diagram (Fig. 12), however, its isotopic signature excludes Proconnesos-1 (Fig. 11), and makes Vermio a certain origin. Sample no. 98 is also from the local quarries but most likely from the Tranovalto quarries.

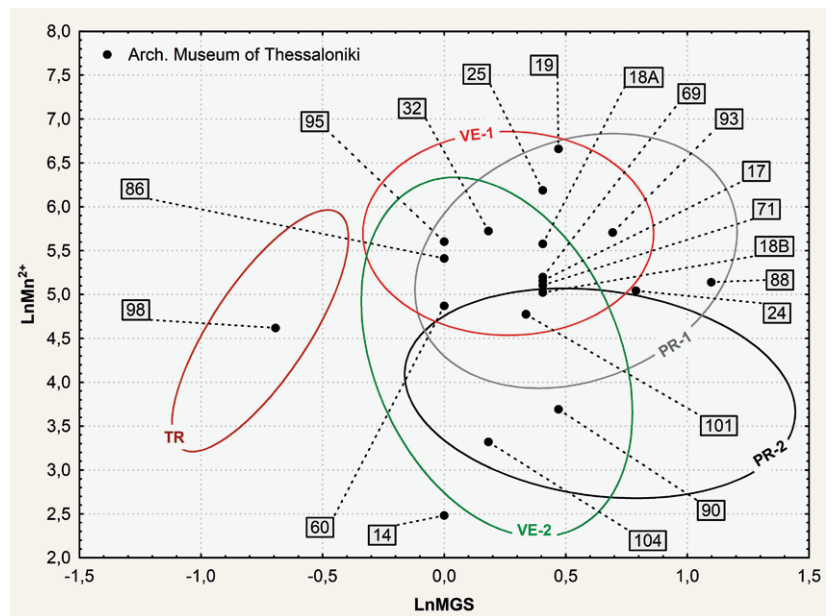
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31 Sample no. 25, a Relief of the Celtic goddess Epona, has $\text{MGS} = 1.0$ mm but otherwise is an extremely fine-grained marble with $\text{MFS} = 0.1$ mm. It plots isotopically inside the Tranovalto and Vermio fields (Fig. 11) but only in the Vermio field in the LnMn^{2+} vs. LnMGS database (Fig. 12), Proconnesos being excluded from the isotopes. We



11



12

Fig. 11: Checking the isotopic signatures of samples selected according to marble characteristics, against the updated isotopic database from local quarries plus some other probable fields. VER = Vermio (red circles); TR = Tranovalto (blue squares); Sedoukia-Pieria (green triangles; ellipse not drawn due to few samples); PR-1 = Proconnesos-1; PA-LK = Paros-Lakkoi. Within this database are included 10 samples from Vermio, 8 from Tranovalto and the 4 from Pieria from a previous analysis by Melfos (2015)

Fig. 12: The selected samples in Fig. 11 plotted against the LnMn^{2+} vs. LnMGS database for the local quarries (Vermio, Tranovalto and Sedoukia-Pieria) plus the Proconnesos quarries

39 Melfos 2015.

therefore conclude that the marble of this relief sculpture must originate either from Tranovalto or Vermio quarries, in both cases it is a ›local‹ origin marble.

32 Sample **no. 60** is a more difficult case as it plots isotopically solely in the Tranovalto field, while in the LnM²⁺ vs. LnMGS database plots solely in the Vermio field (Proconnesos being excluded from isotopes). Its MGS = 1.0 mm is a bit higher than 0.5 mm generally observed in Tranovalto, but the marble deposits in Tranovalto are rather extensive and heavily exploited with modern activity, so slightly higher grain sizes cannot be excluded. We therefore assign **no. 60** to either Tranovalto or Vermio fields, both in the overall local quarries area.

33 Finally, samples **no. 101** and **104** are however more probable to be from Proconnesos with Vermio still probable as a second choice. **No. 101** plots solely in the Proconnesos-2 field in the isotope database and **no. 104** contains 38 % dolomite and exhibits calcitic and dolomitic layers observed in Proconnesian marble.

34 Some more samples, not shown in these diagrams, because of extreme or borderline values of isotopic, MGS or Mn²⁺ parameters, may also have high probability to be from Vermio or the other local quarries taking into account the physical parameters of their marble. Hence, they are assigned as such together with probable alternative origins (see Table 3).

35 Similar treatments and procedures have been applied to the other MGS range groups of samples (Fig. 4) and for every sample individually, investigating thoroughly every possible combination of parameters, and taking also into account the physical and other properties of the marble (grain size distribution, translucency, veins, inclusions, etc.), as well as the date of the sculpture. This has led to the final assignment of the marble provenance for each object (Table 3). Naturally, with such a large number sculptures and marble varieties, the provenance could not be discerned to only one quarry for all samples but to two or more alternatives, and for a few (just three!), where their parameters and quality falls outside all the know quarries and marble types included in the databases, their provenance is indicated so far as ›unknown source‹ with a tentative second suggestion.

Sculptures Made of More Than One Piece of Marble or Found Fragmented

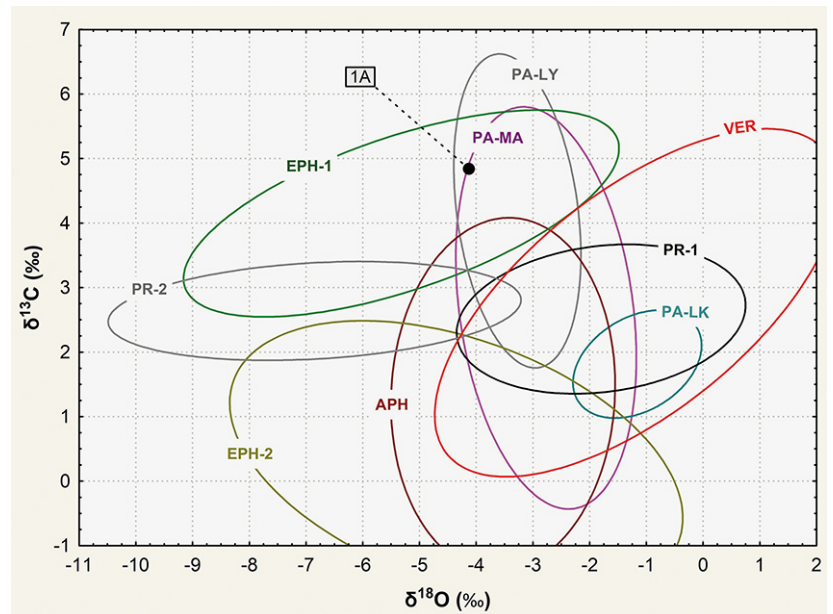
36 There are some sculptures that are composed originally of more than one piece joined together and some others that were found in fragments. We examined all pieces and took samples from the different ones separately.

Headless Statue of a Roman Emperor, Probably Claudius (Samples nos. 1A and 1B)

37 It consists of two marble pieces, the torso (sample **no. 1A**) and the lower part (sample **no. 1B**; Fig. 51). The physical properties of the marble are different, the torso has MGS = 2.1 mm, while the lower part 0.6 mm. There is also a difference in the isotopic values, especially in the $\delta^{13}\text{C}$ value, as well as in the EPR Mn²⁺ intensity (Table 2). The marble is obviously quite different between the two parts and certainly of different origin.

38 Sample **no. 1A** from the torso: the isotopic signature of this sample falls in the overlap of Paros-Marathi/Lychnites (and borderline to Paros-Marathi) and Ephesos field, excluding all other quarries with similar MGS (Fig. 13). However, the isotopic region in the overall Ephesos field in which this sample falls corresponds to a couple of small and unimportant quarries at Ephesos, called ›Ephesos Ia«⁴⁰, which produce slightly greyish or mottled subtype of the prominent Ephesos I marbles, and do not seem very probable

to be exporting marble⁴¹. Hence, the origin from Ephesos must be excluded. Therefore, **Paros-Marathi/Lychnites** remains as the only possibility. It should be noted here that the Paros quarries lie in two marble bearing valleys, the Marathi valley and the Lakkoi valley. In the Marathi valley there are also two underground quarries (the quarry of Nymphs and the quarry of Pan), which produce good quality highly translucent marble⁴². Thus, in the isotopic and EPR databases we have divided the Marathi quarries in two groups based on the quality of marble: Paros-Marathi includes all the open quarries in the Marathi valley, while Paros-Lychnites includes all the good quality highly translucent marble either from the underground or open quarries.



13

Fig. 13: The isotopic signature of sample no. 1A from the torso of the headless statue of a Roman emperor, against possible quarries in the MGS range of the sample

39 Sample **no. 1B** from the lower part of the statue (drapery and legs): the isotopic, EPR, and MGS parameters fall in the overlap between Penteli and Afyon fields (Fig. 5. 6). The presence of characteristic foliations from schistolithic veins (Table 2) leaves no doubt that this marble is from **Penteli**.

Tomb Slab (Samples nos. 18 A and B)

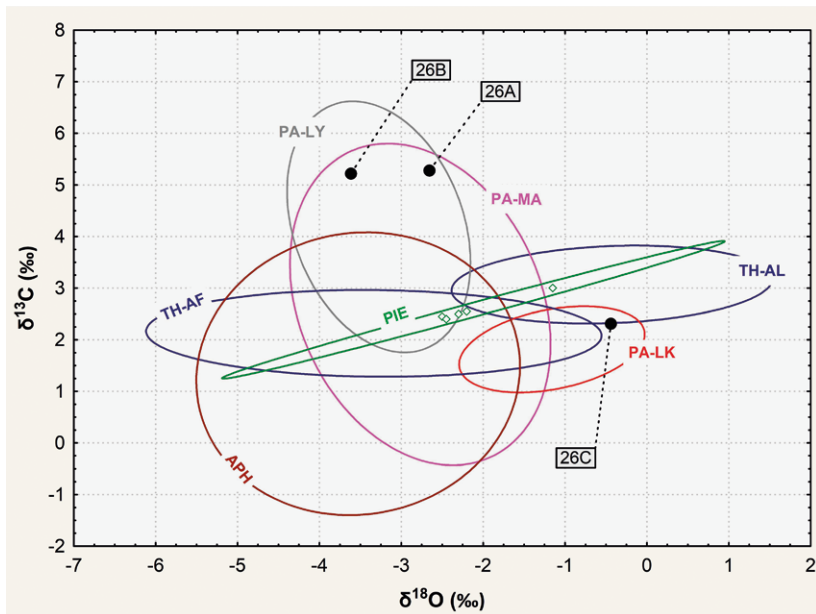
40 It is composed of a main slab piece (**no. 18A**) and an attached piece on its left side (**no. 18B**; Fig. 40). The physical properties, color, translucency, grain-sizes, isotopic values, percent of dolomite etc., are all the same (Table 2), which confirms that these two pieces belong to the same slab. Regarding the provenance of the marble, the comparison of their isotopic signature with the isotopic database including quarries with the same MGS range shows that the only possible quarries are Proconnesos and Vermio (Fig. 11). Given some special features observed in the crystal fabric (stressed and fragmented grains) and the absence of the characteristic grey parallel striations of the Proconnesian marble, we conclude that Vermio is with certainty the provenance for the marble of this tomb slab.

Statue of Emperor (Samples nos. 26A, 26B and 26C)

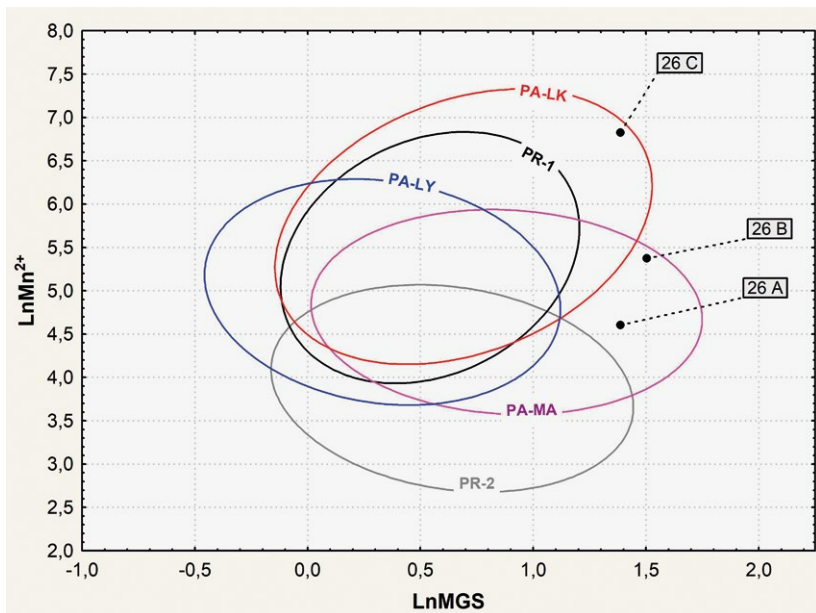
41 This statue (Fig. 67) is apparently a synthesis of three main pieces of marble; the head, the torso and the lower part (drapery and legs). Three samples were taken **nos. 26A, 26B** and **26C** from each of these pieces respectively. The results of the optical in-situ examination, as well as the analytical parameters are shown in Table 2. All three parts are made of coarse-grained marble with MGS \approx 4.0 mm. Their isotopic signatures are plotted against the quarries possible for this MGS and period (Fig. 14). As can be seen from this diagram, the samples **no. 26A** and **no. 26B** plot in the Paros-Marathi and Lychnites fields, while sample **no. 26C** plots in the Paros-Lakkoi field and on the borderline of Thasos-Aliki field, where however there exist no field points, so Thasos can be excluded and the Paros origin for the three pieces is confirmed. Using the LnMn²⁺ vs. LnMGS database for the three Paros quarries (Fig. 15), it further emphasizes the origin of the head and torso (**nos. 26A** and **26B**) from the Marathi quarry district and the

41 Prof. Walter Prochaska personal communication.

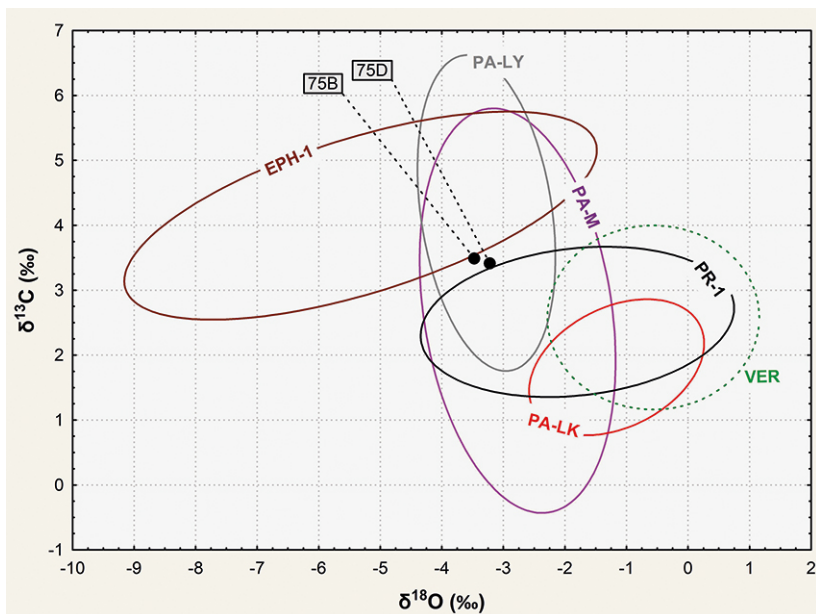
42 Maniatis – Polikreti 2000; Attanasio et al. 2006.



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Lakkoi quarry district for the drapery and legs piece (**no. 26C**). Therefore, this statue is composed of three pieces of Parian marble, but the marble of the lower part comes from a different region of Paros (**Lakkoi valley**) than the head and torso (**Marathi valley**).

A Large Fragmentary Relief (Samples nos. 75B and 75D)

42 Samples from two different fragments were taken: the torso (**no. 75B**; Fig. 66) and from the base with the feet (**no. 75D**; Fig. 66). The isotopic signatures of these samples are plotted against the isotopic database of quarries which are possible according to grain size and period (Fig. 16). As it can be seen, the two samples are isotopically identical and fall in the Paros-Marathi/Lychnites fields, the other quarries being excluded. We then plot the EPR and grain size parameters of these samples against the LnMn²⁺ vs. LnMGS database including only the two Paros quarries which are isotopically possible (Fig. 17). As it is shown, the two samples fall in the **Paros-Marathi** field, that consists of the open quarries district in the Marathi valley. The close similarity of all parameters of these two samples plus the presence of very similar dolomite amounts (14 % and 15 % respectively; Table 2) leave no doubt that these fragments belong to the same marble block.

Fig. 14: The isotopic signature of the three samples from the statue of emperor Augustus. Sample no. 26A from the head, 26B from the torso and 26C from the lower part plotted against quarries compatible with MGS and period. PA-LY = Paros-Lychnites; PA-MA = Paros-Marathi; PA-LK = Paros-Lakkoi; TH-AL = Thasos-Aliki; TH-AF = Thasos-Acropolis/Fanari; APH = Aphrodisias; PIE = Pieria-Sedoukia (a few samples, do not form a proper statistical ellipse)

Fig. 15: The LnMn²⁺ vs. LnMGS parameters of the three samples from the statue of emperor Augustus, plotted against the Paros quarries allowed from the isotopes (Fig. 14). PA-LY = Paros-Lychnites; PA-MA = Paros-Marathi; PA-LK = Paros-Lakkoi

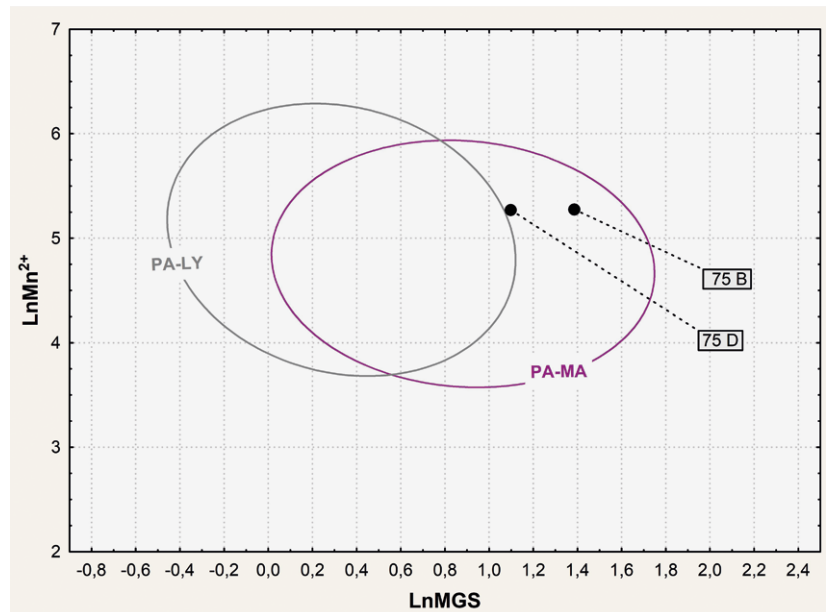
Fig. 16: Samples no. 75B and 75D, from a large fragmentary relief plotted against the isotopic database of quarries compatible with the MGS and period

Some Samples with Extreme Isotope Values

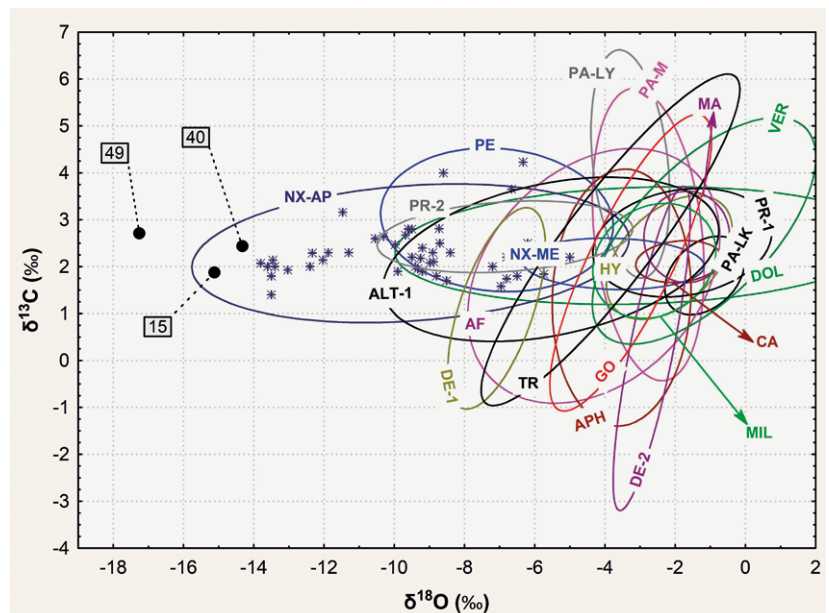
43 Among the 96 sculptures examined there are three that their oxygen isotopic signature ($\delta^{18}\text{O}$) exhibits extreme values. These samples were measured twice and the same oxygen values resulted, making the determination of the origin practically impossible. They are samples nos. 40, 15 and 49. Their isotopic signatures are plotted in Fig. 18 against the global isotope database.

44 Sample no. 40 with MGS = 1.5 mm and MFS = 1.0 mm, and good translucency (Table 2), falls isotopically in the left edge of the Naxos-Apollonas quarry field, however outside the field points. In the LnMn^{2+} vs. LnMGS database it fits also marginally in the Naxos-Apollonas field again outside the field points and in the Afyon and Ephesos fields, which are however excluded from the isotopes. This sample is from a grave stele with a 'funerary' banquet scene dating to 1st century B.C. (Table 1; Fig. 19. 43). It is a generally white marble with some grey faint irregular veins at the side (Fig. 19), not particularly diagnostic. Based on the isotope and LnMn^{2+} results we should assign the origin of this marble to Naxos-Apollonas. However, according to all evidence, the Naxos quarries seem to have ceased to operate during the Roman times, as there is hardly any object from this period identified as made from Naxian marble, and its MGS and MFS are hardly in the Naxos-Apollonas range. Therefore, Naxos is very unlikely to be source for this marble. If we ignore the isotopes, then the local quarries of Tranovalto (Kozani) but also Afyon could be a possibility.

45 Sample no. 15, a greyish marble with MGS = 1.0 mm and MFS = 0.5 mm, and with very low translucency (Table 2). It also falls isotopically at the lower edge of the Naxos-Apollonas field, even further apart of the field points than no. 40 (Fig. 18). The Naxos origin is excluded from the LnMn^{2+} vs. LnMGS database. We, therefore, consider this marble of an unknown quarry but, if we forget the isotopes, a possibility from the local quarries of Vermio or Tranovalto could be considered.



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Fig. 17: Samples no. 75B and 75D, from a large fragmentary relief plotted against the LnMn^{2+} vs. LnMGS database of quarries compatible with the isotopes (Fig. 16)

Fig. 18: Three samples with extreme $\delta^{18}\text{O}$ values, plotted against the global isotope database. The field points of the Naxos-Apollonas quarry are shown

Fig. 19: Grave Stele, 1st century B.C. Sample no. 40

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46 Finally, sample **no. 49**, another grave stele, this time of Demetrios (Table 1), is a white marble with MGS = 1.2 mm and MFS = 0.5–0.8 mm and a good translucency (Table 2). Its $\delta^{18}\text{O}$ value brings it outside every possible quarry (Fig. 18). Again, this is from an unknown source, but its EPR and MGS parameters point perhaps to the local quarries of Vermio or Tranovalto.

Comparison with Previous Analysis of Some Objects

47 A number of sculptures from the Archaeological Museum of Thessaloniki were also analyzed in the past by Pike, Herrmann and Herz⁴³ using stable isotope analysis and empirical macroscopic observations of the marble features the provenance of their marble was assessed. Some of those sculptures were resampled and analyzed also as part of this extended work. We thought it would be interesting to compare the provenance assignments of the commonly analyzed sculptures. This comparison can be seen in (Table 4). It should be noted that the ›Paros-2 (Chorodaki)‹ referred by Pike et al. 2002 is an older name for the quarries in the Paros-Lakkoi valley which since then have been further explored, and seem to extend higher up the valley to Thrapsana village⁴⁴. As shown in this table, the agreement is generally quite good. Only one sample (**no. 14**) is differently assigned. The somewhat different isotopic values measured for this sample in this work brings its signature outside the Paros-2 (Paros-Lakkoi) field as assigned by Pike et al. 2002. Apart from the isotopes, its very low Mn^{2+} intensity and other EPR parameters and particularly its very fine grain size distribution (MFS = 0.2 mm) (Table 2) excludes the Paros origin. The provenance of this marble cannot be determined with 100 % certainty even with our additional parameters approach, nevertheless its origin is most probably from Vermio. Two other samples (**nos. 17** and **18**) were suggested by Pike et al. as probably coming from Veroia, given the lack of isotopic data for quarries in that region at the time the work of Pike et al. 2002 was published. Veroia is a city where local marble workshops operated in ancient times, but there are no marble quarries there. The closest ones are some 10 km west and southwest on the mount Vermio, where a lot of ancient quarries exist. Our newly extended database of the Vermio quarries confirms that the marble of these two objects comes undoubtedly from Vermio. Finally, the marble of one sculpture (**no. 25**) was not possible to be assigned by Pike et al. again. Our analysis showed that it comes from Tranovalto or Vermio.

Archaeological Discussion: the Use of Different Marbles by Period

48 In order to formulate the conclusions of our research in a historically consistent manner, we divided the material into two broad periods: the first comprises the Late Archaic, Classical and Hellenistic periods (from the early 5th century B.C. to 1st century A.D., i.e., Augustan Period), while the second comprises the Imperial period (1st to 3rd century A.D.) as well as Late Antiquity (4th to 5th century A.D.). In our view, the defining historical event that was the conquest of Macedonia by the Romans (148 B.C.) and the creation of the province of Macedonia was not a major turning point for its artistic production, as it had taken shape in earlier times throughout the development of the Macedonian state under the monarchy. During the second period, Macedonia became

43 Pike et al. 2002.

44 Maniatis – Polikreti 2000.

fully incorporated into the Roman state, while maintaining and expanding its cultural ties to the rest of the Hellenic world, and developing close commercial connections to Southern Greece and Northern and Western Asia Minor.

49 During the first period, artistic influence initially came from Ionia and the Greek colonies of the Northern Aegean, then from Attica and later from major Hellenistic centers (Pergamon and Alexandria). During the second period, art in Macedonia was primarily influenced by Attica, the Propontis region and Northern Asia Minor.

50 Subsequently, our remarks mainly focus on the 96 sculptures whose marble has been identified by detailed archaeometric analysis (Table 1. 2. 3). To enrich the discussion and conclusions formed by these results, we make ancillary use of another 75 sculptures (Table 5), whose material provenance is assessed in different ways. A number of them was assessed empirically by the two archaeologists who co-author this paper (Th. S.-T. and E. V.). Some others were assessed as made of dolomitic marble from Thasos also empirically by Herrmann and Newman⁴⁵. Another number verified as dolomitic marble with by X-Ray Diffraction analysis and, hence, inferred as Thasian dolomite⁴⁶, and finally the marble of a number of sculptures have been identified with isotopic analysis and visual examination in the past⁴⁷, as discussed earlier (Table 5). We take it for granted that the empirical identification of the marble of the sculptures does not have the validity of the systematic archaeometric analysis presented above. However, the dolomitic marble of Thasos mainly and Pentelic secondarily are materials with characteristic macroscopic appearance, with which the two archaeologists who co-sign this paper are quite familiar from their long involvement in Greek sculpture, so we may consider these empirical provenance assessments as safe. The same holds for John Herrmann with his long experience with the dolomitic marble of Thasos.

51 The sculptures examined and analyzed in detail archaeometrically in this work are discussed using the sample number as shown in Table 1. 2. 3. (It is reminded that the missing sample numbers are architectural pieces, not considered in this work.) The sculptures listed in Table 5 have their provenance assigned either by testing in the past or assessed empirically. They are discussed using the Museum inventory number (Table 5).

5th – 1st century B.C.

Thasian Marble

52 The oldest sculpture found in Thessaloniki is a small marble head of a youth from a relief frieze (inv. 1530; Fig. 20) that formed part of the décor of a temple situated on present-day Antigonidon Square in the western section of Thessaloniki, which was constructed using architectural members coming from more than one buildings of the Late Archaic period. The head, like most of the architectural members of the temple (nos. 57 [Fig. 21]. 58. 59. 66. 67. 68. 81), is made of Thasian dolomitic marble and can be dated to the early 5th century B.C. according to stylistic criteria. One should note that no. 56 (Fig. 22), part of the same temple, is of calcitic Thasian marble from the Aliko quarries (Table 3). The similarity between the architectural members of the temple on Antigonidon Square and those of the Parthenos temple in Neapolis (present-day Kavala), a Thasian colony, had already been noted by G. Bakalakis and



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Fig. 20: Small relief head from Thessaloniki. Thessaloniki, Arch. Mus. inv. 1530

45 Herrmann – Newman 1995.

46 Herrmann – Newman 1999.

47 Pike et al. 2002.



21



22

Fig. 21: Ionic capital from Thessaloniki, no. 57. Thessaloniki, Arch. Mus. inv. 6736

Fig. 22: Part of a sima with lion's head from Thessaloniki, no. 56. Thessaloniki, Arch. Mus. inv. 11449



23

Fig. 23: Grave stele of a woman from Komotini, no. 105. Thessaloniki, Arch. Mus. inv. 1251

Fig. 24: Grave stele of two men from Ierissos (ancient Akanthos). Thessaloniki, Arch. Mus. inv. I.ΔA.1



24

K. Rhomaios⁴⁸. G. Despinis believed that the already mentioned marble head of a youth (inv. 1530) is likely the work of a Thasian workshop. We can, therefore, attribute the building (or buildings) from which the architectural members of the temple on Antigonidon Square originate to Thasian craftsmen. The question of the provenance of the architectural members used in Roman times to construct the temple on Antigonidon Square cannot be confidently answered. It is, however, difficult to argue that this monumental building (or, rather, buildings) was situated very far from Thessaloniki and outside its territory. Therefore, the presence of marble sculptors from Thasos in the region of the Thermaic Gulf already in the Late Archaic period can be considered sufficiently substantiated. A fragmentary funerary stele dated to 460/450 B.C. from the Komotini region (no. 105; Fig. 23), most likely the work of a Thasian workshop, is also made of Thasian dolomitic marble. A particularly interesting work of sculpture is the large grave relief discovered at ancient Akanthos in 1991 (inv. I.ΔA.1; Fig. 24) representing two sitting figures, a nude youth and a mature man dressed in a himation, facing each other. The composition is crowned by a frameless pediment, decorated with a crouching lion in very low relief. The isotopic and XRD analysis of the marble made by the J. P. Getty's Museum Conservation Institute confirmed that it is also Thasian dolomitic

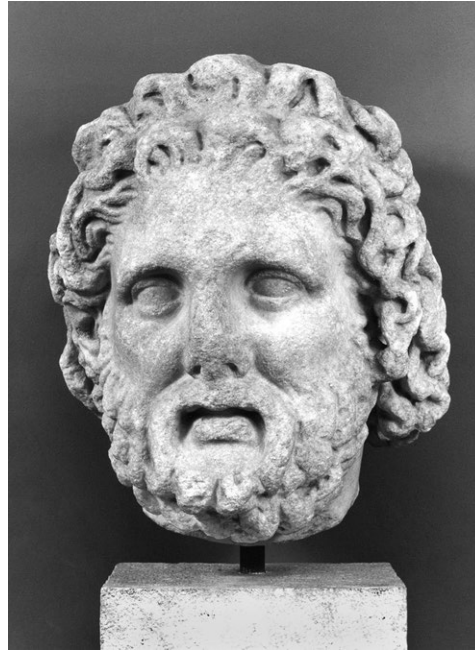
marble. Since Thasos is the artistic center closest to Akanthos, the relief has been tentatively attributed to a Thasian sculptor, even though it differs stylistically from other roughly contemporary reliefs from Thasos, notably the stele of Philis in the Louvre⁴⁹. The style of the relief from Akanthos shows some affinity with that of funerary reliefs of the second and third quarter of the 5th century B.C. from the Aegean islands, but close stylistic and iconographic parallels could not be identified. The dating close to the end of the 5th century B.C. proposed in the publication is not supported by

48 Bakalakis 1936, 17; Rhomaios 1940, 3 f.; Bakalakis 1983, 33 f.; see also recently Schmidt-Dounas 2004.

49 Hamiaux 2001, 101 cat. 97.



25



26

Fig. 25: Torso of a peplophoros from Sohos/Thessaloniki. Thessaloniki, Arch. Mus. inv. 11006

Fig. 26: Head of a bearded god. Thessaloniki, Arch. Mus. Inv. 1019

comparisons with works of this period. An earlier date would be more compatible with both the style of the figures and the archaizing features of the crouching lion in the pediment. The roughly worked surface in the lower part of the relief is an indication that the sculpture was not entirely finished.

53 It is interesting to note the presence of sculptures of the Classical period made of Thasian dolomitic marble in the hinterland of the central part of Macedonia (Mygdonia). For example, the torso of a statuette of a standing woman dressed in a peplos found near the modern village of Sohos, to the north of lake Volvi, is such an example (inv. 11006; Fig. 25). This statuette can be dated to the late 5th or the beginning of the 4th century B.C.; it follows an Attic model and probably represents the goddess Demeter. The marble has been reported macroscopically as Thasian (dolomitic?) by G. Despinis. It is difficult to determine whether the statuette from Sohos is an import or the product of a local workshop.

54 From the Hellenistic period there are also some important works that are definitely made of Thasian dolomitic marble. First of all, the head of a bearded god (inv. 1019; Fig. 26), which, although of unknown origin, is likely to have originated, according to an astute observation by Giorgos Despinis, from the Sarapieion (the sanctuary of Isiac deities) of Thessaloniki. This means that it is probably related to the equally large head of Isis inv. 1011 from the area of the Sarapieion, and should be also dated to the early 3rd century B.C.

55 A much later headless male statue from Thessaloniki wearing a himation without chiton (inv. 10118 and 2495; Fig. 27) is also made of Thasian dolomitic marble. A comparison with examples from Delos allows us to date this statue to the late 2nd century B.C. Furthermore, the quality of the work suggests that it was carved by an important sculptor of a Greek workshop, whose origin cannot be determined with sufficient accuracy.

Parian Marble

56 The funerary stele of a young girl holding a pigeon found in Nea Kallikrateia (no. 10; Fig. 28), on the eastern coast of the Thermaic Gulf, and dated to around 440 B.C. is of particular interest due to its high quality. The stele has been very convincingly



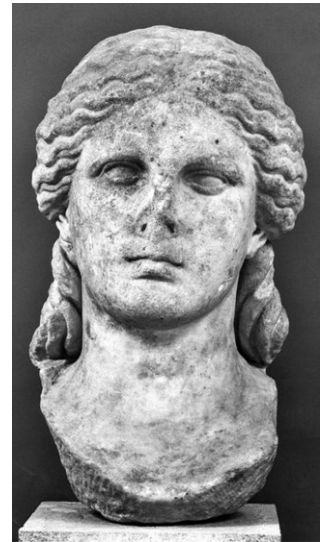
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Fig. 27: Male statue wearing a himation from Thessaloniki, Arch. Mus. inv. 10118. 2495



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Fig. 28: Grave stele of a girl from Nea Kallikrateia/Chalkidiki, no. 10. Thessaloniki, Arch. Mus. inv. 6876



29

Fig. 29: Female head, possibly of Isis from Thessaloniki, no. 23. Thessaloniki, Arch. Mus. inv. 1011

4th century B.C. and found, according to all indications, in Nea Kallikrateia⁵¹, as well as the Dicaea coins found during rescue excavations⁵², led to the identification of the 5th and 4th century BC settlement found at Dicaea, a colony of the Eretrians.

57 Parian marble, most likely of *Lychnites* quality⁵³, is the material of a high-quality sculpture, a larger than life-size female head, made to be inserted into a statue, found in 1938 in the Sarapieion of Thessaloniki (no. 23; Fig. 29). The work can be dated to the first half of the 3rd century B.C. Its findspot leads to the conclusion that this head depicts the goddess Isis, despite the lack of iconographic elements hinting to her iconography⁵⁴. The size and quality of the sculpture and the quality of the marble indicate that this was an exceptionally important work, most probably the cult statue of the goddess. Given the identification, this head must belong to the oldest cult statue of Isis found in Hellenic territory.

attributed to the Paros workshop⁵⁰, and the marble analysis has confirmed its provenance from Paros-Lakkoi. The great similarity between the stele of Nea Kallikrateia and sculptures from the Aegean region, especially from the Cyclades and Euboea, leads to the conclusion that it is associated with the presence of colonists in the area. The recent publication of an important inscription dated to the

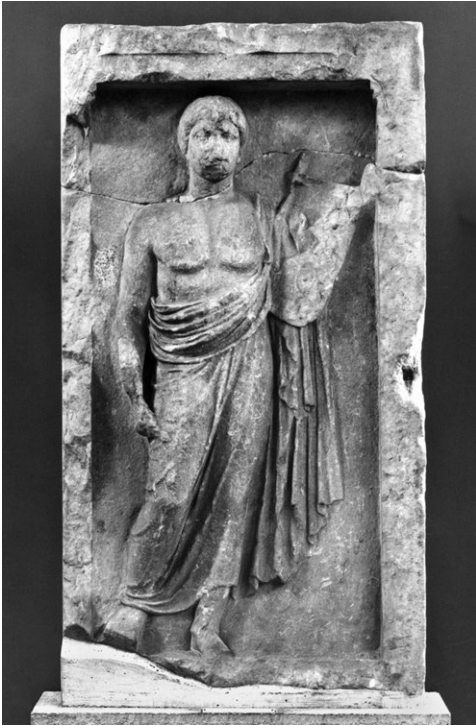
50 Kostoglou-Despoini 2019, 65–79.

51 Voutiras – Sismanidis 2007, 253–274.

52 Bilouka – Graikos 2002; Bilouka – Graikos 2003; Bilouka et al. 2004; Bilouka et al. 2005; Tsigarida 2011, 141 f.

53 Maniatis – Polikreti 2000.

54 Neumann 1993, 213–224.



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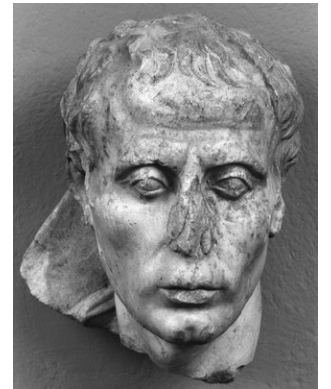
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Fig. 30: Grave stele of a youth from Potidaia/Chalkidiki, no. 11. Thessaloniki, Arch. Mus. inv. 2465

Fig. 31: Small altar with figures in relief, no. 16. Thessaloniki, Arch. Mus. inv. 6679

Fig. 32: Votive relief to Zeus, Hera, Athena and other gods from Thessaloniki, no. 2. Thessaloniki, Arch. Mus. inv. 923

Fig. 33: Fragmentary figure from a large relief from Pella, no. 61. Thessaloniki, Arch. Mus. inv. P 108

Fig. 34: Male portrait from a large relief, from Thessaloniki, no. 7. Thessaloniki, Arch. Mus. inv. 906

Pentelic Marble

58 Several of the sculptures housed at the Archaeological Museum of Thessaloniki, originating from the broader region of the city and Chalkidike peninsula and dated to the late 5th and 4th century B.C., are made of Pentelic marble. This group includes: 1. The funerary stele of a young man with a lyre from Potidaea (no. 11; Fig. 30), the dating of which to the decade between 390 and 380 B.C. was based on comparisons with Attic sculptures. 2. The small altar with relief figures (no. 16; Fig. 31) of unknown origin (perhaps from *Olynthos*), dated to the first half of the 4th century, most likely in the decade between 380 and 370 B.C. The iconographic models of the relief figures are Attic. 3. The votive relief with five standing frontal figures of gods and heroes found near the agora of Thessaloniki (no. 2; Fig. 32), which can be dated to the last twenty years of the 4th century B.C., i.e., the time the city was founded, also follows Attic models.



Fig. 35: Headless cuirassed statue from Kalamoto/Thessaloniki (ancient Kalindoia), no. 8. Thessaloniki, Arch. Mus. inv. 2663



Fig. 36: Part of an anthemion-crowned grave stele from Oreokastro/Thessaloniki, no. 19. Thessaloniki, Arch. Mus. inv. 9258



Fig. 37: Votive relief to the hero Hephaestion from near Pella, no. 14. Thessaloniki, Arch. Mus. inv. 1084

Furthermore, the fragment of a large male torso dressed in a short tunic in high-relief, possibly from a funerary naiskos, originating from *Pella* (no. 61; Fig. 33) and dated to the late 4th century B.C., is reminiscent of the last Attic funerary stele reliefs prior to the prohibitory law of Demetrios of Phaleron (317/316 B.C.).

59 Two sculptures of exceptional quality, dated to the second half of the 1st century B.C. and made of Pentelic marble, can be attributed to highly skilled sculptors. The first is a male portrait of the late Republican period (50–40 B.C.) found just north of the agora of Thessaloniki (no. 7; Fig. 34), and belonging to a life-size figure in high-relief. Comparisons to similar portraits found in *Athens* substantiate the Attic provenance of the work⁵⁵. The second is the headless statue in breastplate from *Kalindoia* (no. 8; Fig. 35), dated to the last twenty years of the 1st century B.C., which was most probably produced in an Attic workshop. It has been claimed that the person depicted is Augustus⁵⁶.

Vermian Marble

60 A peculiar case is the funerary stele of a young man found in *Oreokastro* (no. 19; Fig. 36) and dated between 430 and 420 B.C. Only the upper part survives and includes the young man's head and the palmette crowning. The closest parallels for this stele are found in the central and eastern Aegean; yet the fact that it is of lower quality than its models leads to the conclusion that it is the work of a local workshop under heavy Ionian influence⁵⁷. The marble is fine-grained, but not of high quality and possibly of local provenance. The parameters of the analysis favor the attribution of the marble to a Vermian quarry, with a small probability for a Parian origin. Although there are no indications until now that marble quarries in Vermio were exploited in the 5th century B.C., the attribution of the Oreokastro stele to a local workshop lends credibility to the hypothesis that its marble comes from Vermio.

61 The Oreokastro stele (no. 19; Fig. 36) provides evidence, that by the 5th century B.C., local sculpture workshops in Macedonia were apparently using marble from quarries in the mountain Vermio. These workshops were artistically dependent on those of the Greek islands and Ionia. During the 4th century B.C., the influence of Attic art came to dominate Macedonian sculpture. Indeed, when a work is of Pentelic marble, one may reasonably assume that it is Attic. We do not know if Athenian sculptors fulfilled occasional orders or had established themselves in Macedonia. In the latter case, it is reasonable to assume that they might have exploited local marble quarries. This could explain the presence of sculptures which, though unquestionably belonging to the Attic artistic tradition, are made not of Pentelic but of local marble, possibly from Vermio. A

possible example is the votive relief of the hero Hephaestion from *Pella* (no. 14; Fig. 37), dated to the last quarter of the 4th century B.C.

62 During the 3rd century B.C. and more so during the 2nd and 1st centuries B.C., Vermio marble becomes increasingly common for Macedonian sculptures. It is reasonable to associate the intensive quarrying activity in Vermio with the development of the sculpture workshop of Veroia. A remarkable votive relief to Osiris Mystes (an epithet of the god not attested elsewhere), found in the sanctuary of the Isiac deities of Thessaloniki (no. 22) and probably dating from the early 2nd century B.C., is made of Vermian marble. The votive relief of the hero Hippalkmos (no. 24) found in the center of Thessaloniki, not far from the southeast corner of the agora, and dated to the first half of the 2nd century B.C., is made of marble of the

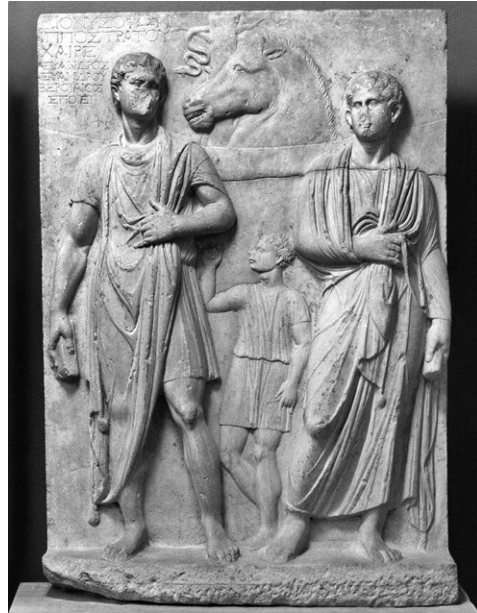
55 Voutiras 2017, 158 n 16 fig. 1. 2.

56 Karanastassi 1995.

57 Despoini 1986, 46–49.



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Fig. 38: Large grave relief depicting a man from Veroia, no. 12. Thessaloniki, Arch. Mus. inv. 1068

Fig. 39: Grave relief of Dionysophon from Lete. Thessaloniki, Arch. Mus. inv. 1935 B

same provenance, albeit of lower quality. These two reliefs differ stylistically from each other; they may well be works of local workshops using Vermian marble.

63 The finds from Veroia indicate that it was home to one or more local sculpture workshops, the volume of production of which saw a significant increase in the second half of the 2nd century B.C.⁵⁸. The works of Veroian sculptors of this period are mostly funerary reliefs and are recognizable not only by their style but also by the use of specific iconographic types of human figures⁵⁹. One of the relatively early examples of this production is a large slab from a funerary monument (no. 12; Fig. 38), most likely made of Vermian marble⁶⁰, with a standing male figure in high relief, originating from Veroia and dated to the late 2nd or early 1st century B.C.⁶¹. During the 1st century B.C., the activity of Veroian sculptors was documented in inscriptions from Lete, Larisa and Eidomene⁶². After the first half of the 1st century A.D., the production of the Veroian workshops apparently decreased and became limited to the city itself and its surrounding region.

64 Several of the funerary reliefs of the 1st century B.C. and early 1st century A.D. found in Thessaloniki and its greater region can be identified as products of Veroian workshops. One example worth mentioning consists of two slabs with relief figures, male and female respectively, found in the necropolis of ancient Lete (inv. 1935A-B; Fig. 39). The quality of the sculptures is above average and the style of the figures points to a date in the first quarter of the 1st century B.C. As the older archaeometric analysis by Pike et al. 2002 showed, the marble probably came from Veroia (Vermio; Table 5). And indeed, the slab with the male figures bears an inscription with the signature of Euandros son of Euandros from Veroia, who belongs to a well attested family of sculptors working in



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Fig. 40: Relief slab from a funerary monument from Lete, nos. 17. 18. Thessaloniki, Arch. Mus. inv. 1934 A-F

58 Allamani-Souri 2014, 285–301.

59 Allamani-Souri 2014, 301–306.

60 The analysis gives also Pieria (Sedoukia) as an option (Table 3), however, the marble quality extracted at this quarry is not suitable for nice sculpture.

61 Allamani-Souri 2014, 319 no. 13.

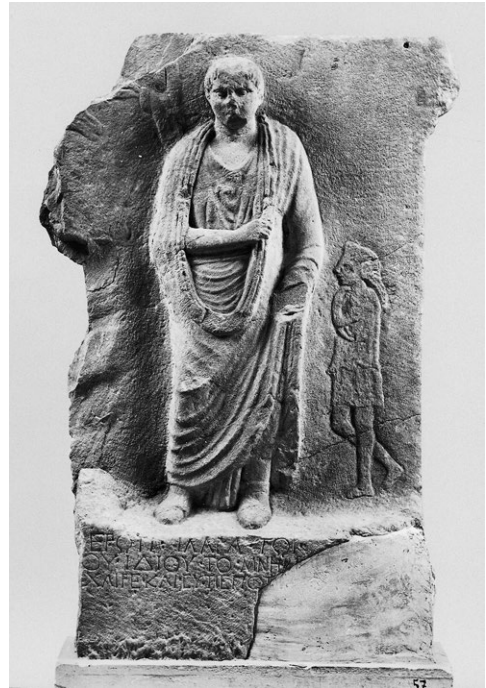
62 Allamani-Souri 2014, 295–299.

Fig. 41: Grave stele of Gaius Popillius from Thessaloniki, no. 32. Thessaloniki, Arch. Mus. inv. 10138



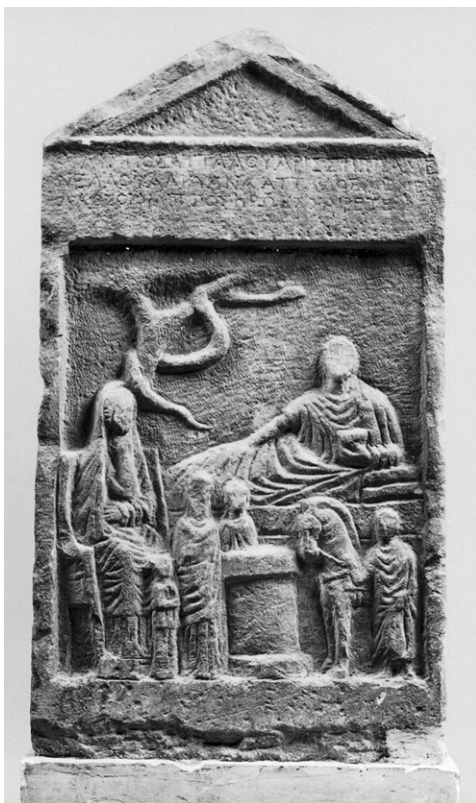
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Fig. 42: Grave relief with a man wearing a toga from Thessaloniki, no. 90. Thessaloniki, Arch. Mus. inv. 57



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Fig. 43: Grave stele with a 'funerary banquet' scene from Kalamoto/Thessaloniki (ancient Kalindoia), no. 40. Thessaloniki, Arch. Mus. inv. 2669



43

Macedonia and Thessaly in the 1st century B.C. The late works of this group of sculptures include two slabs from a funerary monument with figures in relief, also from Lete (**nos. 17, 18**; Fig. 40), that can be dated to the late 1st century B.C. or the early 1st century A.D., and their marble is assigned to Vermio. An interesting observation is that sculptors from Veroia also worked for Roman businessmen (*negotiatores*) established in Thessaloniki. Certain examples include: 1. The funerary stele of Gaius Popillius (**no. 32**; Fig. 41), depicted in a seated position, a work from the mid-1st century B.C. 2. The relief of a *togatus* (**no. 90**; Fig. 42), dated to the late 1st century B.C. or the early 1st century A.D. We can also attribute to a Veroian sculptor a fragmentary funerary relief from Thessaloniki, depicting a Gaul horseman serving in a Roman military unit (*eques alae Macedonicae*) (**no. 60**), dated, on the basis of its inscription, to the first half of the 1st century B.C. This relief, however, according to the analysis, could be made either of Vermio or Tranovalto marble, both locations accessed from Veroia through the Aliakmon River. The result of the analysis of the grave relief **no. 40** (Fig. 43) from Kalindoia, which dates to the same period as **no. 60**, is also doubtful (see above § 44–45). The provenance of its marble from Naxos can also be excluded not only by its late date and fine grain size, as discussed above in § 44, but also by the fact that it is very unlikely for a Macedonian work of this era. On the contrary, its origin from Tranovalto Kozani, suggested as a possible alternative (Table 3), seems more likely.

Imperial Period (1st – 3rd century A.D.) and Late Antiquity

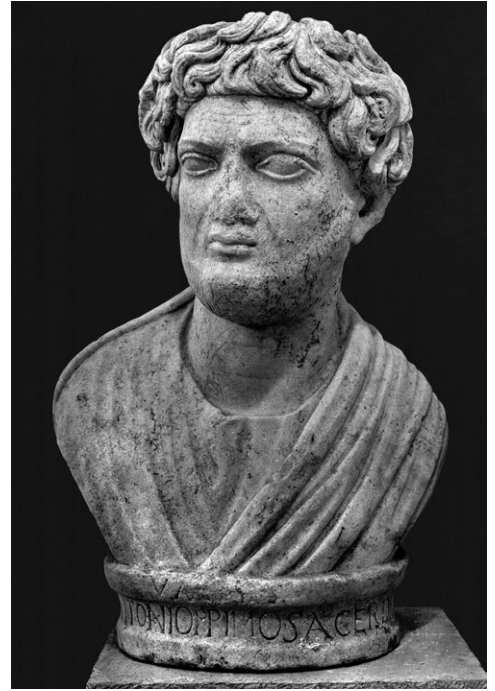
65 During the Imperial period, the sources of marble used during previous periods continued to be used in Macedonian sculptures. The difference lies in the fact that the presence of sculptures of all categories, as is the case throughout the Empire,



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becomes much more frequent, thus enabling us to draw more comprehensive conclusions. Both archaeometric research and macroscopic observation indicate that the most popular types of marble during this period were primarily Thasian marble and secondarily Pentelic marble, while Vermio marble continues to be used. There is limited use of Parian marble, while marbles from Asia Minor, such as Proconnesian, Afyon and Göktepe marble, are less common. In some cases, the results suggest the possible use of marble from Tranovalto (Kozani) and Pieria (Sedoukia).

Thasian Marble

66 Dolomitic Thasian marble is frequently chosen for works of high artistic quality, i.e., imperial and private portraits. One noteworthy example is the colossal head of Emperor Titus from Thessaloniki (no. 3; Fig. 44), which, as its stylistic features suggest, is probably the work of an Athenian artist highly adept at carving the hard dolomitic marble of Thasos. This is also the case with the portrait of a woman, also from Thessaloniki, dated to the late Hadrianic era, where we can easily recognize the Thasian dolomitic (Vathy/Saliara) marble (inv. 3; Fig. 45)⁶³. From the above cases it seems certain that Athenian artists carried out work in Macedonia for a highly demanding clientele using dolomitic Thasian marble, which was both easily accessible and did not fall at all short in terms of qualitative results. At the same time, local portrait-making workshops extensively used also Thasian marble, mainly dolomitic, providing their clientele with more affordable portrait works (statues and busts), e.g., no. 84; inv. 10844; Fig. 46⁶⁴. This is a large group of works most of which are of rather high quality and should be the object of a separate study in order for their stylistic characteristics to be more accurately described and comprehended. The fact that, in addition to the provenance of the marble, there are, occasionally, stylistic characteristics pointing to the artistic tradition of Thasos

Fig. 44: Colossal head of Titus from Thessaloniki, no. 3. Thessaloniki, Arch. Mus. inv. 882

Fig. 45: Head of a girl from Thessaloniki. Thessaloniki, Arch. Mus. inv. 3

Fig. 46: Bust of L. Titonius Primus from Thessaloniki. Thessaloniki, Arch. Mus. inv. 10844

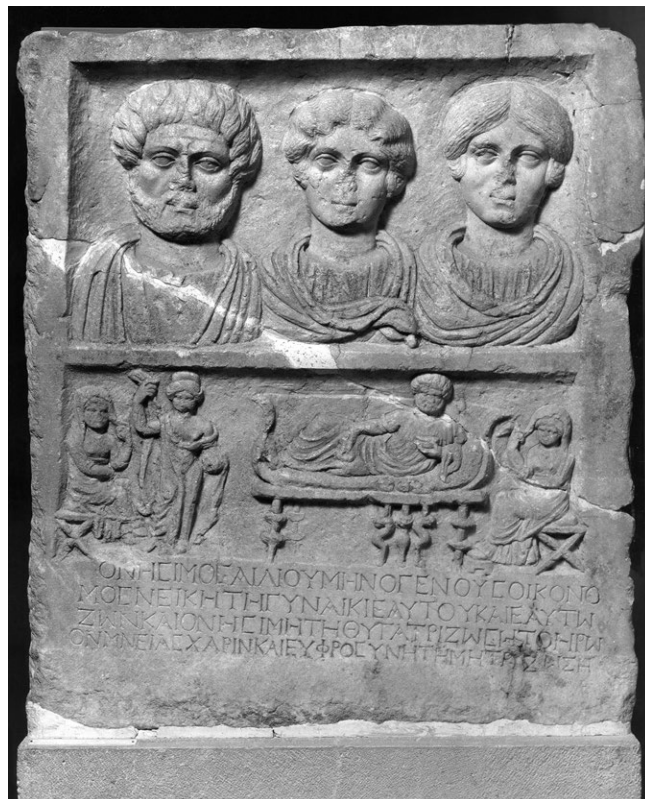
63 See also, with regard to both works, Stefanidou-Tiveriou 2022, 19 f. figs. 10. 11. Similar cases include the female statue from the Sarapieion of Thessaloniki, inv. 851, as well as the head of a bearded god, of unknown provenance, inv. P 61 (Table 5).

64 See also inv. 61. 103. 849. 1051. 1052. 1055. 1066. 1287. 1943. 2476. 6686. 9230. 11451.



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Fig. 47: Votive relief to Theos Theodaimon from Derveni (ancient Lete), no. 31. Thessaloniki, Arch. Mus. inv. 1525



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Fig. 48: Grave relief of Onesimos from Aghios Vasileios Langada/Thessaloniki, no. 33. Thessaloniki, Arch. Mus. inv. 1524

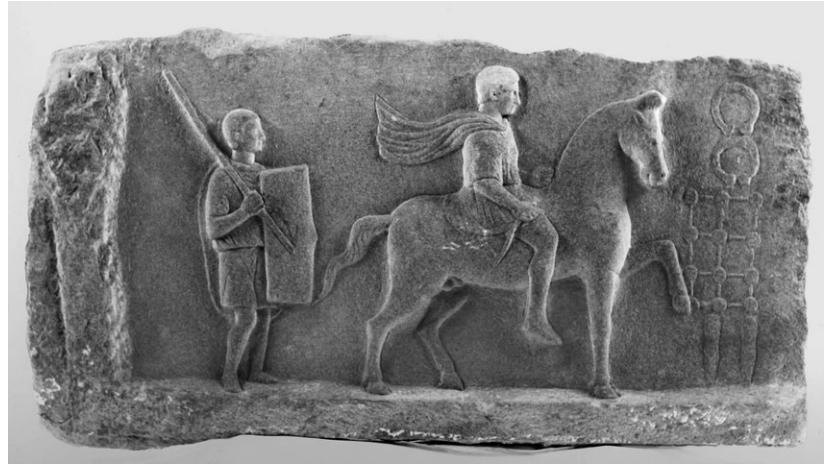
does not necessarily lead to the conclusion that the artists in question were Thasian. Of course, one cannot rule out the possibility that Thasian sculptors worked in Thessaloniki and other Macedonian cities. However, this question cannot be thoroughly investigated before the respective works of Thasos become better known. In any event, one may assume that the workshops of major Macedonian cities, especially Thessaloniki, that had been using Thasian marbles for centuries, had come to adopt stylistic features of the sculpture of the island.

67 In addition to portraits, Thasian marble, mostly dolomitic and on rarer occasions calcitic from Aliko, was used to create numerous sculptures of all kinds: statues and statuettes (inv. 833. 844. 895. 1017. 1255. IET 1056. 7639. 10245), votive reliefs (no. 31; Fig. 47), and predominantly funerary monuments of all categories, which, as a rule, were created by local workshops. Funerary reliefs form a large group characterized by typological diversity, extending from the 1st (inv. 11309) to the 2nd (inv. 11477. 7200 and no. 33; Fig. 48) and 3rd centuries A.D. (inv. 2447). The quality of the reliefs also varies, ranging from crude (inv. 11221. IET 20545) to satisfactory or very good, as is the case with the group of tondo reliefs (inv. 203. 1167. 116. 170. P 35. 9137; Fig. 49), which we believe constitute a creation of the workshops of Thessaloniki (or Thasos)⁶⁵. In this category, the coarse-grained Aliko marble is used relatively rarely and is attested, for example, in nos. 27. 74 [Fig. 50]. 92.

68 In the case of two other categories of funerary monuments of Macedonia, and particularly Thessaloniki, from the 2nd and 3rd centuries A.D., namely altars and sarcophagi, the predominant material used is Thasian marble, in particular the coarse calcitic type from Aliko. With respect to altars, this conclusion is based both on macroscopic observations and on the analysis of samples from a funerary altar from Thessaloniki (no. 37); only one example from Potidaia, the cylindrical, possibly funerary altar, is made of dolomitic (Vathy/Saliara) marble (no. 46). With regard to Thessaloniki sarcophagi, which make up



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a rather large group, there is more extensive archaeometric research available⁶⁶. It was found that, apart from Aliko marble, which was the predominant material used in these monuments, white marble from Vathy/Saliara (dolomitic) and calcitic from cape Fanari and Acropolis at Limenas of Thasos was used in the sarcophagi of above-average quality. These products are all works of local workshops using material quarried on Thasos on the basis of specifications set by Thessaloniki-based workshops⁶⁷. The popularity of these simple, quite often inscribed monuments was limited to the city proper, where they were widely popular among recipients from all social strata.

⁶⁹ Finally, it should be noted that marble from Thasos quarries was extensively used in large public building projects, both for architectural members and for sculpted décor. It is mainly worth citing the example of the double-faced colonnade known to scholarship as ›The Enchanted‹ (›Las Incantadas‹)⁶⁸. The eight relief-adorned pillars of the second level are decorated with mythological figures in high relief that were carved, as proven by the archaeometric analysis, from dolomitic Thasian marble from Vathy/Saliara, in contrast to the architectural members of the gallery made of Aliko marble⁶⁹. What is of particular interest as regards the figures in relief is that they are the work of Athenian artists, as concluded both from the quality of the work and from their stylistic characteristics, which are highly comparable to those of Attic works from the period of 130/140 and 160 A.D.⁷⁰. It is clear that this large-scale work was assigned to a team of Athenian sculptors, several of whom, as noted above, had become familiar with the use of dolomitic marble.

Pentelic Marble

⁷⁰ Pentelic marble is largely present, particularly in the city of Thessaloniki, mainly from the early Imperial age onwards. Reference was made above to the important breastplate-clad statue from Kalindoia, dated to the late 1st century B.C. (**no. 8**; Fig. 35), as well as an older portrait head of a large relief from Thessaloniki (**no. 7**; Fig. 34). It would be no exaggeration to claim that sculptures using Pentelic marble dominate the public spaces and major sanctuaries of Thessaloniki. Of the imperial statues found on Stratigou Doumptoti Street, the headless sculpture consisting of two parts (possibly portraying Caligula and then reworked to portray Claudius) is possibly an Attic work, despite the

Fig. 49: Grave relief in a round form from Gefira/Thessaloniki. Thessaloniki, Arch. Mus. inv. 9137

Fig. 50: Grave relief of a Roman soldier from Thessaloniki, no. 74. Thessaloniki, Arch. Mus. inv. 6081

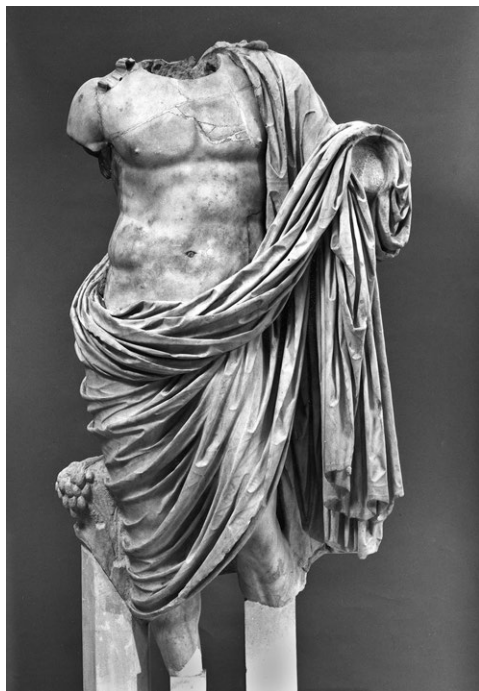
⁶⁶ Maniatis et al. 2010; Stefanidou-Tiveriou 2014, 127–140. 149–155.

⁶⁷ Stefanidou-Tiveriou 2014, 127–140.

⁶⁸ Stefanidou-Tiveriou 2018c, 225–230. Solomon – Galiniki 2021; Stefanidou-Tiveriou 2022, 21–25.

⁶⁹ Laugier – Sève 2011, 582 f. and n. 5.

⁷⁰ Stefanidou-Tiveriou 2018c, 229; Stefanidou-Tiveriou 2021, 27 f.; esp. Stefanidou-Tiveriou 2022, 21–25 figs. 12–20.



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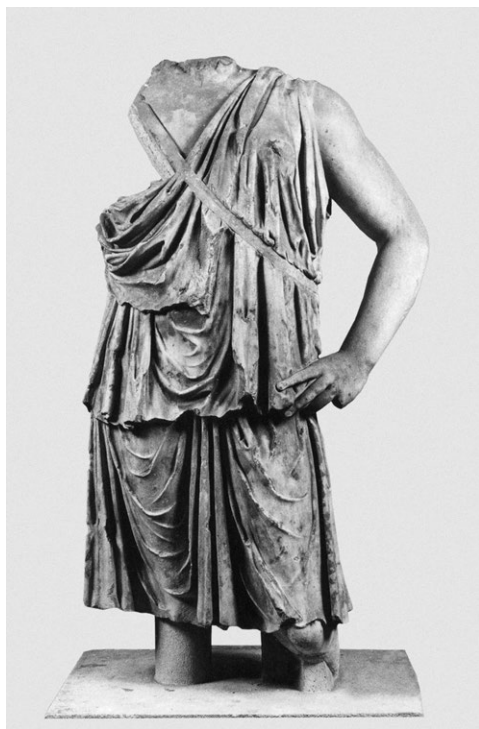


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Fig. 51: Headless statue of an emperor from Thessaloniki, no. 1. Thessaloniki, Arch. Mus. inv. 2467. 2468

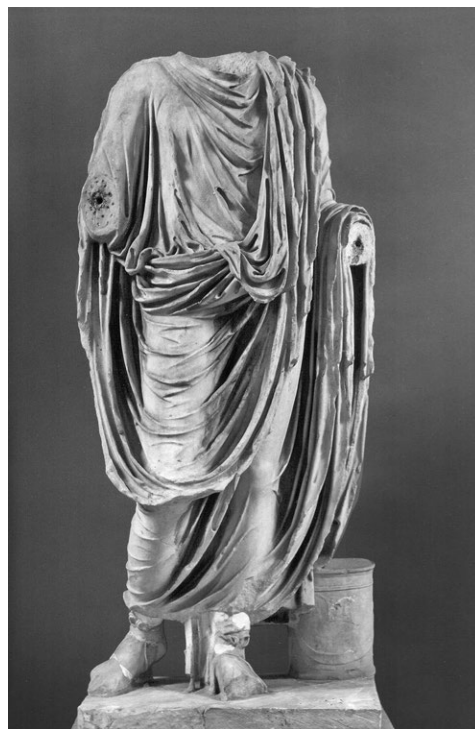
Fig. 52: Headless statue of an aegis-bearing emperor from Thessaloniki, no. 47. Thessaloniki, Arch. Mus. inv. 21996

Fig. 53: Torso of a female statue, probably of Dea Roma from Thessaloniki, no. 70. Thessaloniki, Arch. Mus. inv. 1526



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Fig. 54: Statue of a man wearing a toga from Thessaloniki. Thessaloniki, Arch. Mus. inv. 1528



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fact that only the dressed lower part (**no. 1B**; Fig. 51) is made of Pentelic marble, while the naked torso is made of Parian marble, from the Marathi valley, probably of the high quality *Lychnites* (**no. 1A**; Fig. 51). Additionally, two of the three imperial statues (**nos. 47** [Fig. 52] and **48**) originating from the Ionic temple on Antigonidon Square are of Attic style and of exceptional quality and also made of Pentelic marble. Of these statues, the one in breastplate (**no. 48**) belongs to a series of replicas of the same prototype, all of which are Attic works thought to portray Nero⁷¹. The second statue (**no. 47**), adorned



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Fig. 55: Statue of Aphrodite in the Louvre-Naples type from Thessaloniki. Thessaloniki, Arch. Mus. inv. 831

Fig. 56: Statue of a Muse with kithara from Thessaloniki, no. 29. Thessaloniki, Arch. Mus. inv. 6683

with a large aegis with some well-preserved traces of pigments (see the pigment and gilding section), is later and could portray Hadrian⁷². Pentelic marble is also used for the apparently cult statue of Dea Roma (no. 70; Fig. 53) which was probably placed next to the aforementioned imperial statue and belongs to the same period⁷³. We must add to these the statue of a Roman official wearing a toga (inv. 1528; Fig. 54), made of marble that can be identified empirically as Pentelic with reasonable certainty.

71 Exceptional Attic sculptures of Pentelic marble were also found in the sanctuary of Isiac deities (the so-called Sarapieion) of Thessaloniki, such as the two female portrait statues, inv. 831 (Fig. 55) and 832. The provenance of inv. 831 is confirmed by archaeometric analysis⁷⁴. However, the examples unearthed in the area of the ancient agora are far more numerous. Firstly, the statues of the Muses from the Odeum – three headless ones and the lower part of a fourth (nos. 28. 29 (Fig. 56); 30. 64)⁷⁵ – are of particular interest, as they combine the use of Pentelic marble with a style that is unquestionably that of a local workshop. This large group of statues (probably consisting of ten figures at first), dated to approximately 200 A.D. and intended to adorn the façade of the stage building (*scaenae frons*) of the Odeum, was an important commission, possibly financed by a wealthy donor; the latter commissioned a local workshop which, however, used Pentelic marble – perhaps at the patron's request. This is also the case, for example, with certain relief-decorated sarcophagi of Thessaloniki that imitate Attic models⁷⁶. In other words, this is the exact opposite of the large construction work of the ›Gallery of the Enchanted‹, where the use of Thasian dolomitic marble by Athenian sculptors was clearly due to the context of the overall architectural design of the edifice.

72 Stefanidou-Tiveriou 2012, fig. 5–7.

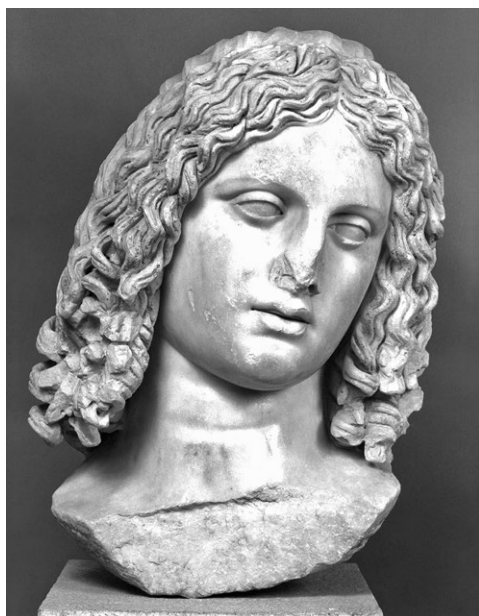
73 Stefanidou-Tiveriou 2012, fig. 1. 2.

74 The first (inv. 831) is assuredly Pentelic, see Pike et al. 2002, 264. 266. 268 fig. 7, while the second (inv. 832) has been considered by the foregoing, Pike et al. 2002, 264. 270 fig. 15, »possibly Afyon«. This second identification seems unlikely, based on the style of the work, thus we favor its identification as Pentelic, proposed by G. Despinis in: Despinis et al. 1997, 106 f. no. 76.

75 On the statues in detail, see Stefanidou-Tiveriou 1990.

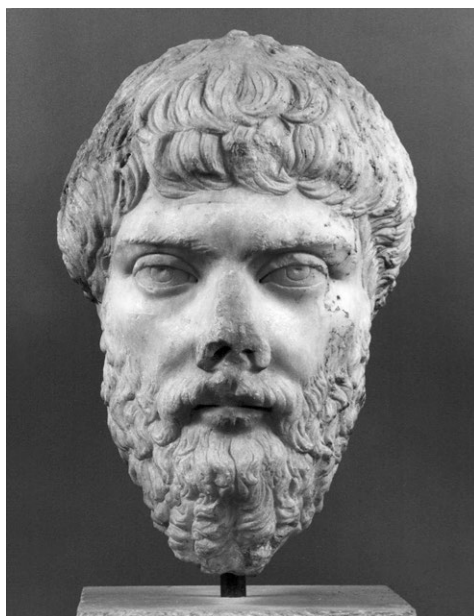
76 Papagianni 2016, 110 and n. 1030.

Fig. 57: Female or young male head from Thessaloniki. Thessaloniki, Arch. Mus. inv. 878



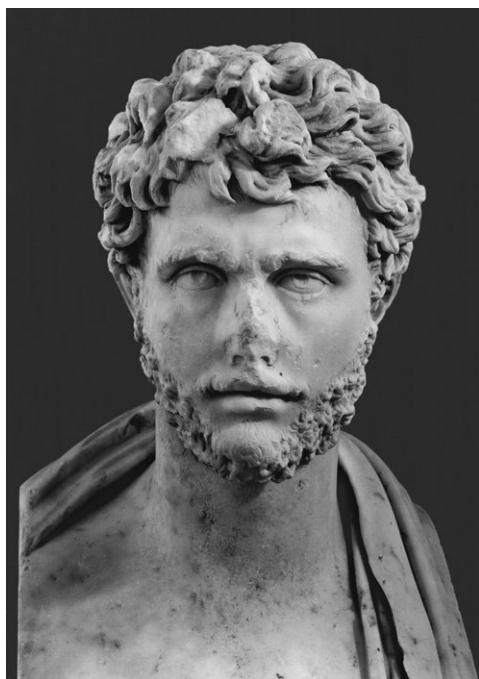
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Fig. 58: Head of a bearded man from Thessaloniki. Thessaloniki, Arch. Mus. inv. 2460



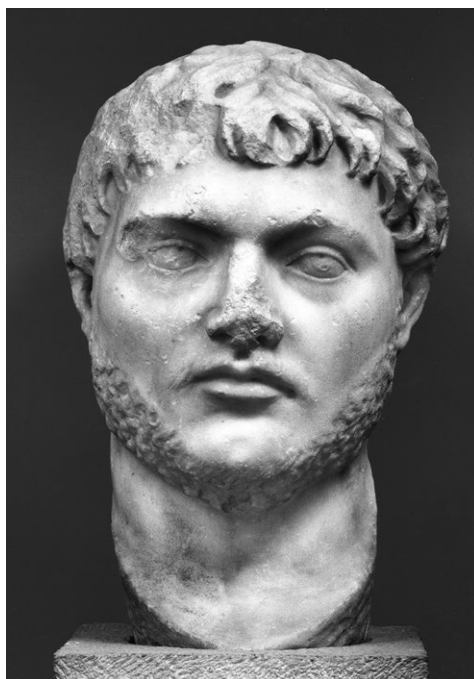
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Fig. 59: Herm with male portrait from Thessaloniki. Thessaloniki, Arch. Mus. inv. 3026



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Fig. 60: Male portrait probably from Thessaloniki, no. 34. Thessaloniki, Arch. Mus. inv. 169



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72 On the contrary, works made of Pentelic marble were found in the northern terrace of the agora, where cult edifices have been identified⁷⁷; these sculptures were carved by some of the top Athenian sculptors of the 2nd century A.D. These include the larger-than-life head of Sarapis, with traces of gilding in the locks, most likely belonging to a cult statue (inv. 897), and two statue heads that belonged to a group, one of a bearded God with part of his naked torso, and a young, long-locked figure, possibly a young man rather than a woman (inv. 886. 6130. 878; Fig. 57)⁷⁸.

73 The large number of private portraits made of Pentelic marble – of varying quality – is impressive and includes some of the finest examples of sculpture of this

77 Stefanidou-Tiveriou 2001; Stefanidou-Tiveriou 2009.

78 On the identification of the marble, cf. Pike et al. 2002, 264 f. 270 f. fig. 16. 17.



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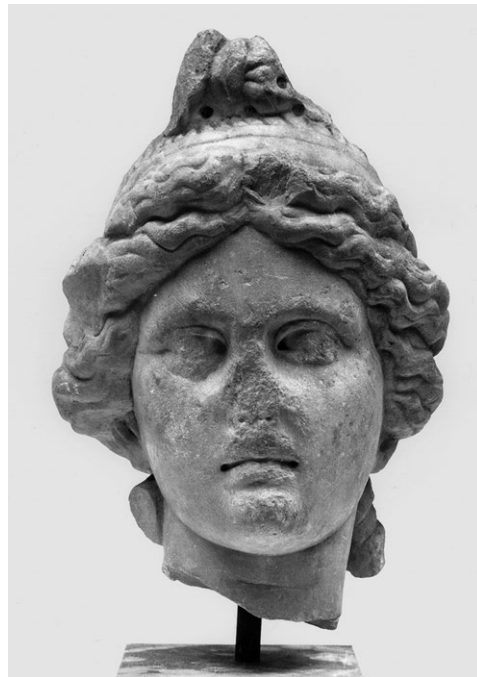
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Fig. 61: Bust of a man from Thessaloniki, no. 35. Thessaloniki, Arch. Mus. inv. 11201

Fig. 62: Bust of a woman from Thessaloniki, no. 36. Thessaloniki, Arch. Mus. inv. 11202



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Fig. 63: Unfinished portrait of a woman from Thessaloniki, no. 77. Thessaloniki, Arch. Mus. inv. 6157

Fig. 64: Female head. Thessaloniki, Arch. Mus. inv. 6152

period, with direct parallels in Athens (inv. 2460 and 3026; Fig. 58. 59); others could almost certainly be considered Attic works (no. 34; Fig. 60; inv. 249. 856. 1029. 3327. 6934. 7337). In certain cases, it is harder to identify Attic characteristics, and we therefore cannot rule out the possibility that they were carved out of Pentelic marble at Thessaloniki workshops by quite skilled sculptors (nos. 35 [Fig. 61]; 36 [Fig. 62]; 100). Finally, the unfinished head with the hairstyle of Faustina the Younger, made of Pentelic marble and intended to be inserted into a statue (no. 77; Fig. 63), is enlightening. That is, we have additional confirmation of the fact that Athenian artists worked in Thessaloniki, as previously claimed, provided this is not a work undertaken by a local sculptor, which is not unlikely. Nevertheless, the use of Pentelic marble alone cannot automatically lead to the attribution of a work to an Athenian sculptor if the work in question does not offer additional information in this respect. For example, works such as nos. 99 and 82,



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Fig. 65: Female head with a mural crown from Thessaloniki, no. 80. Thessaloniki, Arch. Mus. inv. 6386

can be considered Attic solely on the evidence of archaeometric analysis, whereas the female head inv. 6152 (Fig. 64) can be safely considered an Attic work due to its quality and style.

74 On the other hand, it is certain that complete works were directly dispatched from Athens to their destination. Thessaloniki is most probably the top destination in Greece for Attic sarcophagi with rich sculptural decoration during the 2nd and 3rd centuries A.D. These luxury products, of which nos. 45 and 66 are a small sample, were dispatched in their finished form to their destinations, as is generally accepted today⁷⁹. In the cemeteries of Thessaloniki, sarcophagi of Attic provenance coexisted with locally produced sarcophagi, accounting for approximately 13 % of the total extant works⁸⁰. The preference of part of the customers for these imported, particularly costly sarcophagi over the simpler local ones is a complex matter, only partly associated with financial reasons in our opinion, which cannot be discussed here. However, what we can assume, based on the solid fact that Attic sarcophagi reached the port of Thessaloniki by ship, is that they would be unloaded together with other orders of marble products, such as small and large sculptures. In fact, certain works found in Thessaloniki, such as marble table supports (*trapezophora*) with sculpted decoration or statuettes (no. 80; Fig. 65); inv. 225. 846. 1104. 1948. 3024. 3025. 3055. 6386. 6680. 16143), are stylistically very similar to Attic sarcophagi with relief decoration, so that there is no doubt that they were carved by the same sculptors.

Parian Marble

75 The presence of Parian marble is numerically far less significant, as was the case in earlier periods. At the same time, its use mainly in works of high artistic caliber is not surprising. We should first mention a work unique in terms of its function: a relief slab depicting a chlamys-wearing youth (no. 75; Fig. 66) from the city's Sarapieion⁸¹. It was incorporated in a large monument (e.g., pedestal or altar) and must have been carved at a local workshop in the late 1st century B.C. or the early 1st century A.D. Nevertheless, it was made of marble from Paros (Marathi), which may be explained by the high caliber of the sculpture, commissioned by a highly demanding client. However, the most interesting work of this group is the posthumous statue of Augustus, made up of numerous pieces (nos. 26 A–C; Fig. 67). Of these, the head and naked torso (nos. 26 A. B) were carved from marble coming from Paros/Marathi (*Lychnites?*), while the lower part with the legs partly covered by a himation is made also from Parian marble but from a



a



b



c



d

66

Fig. 66: Large fragmentary relief with a youth wearing chlamys from Thessaloniki, no. 75. Thessaloniki, Arch. Mus. inv. 868. 2596

79 See e.g., Koch – Sichtermann 1982, esp. 350; Stefanidou-Tiveriou 2010, 155 n. 10–12 fig. 4; Tambakopoulos et al. 2019.

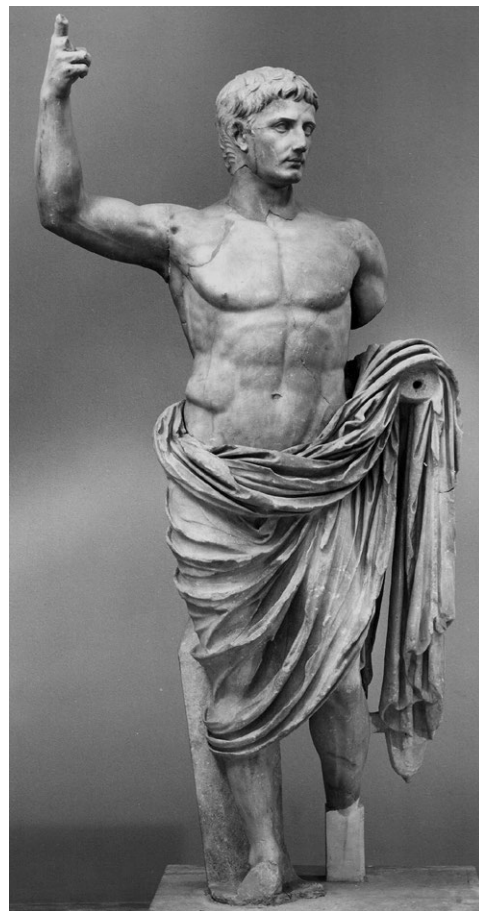
80 Stefanidou-Tiveriou 2010, 155.

81 Stefanidou-Tiveriou 2018d.

different location (Paros-Lakkoi valley). The headless statue found with it is also made of different sorts of marble: as already noted, it combines Parian marble for the torso with Pentelic marble, in this case, for the dressed legs (nos. 1 A, B; Fig. 51).

76 The combination of two types of marble in the different parts of the same statue is not a problem, since for the naked torso and the head a higher quality material was used, while the covered limbs are made of lesser quality marble. However, we should also point out the big stylistic difference between the dress of Augustus and that of the headless statue, whose carving is of superior quality. The problem of the coexistence of these imperial statues (and a third one of which only the right arm of the inv. 2467a survives, perhaps of Pentelic marble), for which the meager excavation data do not help, needs further discussion to be done elsewhere.

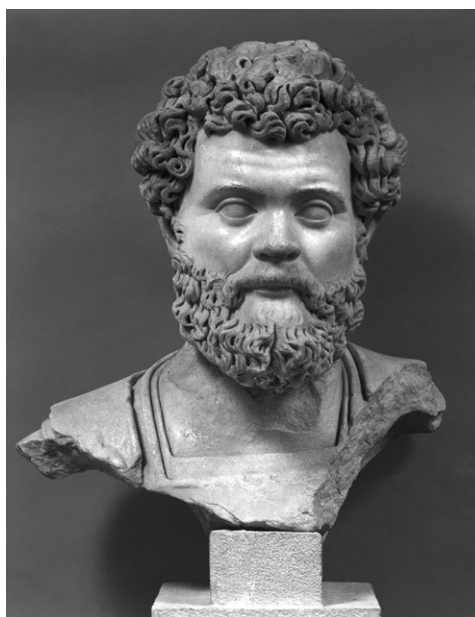
77 Based on an older analysis, Parian marble was also used to construct the larger-than-life acrolithic statue of Athena in the Medici type, dated to the 2nd century A.D. (inv. 877; Fig. 68), of which the head, right arm and right leg survive. This significant statue was reworked during the early Severan period in order to depict the Empress Julia Domna⁸². This statue, certainly serving cult purposes, would have exceeded 2.50 m in height, including the crest of the helmet, and could only have been constructed in situ, as is required by its technique. It should be noted that a similar head, currently in the Memorial Art Museum of Oberlin College⁸³, also comes from Thessaloniki. Two other important sculptures made of Parian marble share a findspot with the members of the statue of Athena. The first, also possibly part of an acrolithic work, consists of the upper part and head of the statue of a female deity with traces of gilding in the locks and erstwhile inserted eyes (inv. 887). The second is the bust of a breastplate-clad bearded man (no. 4; Fig. 69).



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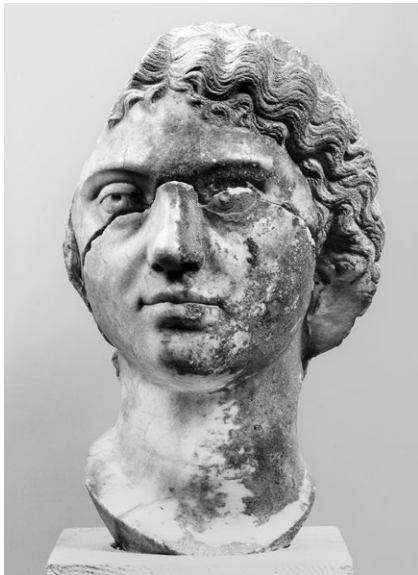
Fig. 67: Statue of Augustus from Thessaloniki, no. 26. Thessaloniki, Arch. Mus. inv. 1065

Fig. 68: Head of Athena reworked as Julia Domna from Thessaloniki. Thessaloniki, Arch. Mus. inv. 877

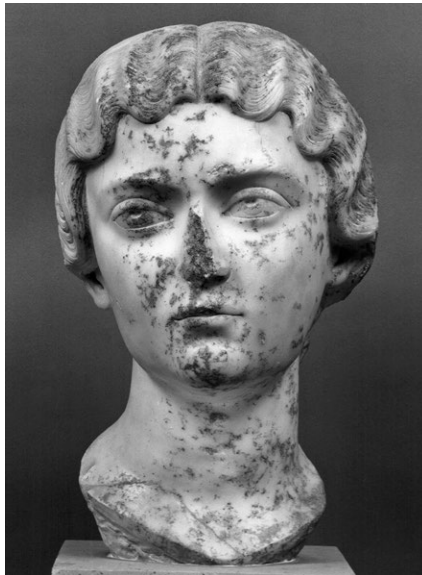
Fig. 69: Bust of Septimius Severus from Thessaloniki, no. 4. Thessaloniki, Arch. Mus. inv. 898

82 Despinis 1975, 11–18 fig. 1–7 pl. 1–8.

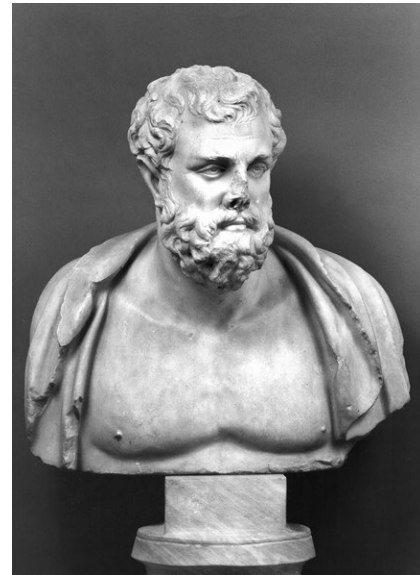
83 Despinis et al. 1997, no. 72 p. 101 n. 8 (G. Despinis).



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Fig. 70: Female portrait from Skydra/Pella district, no. 73. Thessaloniki, Arch. Mus. inv. 2488

Fig. 71: Female portrait from Potidaia/Chalkidiki, no. 85. Thessaloniki, Arch. Mus. inv. 1054

Fig. 72: Bust of a bearded man, no. 13. Thessaloniki, Arch. Mus. inv. 1058

Fig. 73: Portrait head of a bearded man, no. 76. Thessaloniki, Arch. Mus. inv. 1024

Its identification as emperor Septimius Severus in the so-called adoption type⁸⁴, while not without difficulties, was based on the coinage of the emperor and the type of the breastplate with a hybrid relief figure on the shoulder piece. The identification of the marble as Parian further suggests identification as the emperor, given that this material was used in relatively rare and special occasions.

78 Finally, Parian marble is attested, although not with certainty, also in other works, such as the headless bust from Syllata, Chalkidike peninsula (no. 50), emerging from a calyx of acanthus leaves. This iconographic feature combined with the high quality of carving of the sculpture makes it difficult to consider it as the work of a local workshop made of local (i.e., Vermio) marble. In another case, regarding the female portrait from Skydra, dated to around 160 A.D. (no. 73; Fig. 70), the analysis showed that its marble comes either from Paros-Marathi or Aphrodisias in Asia Minor. The sculpture is stylistically closer to metropolitan works made of Asiatic marbles rather than Athenian ones but for the time being its workshop will remain unknown.

Asiatic Fine-Grained Marbles (Göktepe and Afyon)

79 Apart from the sparse use of Parian marble, one must note the even rarer use of marble from the Göktepe quarry, which was discovered just in 1996, lying less than 40 km SW of Aphrodisias⁸⁵. Products of this white, fine-grained marble of exquisite quality are attested not only in Aphrodisias, but in Rome as well and on a limited scale in Greece, e.g., in Athens⁸⁶. It has been identified in three portraits of the middle Imperial period: a female portrait from Potidaia with remains of gilding (no. 85; Fig. 71, see section on pigments and gilding), a male bust of unknown provenance (no. 13; Fig. 72), which has a stylistically very close parallel in the Budapest Museum, and a male bearded head, also of unknown provenance (no. 76; Fig. 73). High quality marble from Afyon (Dokimeion) in Phrygia⁸⁷ has been identified in two portraits of the 3rd century A.D.: the beautiful bust from Kassandreia (no. 102; Fig. 74), and a female portrait from the Roman agora of Thessaloniki (no. 106), which probably represents

84 Stefanidou-Tiveriou 2002.

85 Attanasio et al. 2008; Attanasio et al. 2009; Attanasio et al. 2019, esp. 175–177; Attanasio et al. 2021.

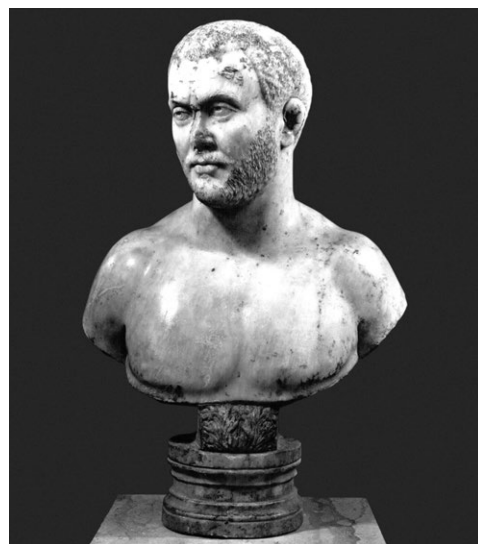
86 See the acrolithic head of Commodus in the Athens National Museum (inv. 488), Attanasio et al. 2019, 202 cat. 1 fig. 25 a; Stefanidou-Tiveriou – Kaltsas 2020, 114–116 cat. IV.1.31 (E. Papagianni).

87 On the quarries in Afyon see e.g., Fant 1989; Attanasio et al 2006.

Empress Marcia Otacilia Severa. The sporadic use of fine marbles from Asia Minor in Macedonia is, for the time being, difficult to explain⁸⁸. However, in Athens there are several examples of Asiatic marble, particularly from Afyon, represented in a rather large number of Roman statuettes at the ancient Agora⁸⁹ and several portraits at the National Archaeological Museum of Athens⁹⁰ and the Acropolis Museum⁹¹.

Vermian Marble

80 Vermian marble, extensively used in the Late Hellenistic period, mostly for stelae and reliefs, is now frequently attested in free-standing sculpture, mainly portraits. Particularly worthy of note is the breastplate-clad statue, possibly portraying Hadrian, with a barbarian kneeling at his feet, from the Ionic temple of Thessaloniki (no. 69; Fig. 75). This iconographically interesting work was created by a Macedonian workshop, as is suggested not only by the marble used but



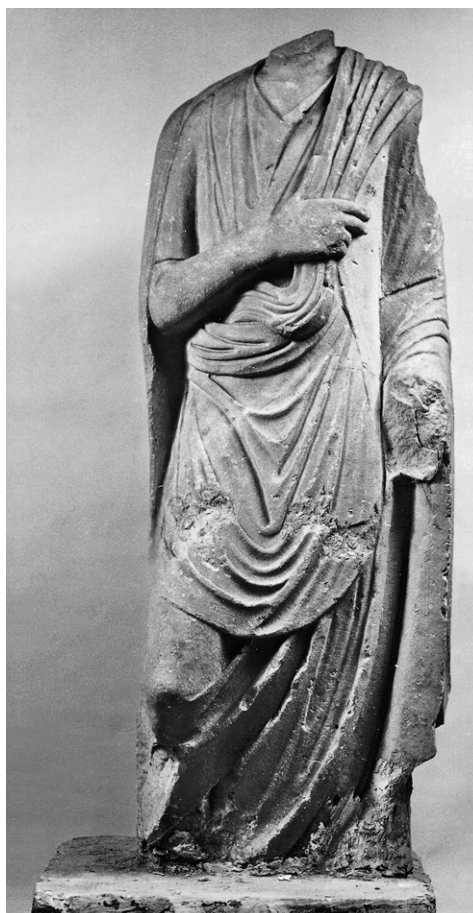
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Fig. 74: Bust of a man from Kassandra/Chalkidiki, no. 102. Thessaloniki, Arch. Mus. inv. 2462



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Fig. 75: Headless statue of a cuirassed emperor from Thessaloniki, no. 69. Thessaloniki, Arch. Mus. inv. 1527. 1529



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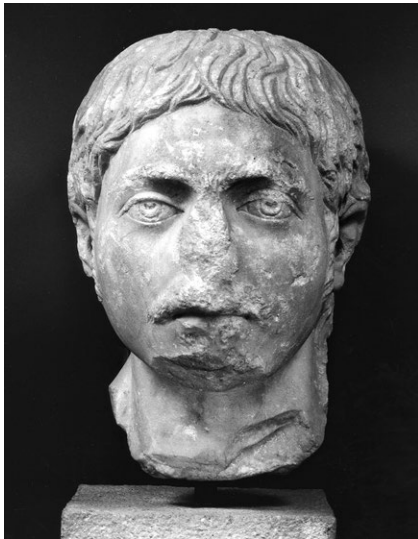
Fig. 76: Statue of a man wearing a toga, no. 71. Thessaloniki, Arch. Mus. inv. 278

88 For similar cases, two suggestions were made: the sculptor was travelling from afar to portray the commissioner, or alternatively the customer might have traveled abroad for the manufacture of his own portrait from a workshop of his choice. See e.g., Attanasio et al. 2019, 196 n. 81. 204. The first case seems much more probable.

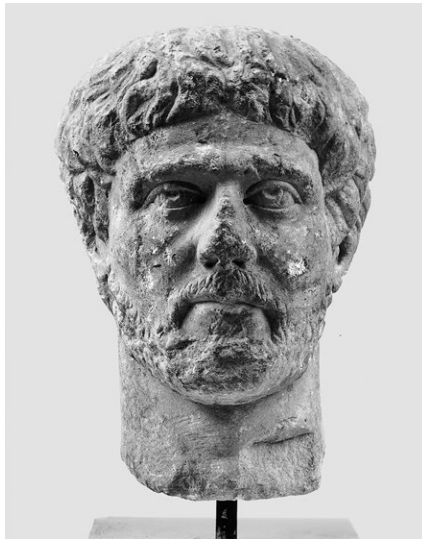
89 Martens et al. 2022a; Martens et al. 2022b.

90 E.g. the acrolithic head of Septimius Severus (inv. 3563), confirmed as Afyon marble (Attanasio et al. 2019, 207 f. 224 cat. 2; Martens et al. 2022a). Initially this was wrongly assigned to Göktepe based on isotopic analysis by Vitti and Bruno at La Sapienza, Rome (Stefanidou-Tiveriou – Kaltsas 2020, 122 cat. IV.1.34). See also Martens et al. 2022a.

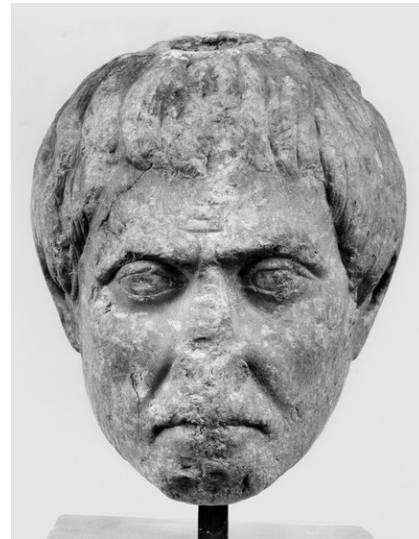
91 Several portraits examined with optical methods and analyzed with pXRF recently at the Acropolis and National Archaeological Museums by Y. Maniatis and B. Martens have been confirmed made of Afyon marble. Further analysis pending.



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Fig. 77: Male portrait from Thessaloniki, no. 95. Thessaloniki, Arch. Mus. inv. 855

Fig. 78: Male portrait, no. 86. Thessaloniki, Arch. Mus. inv. 10433

Fig. 79: Male portrait probably from Thessaloniki, no. 6. Thessaloniki, Arch. Mus. inv. 174

Fig. 80: Female portrait from Thessaloniki, no. 83. Thessaloniki, Arch. Mus. inv. 6878

also by its stylistic characteristics. While the work is skillful, creating a vivid impression of plastic volume, the sculpture clearly falls short of the standard set by the statues crafted by Athenian artists and found at the same site.

81 A headless *togatus* statue of the 2nd century A.D. of unknown origin (no. 71; Fig. 76), a clumsy work in many ways, as well as a number of portraits dated to the 2nd and 3rd centuries A.D., three from Thessaloniki (nos. 87. 95 [Fig. 77]; 93) and one from the Papailiakis collection (no. 86; Fig. 78), are made of Vermio marble and were carved by skilled but not outstanding marble sculptors. Portrait no. 95 from the Sarapieion of Thessaloniki is closely associated, in terms of period and style, with another female portrait from Thessaloniki currently housed at the National Archaeological Museum in Sofia, Bulgaria, inv. 5544⁹². All the above must have been carved at local workshops using marble that was long used in central Macedonian sculpture but was no match for the higher-quality dolomitic marble found on Thasos. It appears that other marbles were also used at times, such as – possibly – marble from Sedoukia (Pieria) found in a male portrait from Thessaloniki (no. 6; Fig. 79), if in this case it is not Vermio marble which analytically has the same probability.

Proconnesian Marble

82 Proconnesian marble makes a rather late appearance in Thessaloniki sculpture, if we exclude the herm of Priapus found at the Sarapieion (the sanctuary of Isiac deities) and dated to the 1st century B.C. on stylistic criteria (no. 72). Furthermore, it is attested in a female head from the city, dated between 160 and 170 A.D. (no. 83; Fig. 80), and possibly in a fragment of a female statue from the 2nd century A.D. (no. 101). Its frequency increases in the early 3rd century A.D., a period to which two *trapezophora* (marble table supports) are dated, one depicting a reclining Hercules (no. 5) and the other Bellerophon (inv. 3875). Both were imported to Thessaloniki from a workshop in northwestern Asia Minor (Propontis region), as was the more recent example, from the mid-4th century A.D. (no. 103), also depicting Bellerophon⁹³. Apart from the *trapezophora*, sarcophagi made of the same marble started arriving in Thessaloniki during the first half of the 3rd century A.D., if not earlier, as indicated by the example for which archaeometric

92 Stefanidou-Tiveriou 2001/2002, 239–251; Milčeva 2005, 34 cat. 15.

93 See also Stefanidou-Tiveriou 1985, 19 f. 42–45 no. 4; 114–121 nos. 25. 26.



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analysis data are available (inv. 5698)⁹⁴, as well as one more with similar characteristics (inv. 5670)⁹⁵. Their simple, unadorned form and the sort of marble used leave no doubt that these products were imported from the quarries of Proconnesos, arriving in Thessaloniki in half-finished form (*Halbfabrikate*) and undergoing final processing in situ. Finally, Proconnesian marble was also used for the capital with sculptural decoration, originally from the Rhaïdestos Collection, dated to the Antonine period (**no. 104**).

Different Marbles in Late Antiquity

83 It is well known that shortly after the mid-3rd century A.D. there was a major downturn in the production of sculptures by the eastern workshops of the Empire. As a result, it is difficult at present to follow their significantly decreased activity during the second half of the 3rd century. However, the period of the Tetrarchy in Thessaloniki sets the scene for remarkable construction as well as artistic activities. A group of sculptures is directly associated with this activity and enables us to assert that during the reign of Galerius and possibly also in its immediate aftermath, teams of sculptors worked in the city, developing a common stylistic ›language‹ that synthesizes elements from different artistic traditions, in particular the Attic tradition⁹⁶. Therefore, it may be no accident that Pentelic marble is used in most of these works. One exception among these works, in terms of the marble used, is the large Arch of Galerius which, as the small fragment kept in the Museum of Thessaloniki shows, was made of Alikı marble (**no. 89**; Fig. 81). This is quite understandable, given that the monument is part of a large-scale building plan for which the use of easily accessible marble imposed itself, as in the case of the ›Gallery of the Enchanted‹. Extensive use of the coarse-grained Thasos-Alikı marble for basic structural elements is known since the 4th and 3rd centuries B.C., i.e., at the Sanctuary of the Great Gods in Samothraki⁹⁷. On the contrary, smaller sculptures are carved out of Pentelic marble. These include, firstly, the so-called small Arch from the southern area of the palace (**no. 20**; Fig. 82)⁹⁸, decorated with the busts of Galerius and his wife, as

Fig. 81: Relief fragment from the ›Arch of Galerius‹/Thessaloniki, no. 89. Thessaloniki, Arch. Mus. inv. P 6

Fig. 82: Arch with relief decoration (›Little Arch of Galerius‹) from Thessaloniki, no. 20. Thessaloniki, Arch. Mus. inv. 2466

Fig. 83: Pseudo-pilaster capital with Kabeiros, from Thessaloniki, no. 21. Thessaloniki, Arch. Mus. inv. 6689



83

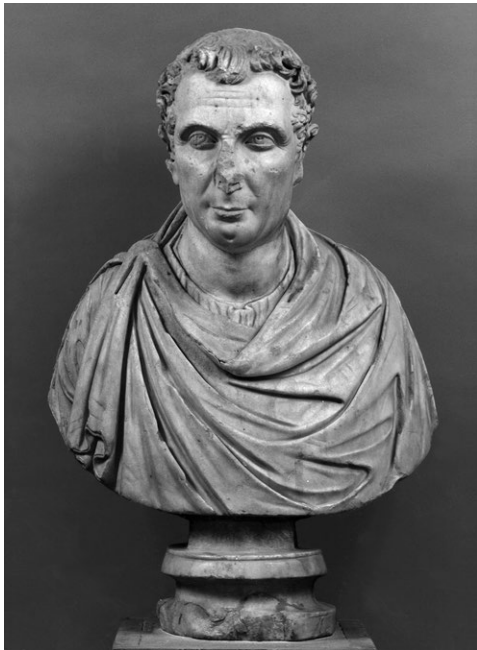
94 Maniatis et al. 2010, 55 f. table 3 (sample 3); 57 fig. 6; Stefanidou-Tiveriou 2014, 27. 33. 127. 132. 237 cat. 137 pl. 66, 3–5.

95 Stefanidou-Tiveriou 2014, 26. 30. 127–229 cat. 121 pl. 60, 1. 2.

96 Stefanidou-Tiveriou 1995, 83–96.

97 Maniatis et al. 2012.

98 Stefanidou-Tiveriou 1995.



84



85

Fig. 84: Bust of a man probably from Thessaloniki, no. 9. Thessaloniki, Arch. Mus. inv. 1061

Fig. 85: Headless bust of a man, no. 96. Thessaloniki, Arch. Mus. inv. 1115

Fig. 86: Pedestal with relief decoration from Thessaloniki. Museum of Byzantine Culture Thessaloniki inv. ΑΓ 3221



86

well as several other figures in relief and decorative elements, carved in a style intensely reminiscent of Attic sarcophagi. The same goes for the four capitals from the Octagon of the same architectural complex depicting deities, for two of which archaeometric data are available (no. 21; Fig. 83; inv. 6692). With regard to another very important work of this period, a large relief of the Celtic goddess Epona (no. 25), the previous isotopic and optical analysis had produced no result⁹⁹; whereas the present analysis shows almost certainly that the marble comes from local quarries, either from Tranovalto or from Vermio (Table 3).

84 The results of the analysis of three further sculptures, which must be dated later than the aforementioned ones, identify their marble as Pentelic and are particularly interesting. These concern, firstly, the well-known bust (no. 9; Fig. 84) of a chlamys-wearing official from the early 5th century, which formed a pair with the bust of his wife (inv. 1060). The provenance of these two works from Veroia is constantly repeated, despite the fact that it is incorrect. The indication «εκ Κοπανού Βεροίας» («from Kopanos, Veroia») is indeed found in the Museum inventory, only for the female bust, but it is later than the initial recording of the sculpture and is most likely a mistake¹⁰⁰. More reliable is the information provided by L'Orange in 1961, who notes that these busts originate from Thessaloniki¹⁰¹. These works, which are among the finest sculpted portraits of Late Antiquity in the Empire, are a testament to the existence of significant artistic forces in Greek territory during this era. The identification of a replica of the male head in Corinth, also made of Pentelic marble, indicates, on one hand, that the man portrayed was a high-ranking imperial official and, on the other, supports the provenance of these works from a Greek, quite possibly Attic workshop. We must add to the above works also in Pentelic marble, a headless male bust of

99 Pike et al. 2002.

100 See in detail Th. Stefanidou-Tiveriou in: Despinis et al. 2010, cat. 522 192 f.

101 L'Orange 1961, 68.

a chlamys-wearing man (no. 96; Fig. 85), also dated to the 5th century A.D. This too is a case of an official whose chlamys, in fact, was clasped with a separately crafted buckle. An approximately contemporaneous head (no. 51) most likely belonged to the statue of a chlamys-wearing official and resulted, as was often the case at that time, from the reworking of an older portrait of the Imperial period.

85 Finally, we end this examination with an important work of Late Antiquity: the pedestal of a column found between Agiou Dimitriou Street and Kassandrou Street in Thessaloniki, currently kept at the Museum of Byzantine Culture (inv. AF 3221; former Archaeological Museum inv. 1296; Fig. 86). It is adorned with figures personifying the cities of Rome and Constantinople on its lateral sides and possibly an official on the damaged front. The column supported the statue of an emperor positioned on the second most important road axis of the city¹⁰². This is a very important piece of evidence of sculpting activity in Thessaloniki in the late 4th or early 5th century A.D. carved, like the Arch of Galerius in the past, out of Aliko marble.

Pigments and Gilding

86 During the course of the in-situ examination and sampling at the Archaeological Museum of Thessaloniki, remains of pigments and gilding were detected on a number of objects. These were examined separately with a digital microscope and recorded. The results are summarized in Table 6.

Pigments

87 As it can be seen in Table 6, the most common pigment that has been preserved is **red**, made of iron oxides (hematite – red ochre) and detected clearly on four objects dating from ca. 440 B.C. to 1st century A.D. (Table 6; Figs. 87. 88. 89. 90). On the

Fig. 87: a: inv. 6876; b: detail of the base with red pigment; c: pigment remains on the base taken with a digital microscope; d: detail of the hair with red pigment; e: pigment remains on the hair taken with a digital microscope



b



c



d



e



a

87

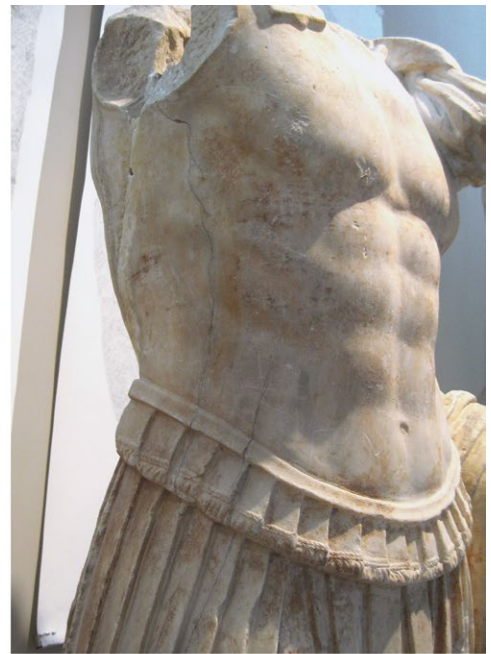
102 See in detail Stefanidou-Tiveriou 2018a.



a
88



b



c

Fig. 88: a: inv. 2663; b: remains of red pigment on the himation; c: remains of red pigment on the right of the breastplate

Fig. 89: a: inv. 10138; b: detail of remains of red pigment at the edge of the pediment



a
89



b

last one, the headless statue of an aegis-bearing emperor of the Hadrianic period (no. 47; Fig. 52), apart from the red pigment on the scales of his aegis (Fig. 90 a. b), **black** pigment was also detected on the folds and on the snake crawling on the right part of the aegis (Fig. 90 c. d). Traces probably of a blue pigment were detected on the hair of the male portrait inv. 169 (Fig. 91).



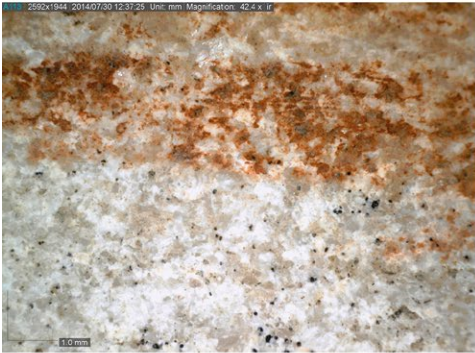
a



b



d



c

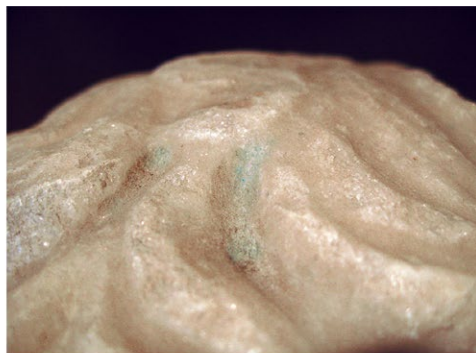


e

90



a



b

Fig. 90: a: inv. 21996; b: detail of red pigment on the scales of the aegis; c: red pigment remains on the scales of the aegis taken with a digital microscope; d: detail of black pigment on the folds of the aegis; e: black pigment remains on the folds of the aegis taken with a digital microscope. Black pigment was also detected on the snake (b)

Fig. 91: a: inv. 169; b: possible remains of blue pigment on the hair

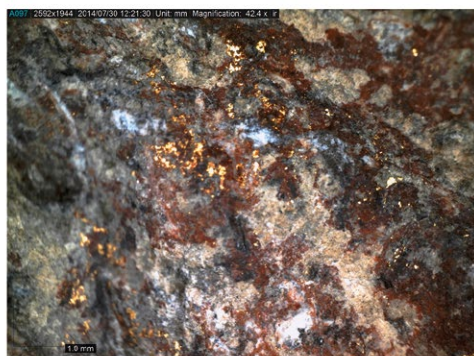
91



a
92



b

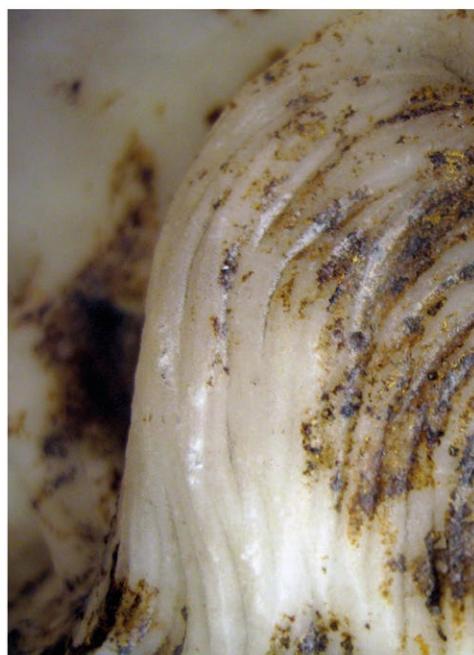


c

Fig. 92: a: inv. 2488; b: details on the hair with remains of gold flakes and red clay; c: gold flakes and red clay (bolo?) underneath at high magnification taken with a digital microscope



a
93

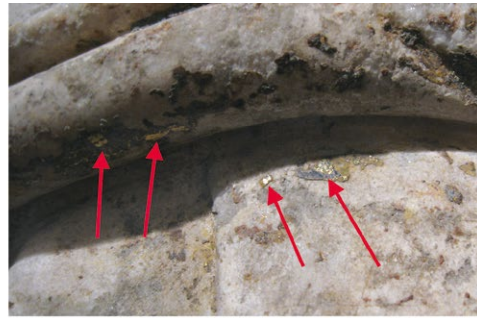


b

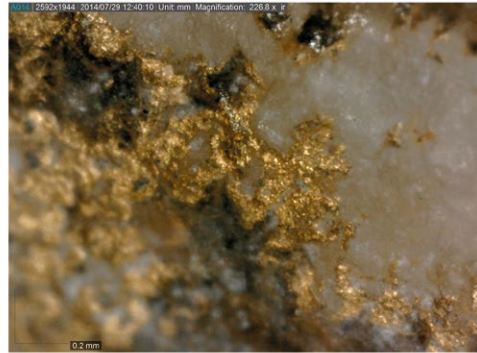
Fig. 93: a: inv. 1054; b: details of gold flakes and glue on the hair



a
94



b



c

Fig. 94: a: inv. 11202; b: detail with gold remains on the himation; c: gold flake remains at high magnification taken with a digital microscope

Gilding

88 Most interesting are the microscopic gold flakes preserved on two portraits and a bust, all female (Table 6), which indicate **gilding**. On the first of these (Fig. 92), a portrait of Aphrodisias marble (**no. 73**; Fig. 70) and dating to ca. A.D. 160, a fine red clay was detected under the gold flakes (Fig. 92 b). This is most likely the so-called *bolo*, a highly illitic clay enriched in iron which gives a warmer goldish color. The second portrait (**no. 85**; Fig. 71), of similar date as the previous one but made of marble from Göktepe (not far from Aphrodisias), had the gold leaf applied directly on the surface of the marble with glue (Fig. 93) without a red *bolo* underneath. Finally, the bust (**no. 36**) of somewhat earlier date (A.D. 130–140) also had the gold leaf applied directly on the marble surface and, in this case, not only on the hair but also on the himation (Fig. 94). The marble of this bust is either from Penteli or from Afyon. Penteli being more likely for stylistic reasons.

Conclusions

89 Systematic archaeometric investigation was performed on 96 sculptures (101 samples including different pieces of the same object) from the Archaeological Museum of Thessaloniki, using a combined approach of many parameters involving in-situ examination with optical methods (measuring and assessing: grain sizes, color, translucency, veins, inclusions) and laboratory analyses with stable isotopes, Electron Paramagnetic Resonance spectroscopy and optical microscopy. The database of the Vermio quarries was particularly enriched in the context of this work as well as that of Tranovalto (Kozani region). This, in combination with the global databases and detailed treatment of the results, allowed us to pinpoint the provenance of the marble of 77 sculptures (75 %) to a single quarry of origin. For 23 pieces (22 %) a second provenance was given as an alternative option, and for only 3 pieces (3 %) the origin remained un-

known. These provided a secure overall understanding of the use of marble in ancient Thessaloniki and the greater area of Macedonia and, with the auxiliary use of a number of sculptures whose marble origin was assessed empirically, allowed us to form a global picture of the use and movement of marble, workshops and artists.

90 In particular, it became clear from the above analysis that the most common marble in the sculpture of Thessaloniki and other regions in Macedonia was Thasian. When this material started being used in the Late Archaic period, it is likely that sculptors from Thasos were the ones who carved works from it. Yet, by the Late Classical period it was already being used by sculptors of other workshops as well. During the subsequent periods, the Hellenistic and Imperial, its use becomes widespread, which is easily explained by its accessibility across the shores of Macedonia. Works of every category, funerary stelae and reliefs, funerary altars and sarcophagi, idealistic sculptures, including cult statues, as well as portraits, even imperial ones, are made of the white, dolomitic marble quarried on the island of Thasos. The quality of the works varies, but it is frequently high, thus suggesting that the use of Thasian marble can be explained not only by its low cost but also by its qualitative characteristics. In certain cases, we believe that the sculptors who carved works of Thasian marble were Athenian. The use of coarse-grained Alike marble is less frequently attested in sculpture, while being extensively used in architecture.

91 The second most frequently used marble is ›local‹ from Vermio mount, which is closely associated with sculptures of the Veroia workshop. It makes its appearance in Thessaloniki and the wider region perhaps as early as the 5th century B.C., but its use becomes very widespread in the Late Hellenistic period, along with the influence of the production of Veroian artists on the city's sculpture. The use of Vermian marble in certain works akin to the Attic stylistic tradition is noteworthy. However, it is most frequently attested on funerary stelae and reliefs of the 1st century B.C. and 1st century A.D., clearly showing Veroian typological and iconographic features. It is also attested in subsequent periods in free-standing sculptures, such as portraits of the 2nd and 3rd centuries A.D.

92 Of the imported marbles, Pentelic is the most prevalent. Its use had begun in the 5th century B.C. but became increasingly frequent during the 4th century B.C. and particularly towards its end, when Attic influences grew. Several of these sculptures are unquestionably the work of Athenian artists, who came to Macedonia to cater to the increased demand for funerary monuments and statues. The Imperial period saw an exceptionally high number of free-standing sculptures that are of high artistic quality and were placed in public places, several of which served cultic purposes, becoming highly prevalent in Thessaloniki. It is almost certain that teams of artists from Athens worked to execute important orders. These include the large order for the sculpted decoration of the ›Gallery of the Enchanted‹, using noticeably dolomitic Thasian marble. There are also works directly imported from Attica, mainly Attic sarcophagi. The use of Pentelic marble together with the influence of Attic artistic tradition is attested until Late Antiquity, as sculptures dated to the Tetrarchy era as well as later sculptures dated to the Theodosian era clearly show.

93 A smaller role is played by Parian marble, the presence of which is documented in Macedonia from the 5th century B.C. onwards, when influences from the Ionic world and the islands of the Aegean appeared in the region. Its use during both the Hellenistic and the Imperial periods is always associated with high-quality works and, in certain cases, cult statues. This marble has also been identified in high-quality portraits, both imperial and private. The use of marble from the Göktepe quarry (Aphrodisias area), another white marble of exceptional quality used in the empire, is, to our knowledge, much rarer. Works made of Dokimeion (Afyon) marble are also few.

94 Finally, Proconnesian marble, which was exceptionally widespread throughout the Roman Empire, is not as popular in Macedonia as one would expect, because the

Thasian quarries, situated closer and being easily accessible, provided plentiful material of good quality for both sculpture (dolomitic) and architecture (calcitic). Proconnesian marble is attested rather rarely in free-standing works and a small number of sarcophagi, being most commonly observed in ornamented *trapezophora* created at a workshop in the Propontis region.

Acknowledgements

95 We would like to acknowledge the kind help of Dr. Polyxeni Adam-Veleni, former Director of the Archaeological Museum of Thessaloniki, who made a positive recommendation of our research to the Ministry of Culture and provided all the assistance we required during the sampling process. For every kind of help in the last stage of the work we thank the current director of the Archaeological Museum of Thessaloniki, Dr. Angeliki Koukouvou, the head of the sculpture collection, Dr. Styliana Galiniki and the curator, Eleonora Mellou.

96 We particularly like to thank Dimitris Karolidis head of the conservation department of the Archaeological Museum of Thessaloniki who provided every possible support and made every effort to facilitate the examination and sampling of the objects by YM and DT in the Museum.

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98 We would also like to thank John J. Herrmann Jr. for the interesting discussion and comments regarding their previous analysis of a number of objects in common.

99 We would like to thank the staff of the German Archaeological Institute in Athens, Eleni Tzimi, for her technical support.

100 The archaeological part of the text was translated from Greek by Daniel Weber with subsequent additions and modifications by the authors.

Tables

Sample no.	Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication
1	2467. 2468	Headless statue and right arm of an emperor	H. 157	Thessaloniki	A.D. 25–50	Despinis et al. 2003, 113–116 cat. 245 (G. Despinis)
2	923	Votive relief to Zeus, Hera, Athena and other gods	H. 58	Thessaloniki	Late 4 th c. B.C.	Despinis et al. 1997, 44–46 cat. 24 (E. Voutitas)
3	882	Colossal head of Titus	H. 58.5	Thessaloniki	A.D. 79–81 or after	Despinis et al. 2003, 129–131 cat. 252 (Th. Stefanidou-Tiveriou)
4	898	Bust of Septimius Severus	H. 55	Thessaloniki	A.D. 196–200	Despinis et al. 2003, 183–187 cat. 289 (Th. Stefanidou-Tiveriou)
5	4363	Table support with Herakles	H. 57	Thessaloniki	Severan period	Despinis et al. 1997, 135 f. cat. 105 (Th. Stefanidou-Tiveriou)
6	174	Male portrait	H. 24	Probably Thessaloniki	Late Trajanic or early Hadrianic period	Despinis et al. 2003, 136 f. cat. 257 (Th. Stefanidou-Tiveriou)
7	906	Male portrait from a large relief	H. 30	Thessaloniki	A.D. 50–40	Despinis et al. 1997, 89–91 cat. 66 (E. Voutiras)
8	2663	Headless cuirassed statue	H. 155	Kalamoto/Thessaloniki (ancient Kalindoia)	Late 1 st c. B.C.	Despinis et al. 2003, 102–106 cat. 242 (Th. Stefanidou-Tiveriou)
9	1061	Bust of a man	H. 72	Probably Thessaloniki	ca. A.D. 410	Despinis et al. 2010, 192–196 cat. 522 (Th. Stefanidou-Tiveriou)
10	6876	Grave stele of a girl	H. 155	Nea Kallikrateia/Chalkidiki	ca. 440 B.C.	Despinis et al. 1997, 25–26 Cat 9 (G. Despinis)
11	2465	Grave stele of a youth	H. 139.2	Potidaia/Chalkidiki	390–380 B.C.	Despinis et al. 1997, 31–33 cat. 15 (Th. Stefanidou-Tiveriou)
12	1068	Large grave relief depicting a man	H. 161	Veroia	Late 2 nd or early 1 st c. B.C.	Despinis et al. 1997, 73 f. cat. 54 (E. Voutiras)
13	1058	Bust of a bearded man	H. 48	Unknown	A.D. 150–160	Despinis et al. 2003, 153 f. cat. 266 (E. Voutiras)
14	1084	Votive relief to the hero Hephaestion	H. 32	Near Pella	320–300 B.C.	Despinis et al. 1997, 42–44 cat. 23 (E. Voutiras)
15	1753	Table	L. 134; H. 70	Derveni (ancient Lete)	Late 4 th c. B.C.	Despinis et al. 1997, 50 f. cat. 30 (G. Despinis)
16	6679	Small altar with figures in relief	H. 23	Unknown	400–350 B.C.	Despinis et al. 1997, 38 f. cat. 20 (E. Voutiras)
17	1934A	Relief slab from a funerary monument	H. 139	Lete	Late 1 st c. B.C. – early 1 st c. A.D.	Despinis et al. 1997, 85–87 cat. 62 (E. Voutiras)
18	1934Γ	Relief slab from a funerary monument	H. 139	Lete	Late 1 st c. B.C. – early 1 st c. A.D.	Despinis et al. 1997, 85–87 cat. 64 (E. Voutiras)
19	9258	Part of an anthemion-crowned grave stele	H. 93.5	Oreokastro/Thessaloniki	450–425 B.C.	Despinis et al. 1997, 27 f. cat. 11 (G. Despinis)
20	2466	Arch with relief decoration (↳Little Arch of Galerius↳)	W. 238.5	Thessaloniki	A.D. 308–311	Despinis et al. 1997, 184–189 cat. 141 (Th. Stefanidou-Tiveriou)
21	6689	Pseudo-pilaster capital with Kabeiros	H. 60.5	Thessaloniki	Early Constantinian period	Despinis et al. 1997, 142–194 cat. 142 (Th. Stefanidou-Tiveriou)
22	997	Votive relief to Osiris Mystes	H. 121.5	Thessaloniki	Late 3 rd or early 2 nd c. B.C.	Despinis et al. 1997, 91–93 cat. 67 (E. Voutiras)

Sample no.	Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication
23	1011	Female head, possibly of Isis	H. 51	Thessaloniki	Early 3 rd c. B.C.	Despinis et al. 1997, 48 f. cat. 27 (G. Despinis)
24	888	Votive relief to the hero Hippalkmos	H. 69	Thessaloniki	200–150 B.C.	Despinis et al. 1997, 93–95 cat. 68 (E. Voutiras)
25	3056	Relief of the Celtic goddess Epona	W. 141	Thessaloniki	Early 4 th c. A.D.	Despinis et al. 1997, 194–197 cat. 148 (Th. Stefanidou-Tiveriou)
26	1065	Statue of Augustus	H. 200	Thessaloniki	A.D. 25–50	Despinis et al. 2003, 108–113 cat. 244 (G. Despinis)
27	10771	Grave stele of Gaius Julius Crescon	H. 109.5	Thessaloniki	A.D. 159/160	Despinis et al. 2010, 239–241 cat. 567 (D. Terzopoulou)
28	6682	Statue of a Muse with pigskin	H. 189	Thessaloniki 1963	Early Severan period	Despinis et al. 1997, 123–126 cat. 94 (Th. Stefanidou-Tiveriou)
29	6683	Statue of a Muse with kithara	H. 176	Thessaloniki	early Severan period	Despinis et al. 1997, 123–126 cat. 95 (Th. Stefanidou-Tiveriou)
30	6681	Statue of a Muse probably with a tablet	H. 176	Thessaloniki	Early Severan period	Despinis et al. 1997, 123–126 cat. 93 (Th. Stefanidou-Tiveriou)
31	1525	Votive relief to Theos Theodaimon	H. 37	Derveni (ancient Lete)	A.D. 116	Stefanidou-Tiveriou – Voutiras 2020, 223 f. cat. 903 (E. Voutiras)
32	10138	Grave stele of Gaius Popillius	H. 110	Thessaloniki	ca. 50 B.C.	Despinis et al. 1997, 82–84 cat. 60 (E. Voutiras)
33	1524	Grave relief of Onesimos	H. 93	Aghios Vasileios Langada/Thessaloniki	A.D. 150–175	Despinis et al. 1997, 152–154 cat. 123 (E. Voutiras)
34	169	Male portrait	H. 38	Probably Thessaloniki	A.D. 130–140	Despinis et al. 2003, 149–151 cat. 264 (Th. Stefanidou-Tiveriou)
35	11201	Bust of a man	H. 64.5	Thessaloniki	A.D. 130–140	Despinis et al. 2003, 151–153 cat. 265 (E. Voutiras)
36	11202	Bust of a woman	H. 55	Thessaloniki	A.D. 130–140	Despinis et al. 2003, 171 f. cat. 280 (Th. Stefanidou-Tiveriou)
37	P75	Funerary altar	L. 152	Thessaloniki	2 nd c. A.D.	Adam-Veleni 2002, 162 no. 74
40	2669	Grave stele with a 'funerary banquet' scene	H. 115	Kalamoto/Thessaloniki (ancient Kalindoia)	1 st c. B.C.	Despinis et al. 2010, 210 f. cat. 534 (K. Sismanidis)
45	17479	Part of a sarcophagus	L. 96	Thessaloniki	Late 2 nd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 555 f. cat. 1175 (E. Papagianni)
46	17356	Funerary altar	H. 98	Potidaia/Chalkidiki	2 nd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 585 f. cat. 1196 (E. Papagianni)
47	21996	Headless statue of an aegis-bearing emperor	H. 134	Thessaloniki	Hadrianic period	Stefanidou-Tiveriou 2012, figs. 5–7
48	21997	Headless statue of a cuirassed emperor	H. 129.5	Thessaloniki	Neronian period	Unpublished. References in: KatEAM IV.1, 197 n. 20 (P. Karanastasi)
49	11993	Grave stele of Demetrios	H. 132	Sana/Chalkidiki	Late 3 rd or early 2 nd c. B.C.	Stefanidou-Tiveriou – Voutiras 2020, 274–276 cat. 943 (E. Papagianni)
50	12657	Headless bust of a man	H. 50	Syllata/Chalkidiki	Hadrianic period	Despinis et al. 2010, 183 f. cat. 514 (Th. Stefanidou-Tiveriou)

Sample no.	Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication
51	8170	Male portrait	H. 35.5	Thessaloniki	A.D. 400–450	Stefanidou-Tiveriou – Voutiras 2020, 141–144 cat. 476 (Th. Stefanidou-Tiveriou)
52	9864	Grave relief with a ›funerary banquet‹ scene	W. 52	Unknown	2 nd or 3 rd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 255–257 cat. 926 (E. Papagianni)
56	11449	Part of a sima with lion's head	L. 45	Thessaloniki	Early 5 th c. B.C.	Despinis et al. 1997, 16 f. cat. 2 (G. Despinis)
57	6736	Ionic capital	L. 139	Thessaloniki	Early 5 th c. B.C.	Grammenos – Knithakis 1994, 21 f. no. 2
58	6742	Part of an ovolo moulding	L. 45	Thessaloniki	Early 5 th c. B.C.	Grammenos – Knithakis 1994, 27 no. 13
59	6750	Part of an ovolo moulding	L. 51.5	Thessaloniki	Early 5 th c. B.C.	Grammenos – Knithakis 1994, 30 no. 21
60	10772	Grave stele of a horseman	H. 85.5	Thessaloniki	100–50 B.C.	Stefanidou-Tiveriou – Voutiras 2020, 282 f. cat. 948 (P. Adam-Veleni)
61	P 108	Fragmentary figure from a large relief	H. 83	Pella	Late 4 th or early 3 rd c. B.C.	Despinis et al. 2010, 45–47 cat. 372 (Th. Stefanidou-Tiveriou)
62	P 48	Grave relief with a multifaceted scene	L. 102	Unknown	50–25 B.C.	Stefanidou-Tiveriou – Voutiras 2020, 418–420 cat. 1055 (V. Allamani-Souri)
63	1091	Grave relief with a multifaceted scene	L. 112	Unknown	1 st c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 433–435 cat. 1063 (E. Papagianni)
64	6129	Fragment of a statue of a Muse	H. 31.5	Thessaloniki	Early Severan period	Despinis et al. 1997, 123–126 cat. 96 (Th. Stefanidou-Tiveriou)
65	P 27. P 28	Two fragments of a sarcophagus	W. 82 and 86	Thessaloniki	Late 2 nd c. A.D.	Despinis et al. 2010, 306–308 cat. 624 (E. Papagianni)
66	6735b	Part of an Ionic base	Diam. 64	Thessaloniki	Early 5 th c. B.C.	Grammenos – Knithakis 1994, 23–24 no. 5
67	6737	Part of the threshold of a large door	L. 165	Thessaloniki	Early 5 th c. B.C.	Grammenos – Knithakis 1994, 25 no. 8
68	6735a	Part of an ionic column	H. 167	Thessaloniki	Early 5 th c. B.C.	Grammenos – Knithakis 1994, 23 f. no. 5
69	1527. 1529	Headless statue of a cuirassed emperor	H. 170	Thessaloniki	Hadrianic period	Despinis et al. 2003, 140–146 cat. 261 (Th. Stefanidou-Tiveriou)
70	1526	Torso of a female statue, probably of Dea Roma	H. 151	Thessaloniki	Hadrianic period	Despinis et al. 2003, 73–75 cat. 212 (E. Gounari)
71	278	Statue of a man wearing a toga	H. 139	Unknown	A.D. 150–175	Despinis et al. 2010, 169–172 cat. 500 (Th. Stefanidou-Tiveriou)
72	1132. 1150	Herm of Priapos	H. 65	Thessaloniki	1 st c. B.C.	Despinis et al. 2003, 26 f. cat. 162 (B. Schmidt-Dounas)
73	2488	Portrait of a woman	H. 39	Skydra/Pella district	ca. A.D. 160	Despinis et al. 2003, 181–183 cat. 287 (Th. Stefanidou-Tiveriou)
74	6081	Grave relief of a Roman soldier	W. 132	Thessaloniki	First half of the 1 st c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 288–290 cat. 954 (E. Papagianni)
75	868. 2596	Large fragmentary relief with a youth wearing chlamys	Initial H. ca. 150–160	Thessaloniki	Late 1 st c. B.C. or early 1 st c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 215–218 cat. 899 (Th. Stefanidou-Tiveriou)

Sample no.	Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication
76	1024	Portrait head of a bearded man	H. 28	Unknown	2 nd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, cat. 717 (E. Voutiras)
77	6157	Unfinished portrait of a woman	H. 35.5	Thessaloniki	A.D. 150–175	Despinis et al. 1997, 183 cat. 288 (G. Despinis)
78	3327	Male portrait, reworked	H. 32.5	Thessaloniki	A.D. 212–217 (and A.D. 235–250)	Despinis et al. 2003, 190–193 cat. 292 (Th. Stefanidou-Tiveriou)
79	1098	Fragment of a statuette of Aphrodite with Eros	H. 21.3	Unknown	150–100 B.C.	Stefanidou-Tiveriou – Voutiras 2020, 178–180 cat. 853 (K. Tzanavari)
80	6386	Female head with a mural crown	H. 8.8	Thessaloniki	A.D. 200–250	Despinis et al. 2010, 99–101 cat. 434 (N. Kazakidi)
81	2658	Ionic capital	H. 46	Thessaloniki	early 5 th c. B.C.	Grammenos – Knithakis 1994, 21 no. 1
82	6140	Statuette of a seated man	H. 81	Unknown	2 nd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 80–82 cat. 719 (Th. Stefanidou-Tiveriou)
83	6878	Female portrait	H. 24	Thessaloniki	A.D. 160–170	Despinis et al. 2003, 180 f. cat. 286 (Th. Stefanidou-Tiveriou)
84	6076	Male portrait	H. 30	Thessaloniki	ca. A.D. 130	Despinis et al. 2003, 148 f. cat. 263 (Th. Stefanidou-Tiveriou)
85	1054	Female portrait	H. 35.5	Potidaia/Chalkidiki	ca. A.D. 160	Despinis et al. 2003, 178–180 cat. 285 (Th. Stefanidou-Tiveriou)
86	10433	Male portrait	H. 29.8	Unknown	Hadrianic period	Despinis et al. 2010, 126 f. cat. 466 (Th. Stefanidou-Tiveriou)
87	1034	Female head from a large relief	H. 24.5	Thessaloniki	Hadrianic or early Antonine period	Despinis et al. 2010, 356 f. cat. 657 (Th. Stefanidou-Tiveriou)
88	1114	Grave relief with a horseman	H. 26.5	Unknown	Late Hellenistic or early Imperial period	Stefanidou-Tiveriou – Voutiras 2020, 285 f. cat. 951 (E. Papagianni)
89	P 6	Relief fragment of the Arch of Galerius	H. 41	Thessaloniki	A.D. 299–303	Laubscher 1975, 93 f. tab. 68.1
90	57	Grave relief with a man wearing toga	H. 80	Thessaloniki	Late 1 st c. B.C. or early 1 st c. A.D.	Despinis et al. 2010, 213–215 cat. 536 (E. Voutiras)
91	1106	Grave relief with a woman and a torch	H. 42.5	Unknown	2 nd half of the 1 st c. or 1 st half of the 2 nd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 355 f. cat. 1010 (E. Papagianni)
92	11124	Grave stele with a man wearing a himation	H. 54	Thessaloniki	2 nd half of the 2 nd c. or 3 rd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 374 cat. 1025 (E. Papagianni)
93	2492	Bust of a man	H. 77	Thessaloniki	A.D. 235–250	Despinis et al. 2003, 202 f. cat. 298 (Th. Stefanidou-Tiveriou)
95	855	Male portrait	H. 29	Thessaloniki	ca. A.D. 220	Despinis et al. 2003, 195 f. cat. 294 (Th. Stefanidou-Tiveriou)
96	1115	Headless bust of a man	H. 42.3	Unknown	A.D. 450–500	Despinis et al. 2010, 191 f. cat. 521 (Th. Stefanidou-Tiveriou)

Sample no.	Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication
97	2637	Fragment of a statuette of Aphrodite	H. 36.5	Unknown	Late 1 st c. B.C.	Stefanidou-Tiveriou – Voutiras 2020, 64 cat. 707 (K. Tzanavari)
98	1208	Votive relief to Asklepios and Hygieia	H. 42	Unknown	330–320 B.C.	Despinis et al. 1997, 41 f. cat. 22 (E. Voutiras)
99	11522	Torso of a statue of Athena	H. 90	Rendina/Thessaloniki	A.D. 100–150	Stefanidou-Tiveriou – Voutiras 2020, 58 f. cat. 704 (K. Tzanavari)
100	11203	Bust of a man	H. 65.5	Thessaloniki 1970	ca. A.D. 250	Despinis et al. 2003, 209 f. cat. 302 (Th. Stefanidou-Tiveriou)
101	1968	Fragment of a female statue	H. 55.2	Thessaloniki	A.D. 100–150	Stefanidou-Tiveriou – Voutiras 2020, 172 f. cat. 842 (K. Tzanavari)
102	2462	Bust of a man	H. 71	Kassandra/Chalkidiki	A.D. 240–250	Despinis et al. 2003, 205–207 cat. 300 (Th. Stefanidou-Tiveriou)
103	10067	Table support with Bellerophon	H. 92	Thessaloniki	ca. A.D. 350	Despinis et al. 1997, 137 f. cat. 107 (Th. Stefanidou-Tiveriou)
104	1094	Pseudo-pilaster capital with Eros	H. 59	Perinthos	A.D. 125–150	Despinis et al. 2010, 352–354 cat. 655 (N. Kazakidi)
105	1251	Grave stele of a woman	H. 61.5	Near Komotini	460–450 B.C.	Despinis et al. 1997, 24 f. cat. 8 (G. Despinis)
106	PA 12962	Female portrait, probably of empress Otacilia Severa	H. 31.4	Thessaloniki	ca. A.D. 250	Adam-Veleni 2012, figs. 1–6

Table 1: List of marble sculptures scientifically examined and analyzed

Sample no.	Museum inv. no.	Marble and sample details	Transl. (cm)	MGS (mm)	MFS (mm)	Mn ²⁺ (r.u.)	Width (Gauss)	Fe ³⁺ (r.u.)	Dol. %	δ ¹⁸ O‰	δ ¹³ C‰
1A	2467+2468, 2467A	White. Sample from the torso	2.0	2.1	0.8–1.5	421.65	1.81	10.54	–	-4.13	4.84
1B		White, schist veins. Sample from the legs	2.0	0.6	0.2–0.4	3057.37	4.42	7.38	–	-4.01	2.66
2	923	White	1.5	1.0	0.5	2843.26	4.05	7.96	–	-4.19	3.09
3	882	White, homeoblastic	1.0–1.5	2.4	2	–	–	–	100 %	-2.93	3.68
4	898	White, inhomogeneous, coarse grained and translucent up in the head, finer and less translucent towards shoulders	2.5–3.0	4.0	0.8–2.5	89.84	1.82	12.61	–	-2.83	4.03
5	4363	White/whitish, grey parallel veins, homeoblastic	1.5–2.0	2.2	2	64.50	3.08	7.99	17 %	-2.62	2.43
6	174	White, highly heteroblastic	1.5–2.0	4.0	0.1–4.0	158.66	1.63	13.09	–	-2.40	2.52
7	906	White, dark grey vein? Homeoblastic	0.5	0.8	0.5	1186.74	2.13	7.37	–	-3.89	2.66
8	2663	White, schist veins	~1.5	1.0	0.5–0.8	3997.97	3.31	9.94	–	-6.23	2.67
9	1061	White/whitish, fine grained, a few grains around 2,5 mm	2.0	2.5	0.5–1.0	2038.51	2.54	5.58	–	-3.84	2.86
10	6876	White	2.5–3.0	3.0	1.0–3.0	211.86	1.85	5.63	–	-1.14	2.03
11	2465	White, schist veins	1.5	1.0	0.5–0.8	2158.47	2.52	6.12	–	-6.64	2.54
12	1068	White, schist vein, fine to medium grained, 1 grain at 6 mm, a few at 3 mm	2.0	6.0	0.5–2.0	156.06	1.60	11.28	–	-1.21	2.95

Sample no.	Museum inv. no.	Marble and sample details	Transl. (cm)	MGS (mm)	MFS (mm)	Mn ²⁺ (r.u.)	Width (Gauss)	Fe ³⁺ (r.u.)	Dol. %	δ ¹⁸ O‰	δ ¹³ C‰
13	1058	White	1.5–2.0?	1.0	0.5	65.30	1.69	0.00	-	-2.33	2.82
14	1084	White, fine grained, a few grains around 1 mm	2.8–3.0	1.0	0.2	11.97	0.91	0.00	-	-0.39	3.13
15	1753	Greyish	0.5	1.0	0.5	1687.38	4.57	12.05	-	-15.46	1.93
16	6679	White/whitish, schist vein, weathered	-	1.0	0.8	2172.38	2.74	5.38	-	-4.31	2.66
17	1934 A	White/whitish	2.0	1.5	0.5–1.0	173.47	2.00	15.41	-	-0.98	2.83
18A	1934B	Greyish, stressed fragmented grains. Sample from the main sculpture	1.0–1.5	1.5	0.5–1.0	264.10	1.82	3.73	13 %	-0.60	2.76
18B		Greyish, stressed fragmented grains. Sample from the added piece	1.0–1.5	1.5	0.5–1.0	151.60	1.29	13.56	21 %	-0.64	2.61
19	9258	White, slightly obscure grain boundaries, perhaps due to weathering	3.0	1.6	0.5–1.0	779.03	2.27	26.86	-	-1.08	2.65
20	2466	White/whitish, dark red veins. Possible iron pyrite and graphite/ manganese inclusions	3.0	1.0	0.8	5052.37	3.44	6.00	-	-8.27	2.91
21	6689	White, schist veins	3.0	1.0	0.5–1.0	1057.44	3.40	6.39	19 %	-6.00	4.11
22	997	White, heteroblastic, round grey grains of mica or quartz of 2–4 mm	-	2.0	0.1–1.0	242.75	1.59	23.72	-	-2.01	1.37
23	1011	White, well-formed grains	2.0	2.0	1.0–1.5	102.07	1.56	6.71	-	-2.96	5.18
24	888	Greyish, lineated grains	1.0–1.5	2.2	2	154.80	2.19	4.15	17 %	-2.48	3.63
25	3056	Whitish, parallel grey veins(?), non-crystalized material in-between grains, extremely fine grained, a few lineated grains	1.5	1.5	0.1	486.43	2.40	12.67	14 %	-3.23	3.39
26A	1065	White, grey band in the back of the head. Probably deposition of dirt or ash. Sample from the Head	n/m – translucent	4.0	2	99.84	2.15	7.12	-	-2.66	5.28
26B	1066	White, grey band in the back, abdomen, and arm. Probably deposition of dirt or ash. Sample from the Torso	n/m – translucent	4.5	1	215.46	1.78	5.97	-	-3.61	5.22
26C	1067	White, grey bands. Probably deposition of dirt or ash. Sample from the Legs/Drapery	2.0	4.0	2	919.37	2.01	9.06	-	-0.44	2.31
27	10771	Grey	1.5–2.0	5.0	-	788.87	2.49	4.92	-	-0.05	3.83
28	6682	White, schist veins. Possible iron pyrite inclusions	1.5	1.0	0.5	1487.02	3.98	8.08	19 %	-6.50	3.98
29	6683	White, schist veins. Possible iron pyrite inclusions	1.5–2.0	1.0	0.5	3127.87	3.82	10.99	-	-6.34	2.66
30	6681	White, schist veins, calcite crystal of 3 cm	1.5–2.0	1.2	0.5	2240.14	3.64	7.13	-	-7.06	3.11
31	1525	White	0.5	3.0	1.5–2.0	-	-	-	100 %	-4.01	3.77

Sample no.	Museum inv. no.	Marble and sample details	Transl. (cm)	MGS (mm)	MFS (mm)	Mn ²⁺ (r.u.)	Width (Gauss)	Fe ³⁺ (r.u.)	Dol. %	δ ¹⁸ O‰	δ ¹³ C‰
32	10138	Greyish	0.5	1.2	0.5	306.08	2.68	-	-	-0.82	3.42
33	1524	White	0.5	2.0	1.5-2.0	-	-	-	100 %	-3.95	3.17
34	169	White, grey veins? Well-formed grains	2.5	1.1	0.5	1904.67	2.70	7.30	-	-8.13	2.81
35	11201	White, veins or depositions	2.5?	1.0	0.5	2463.22	2.73	5.95	-	-7.85	2.57
36	11202	White	1.0	0.6	-	1747.77	2.70	0.00	-	-7.04	2.53
37	P 75	Grey, 1-2 dark wide veins	n.m.	5.0	3.0-4.0	766.80	2.56	3.09	-	-0.46	3.01
40	2669	White, grey veins, well-formed grains	2.0	1.5	1	2237.80	3.58	11.80	-	-13.85	2.65
45	17479	White, schist veins, well-formed grains	1.5	1.0	0.5-0.8	2210.03	2.41	3.20	-	-5.99	2.32
46	17356	White (snow)	1.5	2.0	1.0-1.5	-	-	-	100 %	-3.58	3.45
47	21996	White, grey veins. Possible iron pyrite inclusions	1.5	1.0	0.5-0.8	2907.14	2.69	7.94	-	-8.56	2.62
48	21997	White, schist vein, iron pyrite inclusions	1.5-2.0	1.0	0.5-0.8	820.06	2.29	24.74	-	-6.36	2.44
49	11993	White, on the surface the marble appears with well-formed grains, but from the break the marble is of lower quality	3.0	1.2	0.5-0.8	1169.76	2.07	26.01	-	-16.79	2.96
50	12657	White	2.5-3.0	2.0	1	221.82	1.89	3.91	-	-1.43	3.40
51	8170	White, schist veins	1.5	1.0	0.5-0.8	1647.37	2.96	7.71	-	-7.38	4.13
52	9864	Greyish, schist vein	-	1.0	0.5-0.8	1252.97	4.04	8.61	-	-0.84	3.66
56	11449	Whitish/greyish? heavy weathering, well-formed grains with angular boundaries	1.5	3.0	-	410.05	2.55	6.32	-	-0.69	2.72
57	6736	White, well-formed grains with angular boundaries	2.5+	2.6	1.0-1.5	-	-	-	100 %	-3.83	3.70
58	6741	White, well-formed grains with angular and round boundaries	2.0-2.5	2.5	2-2.5	-	-	-	100 %	-2.05	3.13
59	6751	White, well-formed grains with angular and round boundaries	2.0-3.0	3.0	2-2.5	-	-	-	100 %	-8.09	2.91
60	10772	Whitish/greyish, white veins, foliation-lineation, not typical marble matrix	1.0-1.5	1.0	~1	130.42	1.76	12.77	-	-3.67	3.71
61	P 108	White, schist veins	2.5	1.0	0.5-0.8	3532.18	3.13	7.54	-	-3.57	3.72
62	P48	White, homeoblastic	1.5	2.0	1.0-1.8	-	-	-	100 %	-7.67	2.92
63	1091	White, grey vein? Homeoblastic	2.5	2.0	1.0-1.5	182.64	2.08	12.48	-	-1.98	2.94
64	6129	White, foliation-lineation, not typical marble matrix	2.0	1.0	0.5-0.8	4107.62	4.20	10.66	-	-7.18	2.53
65	P 27. P 28	White, schist veins, well-formed grains. Sample from P 28	2.5	1.0	0.5-0.8	4664.48	4.24	8.05	-	-7.29	2.57
66	6735b	White, similar with 67	1.0?	3.5	-	-	-	-	100 %	-3.62	3.77
67	6737	White, similar with 66	1.5	4.0	-	-	-	-	100 %	-3.71	3.64
68	6735a	White	1.5-2.0	2.5	2	-	-	-	100 %	-3.15	3.53

Sample no.	Museum inv. no.	Marble and sample details	Transl. (cm)	MGS (mm)	MFS (mm)	Mn ²⁺ (r.u.)	Width (Gauss)	Fe ³⁺ (r.u.)	DoI. %	δ ¹⁸ O‰	δ ¹³ C‰
69	1527. 1529	Greyish, grey and white parallel veins, well-formed grains with wax-like surface	2.0	1.5	0.8-1.0	181.11	3.21	4.59	-	-2.19	2.55
70	1526	White, schist and grey veins, weathered, appears whitish	1.5	1.0	0.5-0.8	1869.07	2.57	3.66	-	-4.22	2.53
71	278	Light grey, white veins	0.5-0.8	1.5	0.8-1.0	164.80	2.21	6.32	-	-1.03	2.77
72	1132. 1150	Greyish, grey vein?	0.5	2.5	0.5-1.5	525.71	2.32	8.21	-	-1.36	2.59
73	2488	White pure	1.0	3.0	1.0-2.0	231.46	2.56	10.67	-	-3.49	2.47
74	6081	Whitish/greyish	3.0	5.0	-	3207.68	2.05	6.85	-	-0.54	2.95
75B	868	Sample from the Torso. White, heteroblastic. Stressed grains	3.0	4.0	1.0-2.5	195.47	1.84	9.19	14 %	-3.47	3.49
75D	2596y	Sample from the base-feet. White	3.0	3.0	1.0-2.0	194.57	2.02	8.61	15 %	-3.22	3.41
76	1024	Whitish, well-formed grains	2.5-3.0	0.4	0.1-0.4	70.99	1.60	0.00	-	-2.30	2.73
77	6157	White, light grey vein	2.0	1.0	0.5	1568.78	2.23	14.76	-	-5.64	2.58
78	3327	White, schist veins	3.0	0.8	0.5	3810.34	4.03	8.61	-	-4.51	2.64
79	1098	White/whitish, schist veins	2.0	1.0	0.5	300.77	1.21	11.49	-	-4.98	2.60
80	6386	White/whitish	1.5	1.0	0.5-0.8	1305.41	2.35	14.59	-	-5.71	2.35
81	2658	White, schist vein	2.0-2.5	2.0	0.8-1.5	-	-	-	100 %	-4.39	2.95
82	6140	White/whitish, schist vein?	2.0-2.5	0.8	0.5	2947.06	2.75	6.89	-	-4.95	2.26
83	6878	White	2.0	2.0	1.0-1.5	113.84	5.07	0.00	29 %	-7.16	3.35
84	6076	White (snow)	1.5	1.2	0.8	-	-	-	100 %	-4.11	3.57
85	1054	White	2.5	0.8	0.2-0.5	132.40	1.35	17.78	-	-2.57	2.33
86	10433	White	2.0	1.0	0.8-1.0	223.87	2.22	7.79	-	-1.32	2.92
87	1034	Grey, grey and white parallel veins, semi-crystallised	~0	0.1	-	96.79	1.78	3.96	15 %	-2.76	2.89
88	1114	White, veins or depositions, well-formed grains	0.5	3.0	1.0-2.0	170.67	2.21	4.63	-	-3.19	3.36
89	P 6	Greyish, dark vein	1.0	5.0	3.0-4.0	1738.32	2.64	3.19	-	0.06	3.10
90	57	White, grey diffused veins, layered crystallisation, area of 6×6 cm in the front with very large crystals	2.0	1.6	0.5-0.8	40.15	2.20	9.17	-	-1.71	2.56
91	1106	White, schist veins	1.5	1.0	0.5-0.8	2543.48	3.13	7.52	-	-5.23	2.95
92	11124	Grey	0.5?	5.0	-	622.23	2.53	5.40	-	-0.66	3.48
93	2492	White	2.0	2.0	0.8-1.2	300.81	2.12	8.99	-	-0.52	3.21
95	855	Grey, grey and white parallel veins	2.0+	1.0	0.8-1.0	271.07	2.21	8.94	-	-1.06	3.05
96	1115	White, schist veins	5.0	1.0	0.2-0.8	954.33	2.71	5.62	-	-6.47	2.89
97	2637	White, heavy weathering, well-formed grains	1.5	1.4	0.5-0.8	177.66	1.49	7.07	-	-2.75	4.84
98	1208	White, veins or depositions	1.5	0.5	0.1-0.5	101.45	1.60	5.97	-	-1.89	1.92
99	11522	White, schist veins? Weathered	1.5	0.8	0.5	1217.96	2.51	5.42	20 %	-6.46	2.37

Sample no.	Museum inv. no.	Marble and sample details	Transl. (cm)	MGS (mm)	MFS (mm)	Mn ²⁺ (r.u.)	Width (Gauss)	Fe ³⁺ (r.u.)	Dol. %	δ ¹⁸ O‰	δ ¹³ C‰
100	11203	Whitish, beige veins	3.0	1.0	0.5–0.8	2535.97	2.17	8.74	–	-5.72	3.20
101	1968	Greyish, veins or depositions	2.5	1.4	0.8–1.0	118.43	1.71	7.87	–	-5.63	3.13
102	2462	Greyish, grey and white parallel veins	3.0	0.6	< 0.5	1900.68	2.46	6.23	–	-3.92	2.73
103	10067	Greyish/whitish, well-formed grains, heteroblastic	2.0	3.0	1.0–2.0	48.29	1.57	7.50	–	-1.86	3.28
104	1094	Greyish, calicitic and dolomitic layers	1.0	1.2	0.8–1.0	27.64	4.03	4.95	38 %	-1.66	3.81
105	1251	White (snow)	–	2.0	–	–	–	–	100 %	-3.69	4.19
106	PA 12962	White/whitish, grey bands	2.0–2.5	1.0	–	1534.37	2.37	9.86	–	-6.62	2.84

Table 2: Optical, isotopic and spectroscopic results

Sample no.	Museum inv. no.	Archaeological details	Marble/sample	Provenance 1 st choice	Provenance 2 nd choice
1A	2467+ 2468, 2467A	Headless statue and right arm of an emperor (A.D. 25–50)	White. Sample from the torso	Paros-Marathi (Lychnites?)	
1B			White, schist veins. Sample from the legs	Penteli	
2	923	Votive relief to Zeus, Hera, Athena and other gods (late 4 th c. B.C.)	White	Penteli	
3	882	Colossal head of Titus (A.D. 79–81 or after)	White, dolomitic	Thasos-D (Vathy/Saliara)	
4	898	Bust of Septimius Severus (A.D. 196–200)	White	Paros-Marathi (Lychnites?)	
5	4363	Table support with Herakles (Severan period)	White/whitish, grey parallel veins	Proconnesos	
6	174	Portrait of a man (late Traianic or early Hadrianic period)	White	Vermio/Pieria (Sedoukia)?	
7	906	Portrait of a man from a large relief (A.D. 50–40)	White, dark grey vein?	Penteli	Afyon?
8	2663	Headless cuirassed statue (late 1 st c. B.C.)	White, schist veins	Penteli	
9	1061	Bust of a man (ca. A.D. 410)	White/whitish	Penteli	
10	6876	Grave stele of a girl (ca. 440 B.C.)	White	Paros-Lakkoi	
11	2465	Grave stele of a youth (390–380 B.C.)	White, schist veins	Penteli	
12	1068	Large grave relief depicting a man (late 2 nd or early 1 st c. B.C.)	White, schist vein	Pieria (Sedoukia) or Vermio	
13	1058	Bust of a bearded man (A.D. 150–160)	White	Göktepe	
14	1084	Votive relief to the hero Hephaistion (320–300 B.C.)	White	Vermio?	
15	1753	Table (late 4 th c. B.C.)	Greyish	Unknown source	Tranovalto? Vermio?

Sample no.	Museum inv. no.	Archaeological details	Marble/sample	Provenance 1 st choice	Provenance 2 nd choice
16	6679	Small altar with figures in relief (400–350 B.C.)	White/whitish, schist vein	Penteli	
17	1934A	Relief slab from a funerary monument (late 1 st c. B.C.)	White/whitish	Vermio	
18A	1934Γ	Relief slab from a funerary monument (late 1 st c. B.C. – early 1 st c. A.D.)	Greyish. Sample from the main sculpture	Vermio	
18B			Greyish. Sample from the added piece	Vermio	
19	9258	Part of an anthemion-crowned grave stele (A.D. 450–425)	White	Vermio?	Paros?
20	2466	Arch with relief decoration (›Little Arch of Galerius‹) (A.D. 308–311)	White/whitish, dark red veins	Penteli	
21	6689	Pseudo-pilaster capital with Kabeiros (early Constantinian period)	White, schist veins	Penteli	
22	997	Votive relief to Osiris Mystes (late 3 rd or early 2 nd c. B.C.)	White	Vermio	Proconnesos
23	1011	Female head, possibly of Isis (early 3 rd c. B.C.)	White	Paros-Marathi (Lychnites?)	
24	888	Votive relief to the hero Hippalkmos (200–150 B.C.)	Greyish	Vermio	
25	3056	Relief of the Celtic goddess Epona (early 4 th c. A.D.)	Whitish, parallel grey veins?	Tranovalto	Vermio
26A	1065	Statue of Augustus (A.D. 25–50)	White. Sample from the Head	Paros-Marathi (Lychnites?)	
26B	1065		White. Sample from the Torso	Paros-Marathi (Lychnites?)	
26C	1065		White. Sample from the legs	Paros (Lakkoi)	
27	10771	Grave stele of Gaius Julius Crescon (A.D. 159/160)	Grey	Thasos (Alik)	
28	6682	Statue of a Muse with pigskin (early Severan period)	White, schist veins	Penteli	
29	6683	Statue of a Muse with guitar (early Severan period)	White, schist veins	Penteli	
30	6681	Statue of a Muse probably with a tablet (early Severan period)	White, schist veins	Penteli	
31	1525	Votive relief to Theos Theodaimon (A.D. 116)	White, dolomitic	Thasos-D (Vathy/Saliara)	
32	10138	Grave stele of Gaius Popillius (ca. 150 B.C.)	Greyish	Vermio	Proconnesos?
33	1524	Grave relief of Onesimos (A.D. 150–175)	White, dolomitic	Thasos-Vathy/Saliara	
34	169	Portrait of a man (A.D. 130–140)	White, grey veins?	Penteli	
35	11201	Bust of a man (A.D. 130–140)	White, veins or depositions	Penteli	

Sample no.	Museum inv. no.	Archaeological details	Marble/sample	Provenance 1 st choice	Provenance 2 nd choice
36	11202	Bust of a woman (A.D. 130–140)	White	Penteli	Afyon/Altintas?
37	P 75	Funerary altar (2 nd c. A.D.)	Grey, 1–2 dark wide veins	Thasos (Alikí)	
40	2669	Grave stele with a ›funerary banquet‹ scene (1 st c. B.C.)	White, parallel veins, few greyish irregular veins	Unknown source	Tranovalto? Afyon?
45	17479	Part of a sarcophagus (late 2 nd c. A.D.)	White, schist veins	Penteli	
46	17356	Funerary altar (2 nd c. A.D.)	White (snow), dolomitic	Thasos-D (Vathy/Saliara)	
47	21996	Headless statue of an aegis-bearing emperor (Hadrianic period)	White, grey veins	Penteli	
48	21997	Headless statue of a cuirassed emperor (Neronian period)	White, schist vein	Penteli	
49	11993	Grave stele of Demetrios (late 3 rd or early 2 nd c. B.C.)	White	Unknown source	Vermio or Tranovalto
50	12657	Headless bust of a man (Hadrianic period)	White	Vermio	Paros?
51	8170	Portrait of a man (A.D. 400–450)	White, schist veins	Penteli	
52	9864	Grave relief with a ›funerary banquet‹ scene (2 nd or 3 rd c. A.D.)	Greyish, schist vein	Vermio (unknown quarry?)	
56	11449	Part of a sima with lion's head (early 5 th c. B.C.)	Whitish/greyish?	Thasos (Alikí)	
57	6736	Ionic capital (early 5 th c. B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	
58	6742	Part of an ovolo moulding (early 5 th c. B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	
59	6750	Part of an ovolo moulding (early 5 th c. B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	
60	10772	Grave stele of a horseman (100–50 B.C.)	Whitish/greyish, white veins	Tranovalto/Vermio	
61	P 108	Fragmentary figure from a large relief (late 4 th or early 3 rd c. B.C.)	White, schist veins	Penteli	
62	P 48	Grave relief with a multifaceted scene (50–25 B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	
63	1091	Grave relief with a multifaceted scene (1 st c. A.D.)	White, grey vein?	Vermio/Paros	
64	6129	Fragment of a statue of a Muse (early Severan period)	White	Penteli	
65	P 27. P 28	Two fragments of a sarcophagus (late 2 nd c. A.D.)	White, schist veins. Sample from P 28	Penteli	
66	6735β	Part of an Ionic base (early 5 th c. B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	
67	6737	Part of the threshold of a temple door (early 5 th c. B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	

Sample no.	Museum inv. no.	Archaeological details	Marble/sample	Provenance 1 st choice	Provenance 2 nd choice
68	6735α	Part of an ionic column (early 5 th c. B.C.)	White, dolomitic	Thasos-D (Vathy/Saliara)	
69	1527. 1529	Headless statue of a cuirassed emperor (Hadrianic period)	Greyish, grey and white parallel veins	Vermio	
70	1526	Torso of a female statue, probably of Dea Roma (Hadrianic period)	White, schist and grey veins	Penteli	
71	278	Statue of a man wearing a toga (A.D. 150–175)	Light grey, white veins	Vermio	
72	1132. 1150	Herm of Priapos (1 st c. B.C.)	Greyish, grey vein?	Proconnesos?	
73	2488	Portrait of a woman (ca. A.D. 160)	White	Paros-Marathi or Aphrodisias	
74	6081	Grave relief of a Roman soldier (first half of the 1 st c. A.D.)	Whitish/greyish	Thasos (Aliko)	
75B	868	Large fragmentary relief with a youth wearing chlamys (late 1 st c. B.C. or early 1 st c. A.D.)	White. Sample from the Torso	Paros-Marathi	
75D	2596γ		White. Sample from the base-feet	Paros-Marathi	
76	1024	Portrait head of a bearded man (2 nd c. A.D.)	Whitish	Göktepe	
77	6157	Unfinished portrait of a woman (A.D. 150–175)	White, light grey vein	Penteli	Afyon/Altintas?
78	3327	Portrait of a man (reworked) (A.D. 212–217 and A.D. 235–250)	White, schist veins	Penteli	
79	1098	Fragment of a statuette of Aphrodite with Eros (150–100 B.C.)	White/whitish, schist veins	Penteli?	Kozani?
80	6386	Female head with a mural crown (A.D. 200–250)	White/whitish	Penteli	Afyon/Altintas?
81	2658	Ionic capital (early 5 th c. B.C.)	White, dolomitic, schist vein	Thasos-Vathy/Saliara	
82	6140	Statuette of a seated man (2 nd c. A.D.)	White/whitish, schist vein?	Penteli	Afyon/Altintas?
83	6878	Portrait of a woman (A.D. 160–170)	White	Proconnesos	
84	6076	Portrait of a man (ca. A.D. 130)	White (snow), dolomitic	Thasos-D (Vathy/Saliara)	
85	1054	Portrait of a woman (ca. A.D. 160)	White	Göktepe	
86	10433	Portrait of a man (Hadrianic period)	White	Vermio	Proconnesos
87	1034	Female head from a large relief (Hadrianic or early Antonine period)	Grey, grey and white parallel veins	Vermio	Pieria (Sedoukia)?
88	1114	Grave relief with a horseman (late Hellenistic or early Imperial)	White, veins or depositions	Vermio	

Sample no.	Museum inv. no.	Archaeological details	Marble/sample	Provenance 1 st choice	Provenance 2 nd choice
89	P 6	Relief fragment of the Arch of Galerius (A.D. 299–303)	Greyish, dark vein	Thasos-Aliki	
90	57	Grave relief with a man wearing a toga (late 1 st c. B.C. or early 1 st c. A.D.)	White, diffused grey veins	Vermio (Koumaries)	Proconnesos?
91	1106	Grave relief with a woman and a torch (2 nd half of the 1 st c. or 1 st half of the 2 nd c. A.D.)	White, schist veins	Penteli	
92	11124	Grave stele with a man wearing a himation (second half of the 2 nd or 3 rd c. A.D.)	Grey	Thasos-Aliki	
93	2492	Bust of a man (A.D. 235–250)	White	Vermio	Proconnesos
95	855	Portrait of a man (ca. A.D. 220)	Grey, grey and white parallel veins	Vermio	Proconnesos
96	1115	Headless bust of a man (A.D. 450–500)	White, schist veins	Penteli	
97	2637	Fragment of a statuette of Aphrodite (late 1 st c. B.C.)	White	Paros-Marathi (Lychnites?)	
98	1208	Votive relief to Asklepios and Hygieia (330–320 B.C.)	White, veins or depositions	Kozani?	Hymettos?
99	11522	Torso of a statue of Athena (A.D. 100–150)	White, schist veins? Weathered	Penteli	Afyon/Altintas?
100	11203	Bust of a man (ca. A.D. 250)	Whitish, beige veins	Penteli	Afyon?
101	1968	Fragment of a female statue (A.D. 100–150)	Greyish, veins or depositions	Proconnesos?	Local source?
102	2462	Bust of a man (A.D. 240–250)	Greyish, grey and white parallel veins	Afyon	Penteli
103	10067	Table support with Bellerophon (ca. A.D. 350)	Greyish/whitish	Proconnesos	
104	1094	Pseudo-pilaster capital with Eros (A.D. 125–150)	Greyish	Proconnesos	Vermio
105	1251	Grave stele of a woman (460–450 B.C.)	White (snow), dolomitic	Thasos (Vathy/Saliara)	
106	PA 12962	Portrait of a woman (ca. A.D. 250)	White/whitish, grey bands	Afyon?	Tranovalto?

Table 3: Provenance assignments of the marble of all sculptures after combined multi-technique analyses

Sample no.	Museum inv. no.	Isotopes (this work)		Isotopes (Pike et al. 1998)		Provenance (this work)	Provenance (Pike et al. 2002)
		$\delta^{13}\text{C}\text{‰}$	$\delta^{18}\text{O}\text{‰}$	$\delta^{13}\text{C}\text{‰}$	$\delta^{18}\text{O}\text{‰}$		
17	1934A	2.83	-0.98	3.042	-0.621	Vermio	Veria?
18A	1934B	2.76	-0.60	3.151	-1.142	Vermio	Veria?
11	2465	2.54	-6.64	2.591	-6.997	Penteli	Penteli
20	2466	2.91	-8.27	2.650	-8.650	Penteli	Penteli

Sample no.	Museum inv. no.	Isotopes (this work)		Isotopes (Pike et al. 1998)		Provenance (this work)	Provenance (Pike et al. 2002)
		$\delta^{13}\text{C}\text{‰}$	$\delta^{18}\text{O}\text{‰}$	$\delta^{13}\text{C}\text{‰}$	$\delta^{18}\text{O}\text{‰}$		
1B	2467A	2.66	-4.01	5.110*	-3.400*	Penteli	Penteli
10	6876	2.03	-1.14	2.066	-1.398	Paros-Lakkoi	Paros-2
25	3056	3.39	-3.23	3.284	-3.559	Tranovalto/Vermio	Unknown
26C	1065	2.31	-0,44	2.206	-1.331	Paros-Lakkoi	Paros-2
14	1084	3.13	-0.39	2.78	-1.309	Vermio?	Paros-2
28	6682	2.66	-6,34	4.312	-6.419	Penteli	Penteli
29	6683	2.66	-6.34	2.664	-6.908	Penteli	Penteli

* Most probably the values between $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ inverted.

Table 4: Comparison of provenance assignments for sculptures analyzed previously also by Pike et al. 2002

Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication	Provenance assessment	Method of assessment
3	Head of a girl	H. 25	Thessaloniki	A.D. 130–140	Despinis et al. 2003, 174–176 cat. 282 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ¹
61	Portrait of a girl	H. 23	Unknown	Late Traianic or early Hadrianic period	Despinis et al. 2003, 167–169 cat. 278 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ¹
103	Male portrait	H. 31	Drama 1913	Claudian period	Despinis et al. 2003, 121–123 cat. 249 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Tested by XRD ³
203. 1167. 116. 170	Grave relief in a round form	Original diam. ca. 88	Idadie Turkish School Thessaloniki	Second quarter of the 1 st c. A.D.	Despinis et al. 1997, 147 f. cat. 117 (E. Voutiras)	Thasos-dolomitic	Visual examination ²
225	Statuette of Aphrodite or a Nymph	H. 81	Unknown	Last quarter of the 2 nd c. A.D.	Despinis et al. 1997, 126–128 cat. 99 (Th. Stefanidou-Tiveriou)	Penteli	Tested by isotopes ⁴
831	Statue of Aphrodite in the Louvre-Naples type	H. 171	Thessaloniki	First half of the 2 nd c. A.D.	Despinis et al. 1997, 104–106 cat. 75 (G. Despinis)	Penteli	Tested by isotopes ⁴
832	Female statue	H. 131	Thessaloniki	First half of the 2 nd c. A.D.	Despinis et al. 2003, 166 f. cat. 76 (G. Despinis)	Afyon? [*] Penteli ^{**}	*Tested by isotopes ⁴ **Visual examination ²
833	Part of a statuette of Athena	H. 37	Thessaloniki	2 nd c. A.D.	Despinis et al. 1997, 107 f. cat. 77 (G. Despinis)	Thasos-dolomitic	Visual examination ¹
844	Statuette of Harpokrates	H. 116	Thessaloniki	First half of the 2 nd c. A.D.	Despinis et al. 1997, 115 f. cat. 86 (G. Despinis)	Thasos-dolomitic	Tested by XRD ³
846	Table support with Herakles	H. 81	Thessaloniki	Second quarter of the 3 rd c. A.D.	Despinis et al. 1997, 134 f. cat. 104 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
849	Headless statue of a man wearing a toga	H. 151	Thessaloniki	First half of the 2 nd c. A.D.	Despinis et al. 2010, 158 f. cat. 490 (E. Gounari)	Thasos-dolomitic	Visual examination ²
851	Female statue	H. 162.5	Thessaloniki	First half of the 1 st c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 147–150 cat. 818 (K. Tzanavari)	Thasos-dolomitic	Visual examination ²
856	Female portrait	H. 28	Thessaloniki	Early 1 st c. A.D.	Despinis et al. 2010, 144 cat. 477 (G. Despinis)	Penteli	Visual examination ²
877	Head, right hand and right leg of an acrolithic statue of Athena reworked as Julia Domna	H. of head with neck 69.5	Thessaloniki	Antonine period	Despinis et al. 1997, 99–101 cat. 72 (G. Despinis)	Paros-1 (Lychnites)	Tested by isotopes ⁴
878	Female or young male head	H. 54	Thessaloniki	Last quarter of the 2 nd c. A.D.	Despinis et al. 2003, 120–122 cat. 90 (G. Despinis)	Penteli	Visual examination ²
886. 6130	Head and torso of a bearded god	H. of the head 39.5	Thessaloniki	Last quarter of the 2 nd c. A.D.	Despinis et al. 2003, 119 f. cat. 89 (G. Despinis)	Penteli	Tested by isotopes ⁴
887	Bust with head of a goddess	H. 50	Thessaloniki	Early Antonine period	Despinis et al. 1997, 102–104 cat. 74 (G. Despinis)	Paros-1 (Lychnites)	Tested by isotopes ⁴
895	Statue of a young water-bearer	H. 90	Thessaloniki	Mid-2 nd c. A.D.	Despinis et al. 1997, 128 f. cat. 98 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ²
897	Head of Sarapis	H. 52.4	Thessaloniki	Early or mid-Antonine period	Despinis et al. 2003, 113 f. cat. 84 (G. Despinis)	Penteli	Visual examination ²

Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication	Provenance assessment	Method of assessment
1017	Head of a bearded god	H. 38	Thessaloniki	Antonine period	Despinis et al. 1997, 109 f. cat. 80 (G. Despinis)	Thasos-dolomitic	Visual examination ¹
1019	Head of a bearded god	H. 38.5	Unknown	Early 3 rd c. A.D.	Despinis et al. 1997, 57 f. cat. 38 (G. Despinis)	Thasos-dolomitic	Visual examination ¹
1029	Male portrait	H. 28	Unknown	A.D. 160–180	Despinis et al. 2010, 134 f. cat. 471 (E. Chiotti)	Penteli	Visual examination ²
1051	Female portrait	H. 35	Unknown	Claudian period	Despinis et al. 2003, 133–135 cat. 255 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ¹
1052	Head of a girl	H. 23	Unknown	Late Traianic or early Hadrianic period	Despinis et al. 2003, 167–169 cat. 278 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Tested by XRD ³
1055	Portrait of Vespasian (reworked from a head of Vitellius)	H. 33	Unknown	A.D. 69–79	Despinis et al. 2003, 125–129 cat. 251 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Tested by XRD ³
1066	Female statue	H. 141.5	Derveni 1936 (ancient Lete)	Late 2 nd or early 1 st c. B.C.	Despinis et al. 1997, 55 f. cat. 36 (G. Despinis)	Thasos-dolomitic	Visual examination ²
1104 (6674)	Table support with Maenad and Satyr	H. 72.5	Unknown	Mid-3 rd c. A.D.	Despinis et al. 1997, 131 cat. 100 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
1255	Female statue in the type of the Large Herculeanum Woman	H. 184	Pylaia/Thessaloniki	Mid-2 nd c. A.D.	Despinis et al. 1997, 112 f. cat. 83 (G. Despinis)	Thasos-dolomitic	Visual examination ²
1287	Part of a grave relief with male portrait	H. 38	Thessaloniki	Hadrianic period	Despinis et al. 1997, 150 cat. 120 (E. Voutiras)	Thasos-dolomitic	Tested by XRD ³
1528	Statue of a man wearing a toga	H. 130	Thessaloniki	Mid-1 st c. A.D.	Despinis et al. 2003, 123–125 cat. 250 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
1530	Head from a relief	H. 11.4	Thessaloniki	Early 5 th c. B.C.	Despinis et al. 1997, 9 f. cat. 1 (G. Despinis)	Thasos-dolomitic	Visual examination ²
1935A	Grave relief with two women	H. 130	Lete	First quarter of the 1 st c. B.C.	Despinis et al. 1997, 78 f. cat. 57 (E. Voutiras)	Veria (Vermio)?	Tested by isotopes ⁴
1935B	Grave relief of Dionysophon	H. 129	Lete	First quarter of the 1 st c. B.C.	Despinis et al. 1997, 75–78 cat. 56 (E. Voutiras)	Veria (Vermio)?	Tested by isotopes ⁴
1943	Female statue	H. 211	Thessaloniki	Early Severan period	Despinis et al. 2003, 213–216 cat. 305 (G. Despinis)	Thasos-dolomitic	Tested by XRD ³
1948	Torso of a statuette of Herakles	H. 53	Unknown	Second quarter of the 3 rd c. A.D.	Despinis et al. 2010, 105 cat. 436 (G. Despinis)	Penteli	Visual examination ²
2447	Grave relief of Manto	H. 32.5	Unknown	First half of the 3 rd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 480–482 cat. 1107 (D. Terzopoulou)	Thasos-dolomitic	Visual examination ²
2460	Head of a bearded man	H. 33	Thessaloniki	Mid-Antonine period	Despinis et al. 2010, 165–167 cat. 277 (E. Voutiras)	Penteli	Visual examination ²
2467a	Right arm of the statue of an emperor	L. 62	Thessaloniki	A.D. 25–50	Despinis et al. 2003, 116–119 Cat 246 (G. Despinis)	Penteli	Visual examination ²
2476	Portrait of a youth	H. 32	Unknown	Traianic period	Despinis et al. 2003, 139 cat. 259 (E. Gounari)	Thasos-dolomitic	Tested by XRD ³

Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication	Provenance assessment	Method of assessment
2498	Male portrait	H. 34.5	Thessaloniki	Second decade of the 3 rd c. A.D.	Despinis et al. 2003, 193–195 cat. 293 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
3024	Table support with Ganymedes	H. 87	Thessaloniki	Mid-3 rd c. A.D.	Despinis et al. 1997, 136 f. cat. 106 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
3025	Table support with Eros	H. 75	Thessaloniki	Last quarter of the 2 nd c. A.D.	Despinis et al. 1997, 132 f. cat. 102 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
3026	Herm with male portrait	H. 188	Thessaloniki	Early 3 rd c. A.D.	Despinis et al. 2003, 187–189 cat. 290 (E. Voutiras)	Penteli	Visual examination ²
3055	Statuette of a Pan	H. 63	Thessaloniki	Third quarter of the 2 nd c. A.D.	Despinis et al. 2003, 50 f. cat. 189 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
3327	Male portrait, reworked	H. 32.5	Thessaloniki	Second decade of the 3 rd c. A.D.	Despinis et al. 2003, 190–193 cat. 292 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
3875	Table support with Bellerophon	H. 92	Thessaloniki	First half of the 3 rd c. A.D.	Despinis et al. 1997, 138 f. cat. 108 (Th. Stefanidou-Tiveriou)	Proconnesos	Tested by isotopes ⁴
5698	Sarcophagus	L. 232	Thessaloniki	Second quarter of the 2 nd c. A.D.	Stefanidou-Tiveriou 2014, 237 cat. 137; 153 (no. 13)	Proconnesos	Visual examination ²
6152	Female head	H. 29.5	Unknown	A.D. 140–160	Stefanidou-Tiveriou – Voutiras 2020, 54–56 cat. 702 (E. Papagianni)	Pentelic	Visual examination ²
6386	Female head with mural crown	H. 8.8	Thessaloniki	First half of the 3 rd c. A.D.	Despinis et al. 2010, 99–101 cat. 434 (N. Kazakidi)	Pentelic	Visual examination ²
6680	Statuette of a sleeping Silenus	H. 33.5	Unknown	Hadrianic period	Despinis et al. 1997, 129–131 cat. 97 (Th. Stefanidou-Tiveriou)	Pentelic	Visual examination ²
6686 (10812)	Female portrait	H. 24	Thessaloniki	ca. A.D. 130	Despinis et al. 2003, 169–171 cat. 279 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ¹
6692	Pseudo-pilaster capital with Dioskourous	H. 60.5	Thessaloniki	Early Constantinian period	Despinis et al. 1997, 189–194 cat. 145 (Th. Stefanidou-Tiveriou)	*Pentelic	Tested by isotopes ⁴
6934	Male portrait	H. 27	Thessaloniki	A.D. 70–80	Despinis et al. 2003, 131 f. cat. 253 (Th. Stefanidou-Tiveriou)	Penteli	Visual examination ²
7200	Grave relief with the bust of a youth	H. 214.5	Thessaloniki	Hadrianic period	Stefanidou-Tiveriou – Voutiras 2020, 451–454 cat. 1076 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ²
7337	Portrait of a boy	H. 22	Unknown	Second quarter of the 3 rd c. A.D.	Despinis et al. 2003, 198–200 cat. 296 (D. Kaplanidou)	Penteli	Visual examination ²
7639	Statue of a lion	H. 184.5	Langadas/Thessaloniki	Late 4 th or early 3 rd c. B.C.	Stefanidou-Tiveriou – Voutiras 2020, 199–201 cat. 882 (N. Kazakidi)	Thasos-dolomitic	Visual examination ²
9137	Grave relief in a round form	diam. 70	Gefira/Thessaloniki	Mid-3 rd c. A.D.	Despinis et al. 2003, 242–244 cat. 324 (Ch. Ioakeimidou)	Thasos-dolomitic	Visual examination ²
9230	Headless statue of a boy wearing a toga	H. 81.5	Thessaloniki	Second half of the 2 nd c. A.D.	Despinis et al. 2010, 172 f. cat. 501 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ²
10118. 2495	Male statue wearing a himation	H. 170	Thessaloniki	late 2 nd c. B.C.	Despinis et al. 2003, 23–25 cat. 160 (G. Despinis)	Thasos-dolomitic	Visual examination ¹

Museum inv. no.	Description	Dimensions (cm)	Find location	Date	Publication	Provenance assessment	Method of assessment
10245	Table support with Eros	H. 54	Wider area of Thessaloniki	Mid-2 nd c. A.D.	Stefanidou-Tiveriou 1985, 88-91 no. 18	Thasos-dolomitic	Tested by XRD ³
10844	Bust of L. Titonius Primus	H. 51.5	Thessaloniki	Hadrianic period	Despinis et al. 2003, 146-148 cat. 262 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Tested by XRD ³
11006	Torso of a peplophoros	H. 45.5	Sohos/Thessaloniki	End of the 5 th c. B.C.	Despinis et al. 2003, 14 cat. 150 (G. Despintis)	Thasos-dolomitic?	Visual examination ²
11204	Bust of a bearded man	H. 64	Thessaloniki	First half of the 3 rd c. A.D.	Despinis et al. 2003, 200 f. cat. 297 (E. Voutiras)	Thasos-dolomitic	Visual examination ²
11221	Part of a grave relief	H. 30	Thessaloniki	1 st c. A.D.	Despinis et al. 2003, 246 f. cat. 328 (Ch. Ioakeimidou)	Thasos-dolomitic	Visual examination ²
11309	Grave relief with busts	H. 91	Sohos/Thessaloniki	Late 1 st c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 497 f.- cat. 1123 (E. Chioti)	Thasos-dolomitic	Visual examination ²
11451	Bust of a youth, reworked	H. 161	Thessaloniki	2 nd c. A.D./first half of the 3 rd c. A.D.	Despinis et al. 2003, 155-157 cat. 268 (Th. Stefanidou-Tiveriou)	Thasos-dolomitic	Visual examination ²
11477	Grave relief of Torkion	H. 67	Thessaloniki	Second half of the 2 nd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 442 f. cat. 1069 (E. Papagianni)	Thasos-dolomitic	Visual examination ²
16143	Table with a support decorated with Dionysos	H. 121	Potidaia (ancient Kassandreia)/Chalkidiki	Around the mid-2 nd c. A.D. or a little later	Stefanidou-Tiveriou – Voutiras 2020, 581-583 cat. 1194 (K. Sismanidis)	Penteli	Visual examination ²
ΑΓ 3221 (1296)	Pedestal of a column with relief decoration	H. 203	Thessaloniki	Late 4 th or early 5 th c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 570-573 cat. 1186 (Th. Stefanidou-Tiveriou)	Thasos-Aliki	Visual examination ²
I.Α.Α.1	Grave stele	H. 165	Ierissos (ancient Akanthos)	Third quarter of the 4 th c. B.C.	Stefanidou-Tiveriou – Voutiras 2020, 242-246 cat. 919 (E. Trakosopoulou-Salakidou)	Thasos-dolomitic	Tested by Isotopes and XRD ⁵
ΙΣΤ 1056	Statue of Dionysos	H. 122	Thessaloniki	Late Hadrianic – early Antonine period	Stefanidou-Tiveriou – Voutiras 2020, 17 f. cat. 666 (E. Trakosopoulou-Salakidou)	Thasos-dolomitic	Visual examination ²
ΙΣΤ 20545	Grave relief of Kopria	H. 34	Thessaloniki	First half of the 3 rd c. A.D.	Stefanidou-Tiveriou – Voutiras 2020, 492-494 cat. 1118 (E. Trakosopoulou-Salakidou)	Thasos-dolomitic	Visual examination ²
P 35	Grave relief in a round form	diam. 51	Unknown	Late 1 st or early 2 nd c. A.D.	Despinis et al. 2003, 227-229 cat. 312 (Ch. Ioakeimidou)	Thasos-dolomitic	Visual examination ²
P 61	Head of a bearded god	H. 43	Unknown	Antonine period	Despinis et al. 2003, 61-63 cat. 198 (G. Despintis)	Thasos-dolomitic	Visual examination ²

¹ Herrmann – Newman 1995.

² Visual examination by Th. Stefanidou-Tiveriou and E. Voutiras.

³ Herrmann – Newman 1999.

⁴ Pike et al. 2002.

⁵ Stefanidou-Tiveriou – Voutiras 2020, 242 cat. 919 (E. Trakosopoulou-Salakidou).

Table 5: List of sculptures discussed but not examined or analyzed in this work. Their marble provenance was assessed either by visual examination or testing in previous works

Sample no.	Museum inv. no.	Object	Pigment color and type	Location	Photos	Marble provenance
10	6876	Grave relief of a girl (ca. 440 B.C.)	Red (red ochre)	On the base and on the hair. Traces of floral decoration on the pediment but no remains of pigment detected	Fig. 87	Paros-Lakkoi
8	2663	Headless statue in breastplate of an officer (late 1 st c. B.C.)	Red (red ochre)	On the breastplate and on the himation	Fig. 88	Penteli
32	10138	Grave stele of Gaius Popillius (ca. 150 B.C.)	Red (red ochre)	On the upper edge of the pediment	Fig. 89	Vermio
47	21996	Headless statue of an aegis-bearing emperor (hadrianic)	Red (red ochre)	On the scales of the aegis	Fig. 90 (a. b)	Penteli
47	21996	Headless statue of an aegis-bearing emperor (hadrianic)	Black (most probably carbon black)	On the snakes and the folds of the aegis	Fig. 90 (c. d)	Penteli
34	169	Portrait of a man (A.D. 130–140)	Blue pigment remains (most probably)	On the hair	Fig. 91	Penteli
73	2488	Portrait of a woman (ca. A.D. 160)	Gold flakes, red clay underneath (bolo?)	On the hair	Fig. 92	Aphrodisias or Paros
85	1054	Portrait of a woman (ca. A.D. 160)	Gold flakes (no bolo detected; gilding applied directly on marble with glue)	On the hair	Fig. 93	Göktepe
36	11202	Bust of a woman (A.D. 130–140)	Gold flakes (no bolo detected; gilding applied directly on marble with glue)	On the hair and the himation	Fig. 94	Penteli or Afyon

Table 6: Pigments and gilding remnants detected on some objects

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AUTHOR DETAILS

Prof. Dr. Theodosia Stefanidou-Tiveriou
School of History and Archaeology, Aristotle
University of Thessaloniki, University Campus
541 24 Thessaloniki

Greece

ORCID-iD: <https://orcid.org/0000-0002-5176-521X>

ROR ID: <https://ror.org/02j61yw88>

Prof. Dr. Emmanuel Voutiras
School of History and Archaeology, Aristotle
University of Thessaloniki, University Campus
541 24 Thessaloniki

Greece

ORCID-iD: <https://orcid.org/0000-0002-1350-8650>

ROR ID: <https://ror.org/02j61yw88>

Dr. Dimitris Tambakopoulos
Laboratory of Archaeometry, Institute of
Nanoscience and Nanotechnology, NCSR
Demokritos

153 10, Aghia Paraskevi, Attiki

Greece

ORCID-iD: <https://orcid.org/0000-0003-0759-7009>

ROR ID: <https://ror.org/038jp4m40>

Prof. Dr. Yannis Maniatis
Laboratory of Archaeometry, Institute of
Nanoscience and Nanotechnology, NCSR
Demokritos

153 10, Aghia Paraskevi, Attiki

Greece

ORCID-iD: <https://orcid.org/0000-0001-8120-8978>

ROR ID: <https://ror.org/038jp4m40>

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