

Euromos of Caria: the Origin of an Hitherto Unknown Grey Veined Stepped Marble of Roman Antiquity

Bruno, Matthias; Attanasio, Donato; Prochaska, Walter; Yavuz, Ali Bahadir

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EUROMOS OF CARIA: THE ORIGIN OF AN HITHERTO UNKNOWN GREY VEINED STEPPED MARBLE OF ROMAN ANTIQUITY

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Abstract

During a site survey in 2012 an unknown marble quarry was discovered near the ancient city of Euromos (Milas), where a very typical grey veined stepped marble was extracted. A systematic archaeological investigation of the quarry site was undertaken and extensive sampling was carried out for archaeometric analyses (isotopes, EPR, MGS) in order to obtain a reference data bank, even if the macroscopic aspect of the Euromos marble allows an easy preliminary autoptic distinction, thanks to the frequent presence of stepped grey veins, due to shear fractures of the marble outcrop. The use of the Euromos marble was not limited to the region, where it was employed at Euromos and Iasos, but it was diffused all over the Roman Empire probably from the Hadrianic period onwards and it is attested in several coastal cities of Asia Minor, Palestine, north Africa and obviously also in Rome.

Keywords

Euromos, Caria, marble provenance, archaeometry

Introduction

Marbles were quarried in Roman antiquity all over the Mediterranean basin from east to west, and Asia Minor was certainly one of the most important exploitation areas. White and coloured marbles were quarried from the 1st century BC in western Anatolia and distributed in Rome and several cities of the Roman Empire. *Caria* was an especially marble-rich region and produced several important marbles extracted close to the ancient cities of Aphrodisias, Muğla, Stratonikeia, Milas and Iasos.¹

Occasionally, during the surveys conducted in Asia Minor from 2006, we had the opportunity of passing alongside the hill that stands south-east of the Temple of Zeus at Euromos. Quarries with their debris were clearly visible, but supposing they were just a few of the many marble quarries intended for local use we always postponed any visit to them. When we finally decided to visit these quarries in 2012, not simply with the aim of grasping their size but also realizing the quality of the produced marble, we came upon an unexpected surprise: the site revealed itself in all of its relevant extent and its very particular marble quality, one that has already been found in many archaeological sites, allowing its importance to be thoroughly understood.

The Euromos quarry district

The quarries were opened at the top, along the slopes and at the foot of a hill that lies to the south-west of the ancient Temple of Zeus Lepsynos at Euromos and to the right of the national road that leads north from Milas towards Söke and west to the nearby village of Kızılcakuyu (Fig. 1). The district can be divided into three different sectors: the largest one located on top of the hill; the second on the slopes leading downwards to the nearby village; and the third, southwards at the foot of the hill, close to a modern food factory.

The first sector stretches out over nearly the entire summit of the hill, and some of its slopes also face onto the south-western side and are very visible from the nearby national road with their heaps of debris. The first site, which can be reached after a steep climb (Fig. 2), hosts four still abandoned rectangular medium-sized blocks, one of which is not separated from the bedrock, as a rough column shaft, and another sporadic one lying in the same area. Further on to the right stands another quarry, while a larger and deeper extraction site, with a wall reaching approximately 15 metres in height, is

1 BRUNO *et al.* 2012, 564-566.

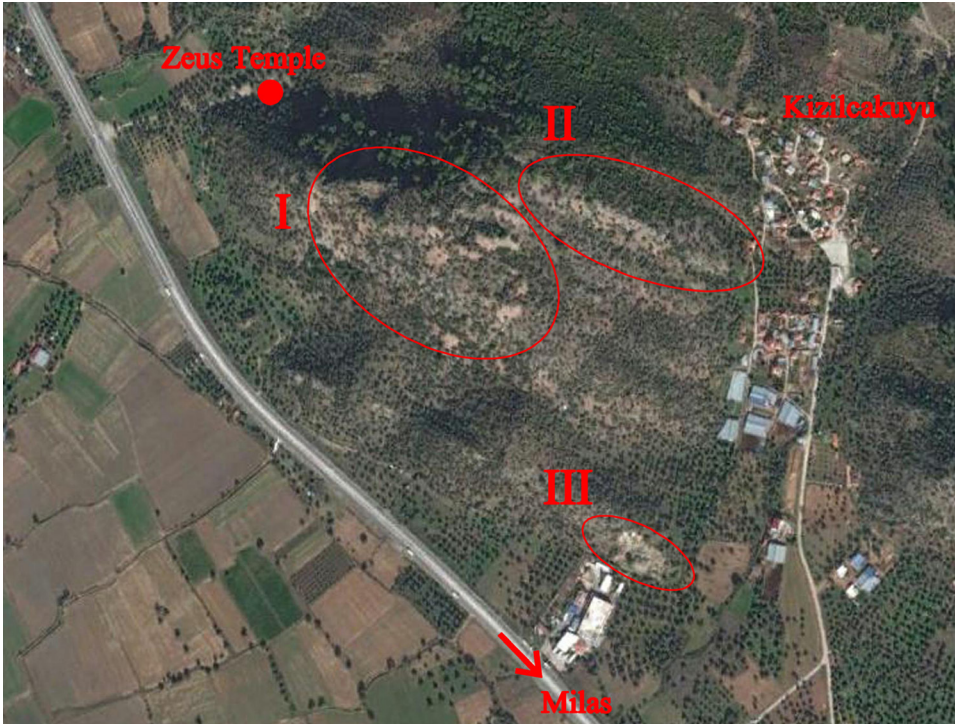


Fig. 1. The location of the Euromos quarry district with the three different sectors



Fig. 2. Euromos. Quarry front on the south-western slopes of the hill in sector I



Fig. 4. Euromos. Partial view of quarry sector II from the bottom of the hill



Fig. 3. Euromos. Abandoned column drums and shafts in the upper area of sector I



Fig. 5. Euromos, quarry sector II. Large unfinished labrum in an upside-down position



Fig. 6. Euromos. General view of quarry sector III

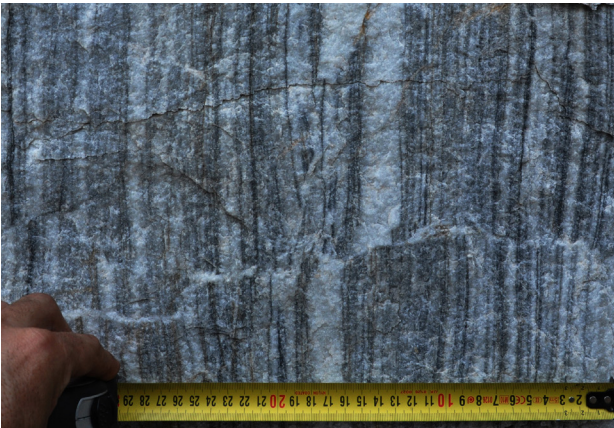


Fig. 7. Macroscopic aspect of grey veined stepped Euromos marble

located towards the interior. There are at least 8 rough-hewn shafts of medium and large size that lie abandoned in the vicinity (Fig. 3); some of them are compatible with the dimensions of those used in the nearby Temple of Zeus. Proceeding towards the peak and the inner part of the hill, one notices a remarkable sequence of depressions and quarry fronts that testify to the whole area having been subjected to intense mining activities during ancient times.

The second sector is developed along the northern slopes of the hill and heads downwards toward a country dirt road that, from the village of Kızılcakuyu (Fig. 4), heads southwards while skirting the hill. It is a wide sector that develops vertically, quarry walls still preserving evident traces of processing and extraction that, especially in this area, seemed to have been also fostered by the frequent presence of cracks in the rocks. Oddly enough there is an almost total absence of quarry artefacts in this sector, with the exception of a single

large semi-finished *labrum* for a fountain, currently lying in the lower part of this quarry area in an upside-down position (Fig. 5).

The third sector is the one located a short distance away from a modern factory, at the foot of the southern extremes of the hill (Fig. 6); it is one great mining site that in recent times has been the object of partial sporadic exploitation, as is attested by modern core holes used for inserting explosives. This site has also been partially filled by ancient debris thrown inside, coming from adjacent overlying extraction areas, as attested by the presence of a great parallelepiped block still attached to the bedrock that has been discovered over the western quarry front.

Grey veined stepped Euromos marble

Euromos marble is very particular since it has peculiar macroscopic features that allow its identification even on a simple macroscopic basis. The marble is characterized by a close sequence of parallel grey veins that can be of different thickness, alternating with other white veins that tend to be linear, but at times can also be rippling and wavy. But the main characteristic is determined by the peculiarity of the marble outcrop: subsequent to the bedrock being shattered with a prevalingly orthogonal trend compared to the veins, a slight shift of the same and its subsequent re-compacting has endowed the marble with characteristics that allow its definition as the grey veined stepped marble of Euromos (Fig. 7). This unique feature in the broader panorama of white-grey veined marbles from Asia Minor used in Roman antiquity allows for its simple macroscopic identification also supported by analytical results obtained from a wide sampling in the Euromos quarries.

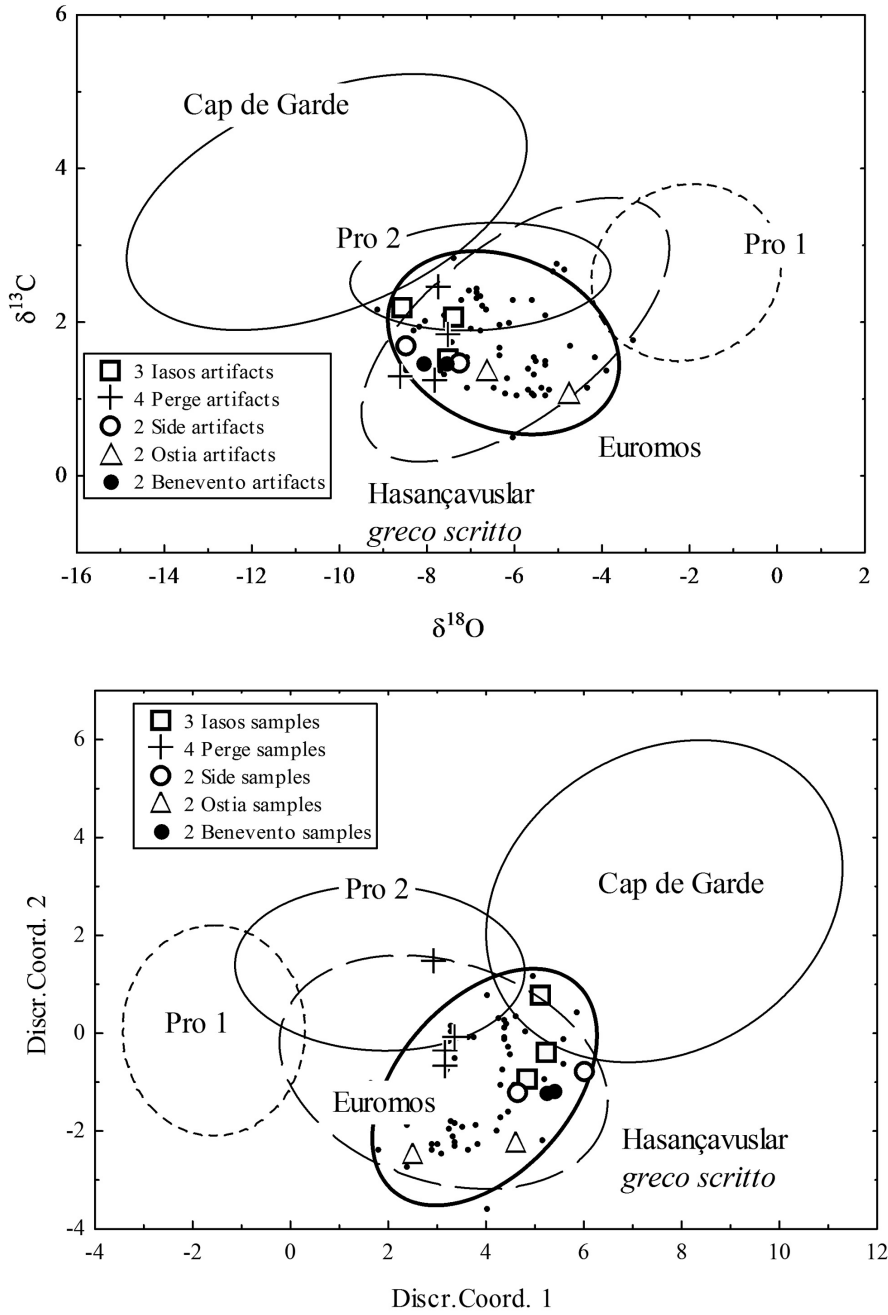


Fig. 8. Isotopic (above) and statistical (below) plots of the Euromos marble quarries and the archaeological artifacts tested. Despite the unique macroscopic appearance of Euromos marble, sites that might provide vaguely similar marbles have been included for comparison



Fig. 9. Euromos, Temple of Zeus Lepsynos (Hadrianic age). The column shafts, set together with three different drums, are in the local variety of the grey veined stepped Euromos marble, while the Corinthian capitals, the attic column bases and the elements of the entablature are in the white marble of Milas

N.	Site artifact	MGS Mm	$\delta^{18}\text{O}$ ‰	$\delta^{13}\text{C}$ ‰	EPR intensity %	EPR linewidth %
Euromos, 56 samples		1.3 0.9/2.5	-6.25 -9.1/-3.3	1.73 0.5/2.8	131.9 19/691	56.2 45/72
1	Iasos, south stoa, plinth cat. 2	0.9	-7.49	1.52	131.8	56.6
2	Iasos, south stoa, plinth cat. 6 (fig. 11)	0.7	-8.53	2.17	72.4	60.5
3	Iasos, east stoa, column cat. 3 (fig. 10)	1.1	-7.37	2.06	212.1	63.2
4	Perge, agora, north external portico, column cat. 3	0.9	-8.57	1.29	13.3	70.8
5	Perge, agora, north external portico, column cat. 4	1.7	-7.52	1.84	15.3	53.9
6	Perge, agora, north external portico, column cat. 5	0.9	-7.82	1.23	17.3	57.7
7	Perge, agora, north external portico, column cat. 6 (fig. 15)	1.1	-7.70	2.45	7.6	55.0
8	Side, state agora, column cat. 1	1.1	-7.24	1.47	125.3	56.6
9	Side, state agora, column cat. 2	1.6	-8.44	1.69	158.4	53.4
10	Ostia, entrance to the direction of excavations, column (fig. 17)	1.7	-6.61	1.38	330.2	77.7
11	Ostia, Decumanus – Via della Foce, column	1.3	-4.74	1.10	78.7	51.9
12	Benevento, Theatre, column cat. n. 9	1.4	-8.07	1.45	131.4	56.4
13	Benevento, Theatre, column cat. n. 26	1.1	-7.56	1.46	175.9	55.5

Table 1. Analytical properties of Euromos quarry samples and related artifacts. For the quarries average and min/max values are given. Isotopic and EPR variables are given in ‰ or % with respect to specific standards (Pee Dee Belemnite for isotopes and Dolomite N368 BCS for EPR)

Archaeometry of Euromos marble

Based on its very characteristic and peculiar appearance mentioned above, the marble of Euromos should not be considered as a grey veined variety but rather as a true polychrome marble, perhaps used in many instances as a substitute of the more renowned Euboean *cipollino*. Despite the fact that macroscopic identification is in general easy and unmistakable, archaeometric studies of the quarry and artifact samples were carried out to provide quantitative support and to avoid misclassification of occasional less-than-typical items. Fifty-six quarry samples and 13 artifacts originating from different archaeological sites were investigated by isotopic analysis, EPR spectroscopy and grain size measurements. Analytical data, summarized in Table 1, are illustrated by the isotopic and statistical graphs (Fig. 8), where sites that may provide marbles vaguely similar to Euromos are also shown for comparison. The results indicate that the marble of Euromos is a medium grain variety exhibiting relatively light oxygen ratios but unexceptional values of the carbon isotopes. The EPR intensity is medium to high and the samples are dolomite free (only one quarry sample contains ca. 20% of this phase). On analytical grounds the marble is difficult to distinguish from the Hasançavuslar *greco scritto* both in terms of isotopes or EPR parameters. Obviously, however, the peculiar aspect

of the Euromos marble as well as the even distribution of the archaeological samples within the source site ellipse do not leave any doubt on the provenance that is fully confirmed by the statistical probability values.

Use and distribution of grey veined stepped Euromos marble

The discovery of this yet unknown marble of Euromos obviously calls for a historical and archaeological framework for this stone, and comprehension of its distribution during Roman times.

As already mentioned, this marble was used for the fluted column shafts of the nearby Temple of Zeus Lepsynos at Euromos (Fig. 9), where the dedication engraved on the architrave of the doorway to the cella allows it to be dated to the Hadrianic age.² The fluted columns of the peripteral temple, totalling 36 in number, were made using three different drums and were not monolithic artefacts. They host some engraved panels that testify how local magistrates and high-priests of the temple were involved in the construction and building activity of the temple, offering at their own expense the

2 HARPER 1978, 384.



Fig. 10.
Iasos, east stoa.
Column shaft, n. 3, of
grey veined stepped
Euromos marble



Fig. 12.
Ephesos, Marble
Street. Fragmentary
column shaft of
grey veined stepped
Euromos marble



Fig. 11. Iasos, south stoa, plinth of grey veined stepped
Euromos marble, n. 2, of the central piers

columns whereupon they wrote their own commemorative inscriptions.³ The use of Euromos marble has also been detected in nearby Iasos, where it was employed in the monolithic shafts of the agora's eastern portico (Fig. 10; Tab. 1, n. 3), whose construction can reasonably be dated between 136 and 138 according to an inscription engraved on an architrave,⁴ whereas in the southern sector one can observe the use of Euromos marble for the dado plinths in the central row of piers (Fig. 11: Tab. 1, n. 2). Four out-of-context column shafts were discovered even in nearby Milas, and they are presently deposited in the gardens of the local Archaeological Museum.

3 BARRESI 2003, 348-350.

4 PUGLIESE CARATELLI 1987, 151.



Fig. 13. Kaunos, northern road along the terrace temple. Entrance decorated with a pair of grey veined stepped Euromos marble column shafts

The marble was relatively widespread, always used for column shafts, even in Ephesus, where 5 examples were discovered along the Arcadiane (2), the Marble Street (1, Fig. 12), the Gymnasium of the Theatre (1) and the lower agora (1). In Magnesia on the Maeander, two shafts lie in the area of the Market Basilica,⁵ while in Miletos two shafts and a plinth are lying on the stacks close to the Archaeological Museum.

At the present state of research, this marble seems to have followed a preferential route southwards and eastwards, as testified by its presence in Knidos, in the lower stoa of the town (3) and in the nearby lapidary (4). Also at Kaunos,⁶ two shafts are at an entrance along the northern road that skirts the terrace temple dedicated to Zeus Soterios (Fig. 13), while two more lie along the opposite southern side, and another two out of context lie respectively in the agora and in the nearby Basilica. However, the most striking testimony of the grey veined stepped Euromos marble can be found in the city of Perge, where its boundless use is testified by its prevalent employment for the urban Colonnaded Street (Fig. 14), the ancient

Decumanus, which was rebuilt during the twenties of the second century AD. From the Arch of Plancia Magna, close to the ancient Hellenistic Gate, after approximately 500 metres it reaches the monumental *Nymphaeum* on the foothills of the acropolis.⁷ At least 170 shafts were used in this Colonnaded Street, together with the more limited use of Troad granite and Proconnesian marble, the latter being employed only for a section of the eastern portico of the same road.⁸ Euromos marble was also used in at least 20 shafts that decorated the northern external side of the agora (Fig. 15; Tab. 1, n. 6), running alongside a road that led to the Colonnaded Street. In the nearby city of Side, the so-called State agora from the 2nd century AD,⁹ was probably supposed to have had the colonnade of the vast square adjacent to the great Marble Hall, exclusively decorated in huge columns with protruding shelves at the top; there are still 28 of these lying in the monument area (Fig. 16), whose square was probably also decorated with fountains, as testified by a great fragmentary *labrum*, again in the same grey veined stepped Euromos marble. And finally, further eastwards, at least one shaft has been discovered in the coastal area with sand dunes in the ancient city of *Elaiussa Sebaste*.

Grey veined stepped Euromos marble continued to spread towards the east, as witnessed by a shaft that was reused towards the mid-second century AD for an engraved cippus discovered in *Caesarea Maritima*¹⁰ and two others that were reused in the ancient cathedral of *Hippo Sussita* in Palestine from the end of the sixth century, which were evidently recovered from abandoned monuments in the town dating back to the Roman age.

A single fragmentary shaft of grey veined stepped Euromos marble was even discovered in the city of Lepcis Magna in Tripolitania, close to the so-called temple dedicated to an unknown divinity along the Decumanus Maximus; this attests to its distribution, albeit a sporadic one, in north Africa.¹¹

But its spread was not only limited to the eastern part of the Empire: at Salona in Croatia, different column shafts lie along the road behind the Episcopal Centre (4) and in the central courtyard of the great urban Baths (1), while another one can be found in the Archaeological Museum in Split.

And ultimately, grey veined stepped Euromos marble is not lacking in the Italian Peninsula, where a

5 BINGÖL 2007, 117-125.

6 ÖGÜN 1995.

7 ABBASOĞLU 2001, 179; HEINZELMANN 2003; PINNA CABONI, 1996, 324.

8 HEINZELMANN 2003, 210-211.

9 AKURGAL 1985, 340; PINNA CABONI, 1997, 256.

10 BURRELL 2015.

11 BRUNO, BIANCHI 2015, 77-78, Tav. XXXVII.2.



Fig. 14.
Perge, Colonnaded Street.
General view of the
south western part of the
street, with column shafts
in grey veined stepped
Euromos marble



Fig. 15.
Perge, northern
external side of
the agora. Column
shaft in Euromos
marble n. 7

few examples can be recalled amongst the marble depots of the Roman Theatre in Benevento (2) and in the Archaeological Museum in Venafro (1). In Rome this *Carian* marble is attested as some supports produced with ancient columns in the Vatican Museums and in the National Archaeological Museum of Palazzo Massimo alle Terme, or in ecclesiastical buildings, like the two small shafts reused for the altar in the San Benedetto chapel of the eponymous church situated in Piazza in Piscinulla in the Trastevere district of Rome.¹² One should keep in mind two more examples that can be found in the nearby city of Ostia, where a fragmentary shaft has been placed close to the entrance to the direction of the excavations (Fig. 17; Tab. 1, n. 10), while another one lies out of context at the junction between the Decumanus Maximus and Via della Foce.

Conclusions

It can be understood from the picture describing the spread of grey veined stepped Euromos marble how its use and distribution was not limited to the restricted regional area (Fig. 18). According to the present state of research, its diffusion, which seemed to be mainly addressed towards the eastern part of the Mediterranean basin, involved some of the principal coastline cities in Asia Minor, even reaching Palestine and North Africa; whereas regarding the opposite side, its use is not only attested on the eastern shore of the Adriatic Sea, but also

12 These columns were identified as cipollino, CORSI 1845, 385.



Fig. 16.
Side, State Agora.
General view of the
monumental hall
on the east side. In
foreground, some of
the large column
fragments in grey
veined stepped
Euromos marble of
the porticoes of the
Agora



Fig. 17.
Ostia Antica,
entrance to the
excavations.
Fragmentary column
shaft of grey veined
stepped Euromos
marble n. 10

in cities in southern Italy, Rome and Ostia.¹³ Its striking macroscopic aspect, grey veined and “stepped”, allow us to consider it with polychrome marbles, perhaps allowing it to be considered, in a broader sense, a substitute marble for the more renowned karystian *cipollino* marble from Euboea. Its use for column shafts for the Temple of Zeus in Euromos and in the eastern portico of the Iasos agora, where grey veined stepped Euromos marble was coupled with the white local marble quarried in the surroundings of Milas, seems to support this hypothesis. But this suggestion is especially corroborated by the Colonnaded Street in Perge, where an incredible use of column shafts in Euromos marble also confirms the production capacities of the large quarries discovered and localized on the hill in the vicinity of ancient Euromos. While on one hand these three monuments were supposed to be part of a single project, and this is especially true for the Colonnaded Street in Perge, certainly defined by the pertinent authorities of the city itself due to its large scale extension in the city, it is also particular in the way that private citizens or city officials were involved in the financial support in all the three mentioned examples. It is very likely that in all three cases there was a single request by a figure authorized by the clients at the Euromos quarries for the necessary production of all the artefacts and it would be improbable to believe that every single contributor turned to the workshops operating in the district in an independent manner, as suggested by some scholars.¹⁴

13 BRUNO, BIANCHI 2015, 77-78.

14 HEINZELMANN 2003, 215-217.

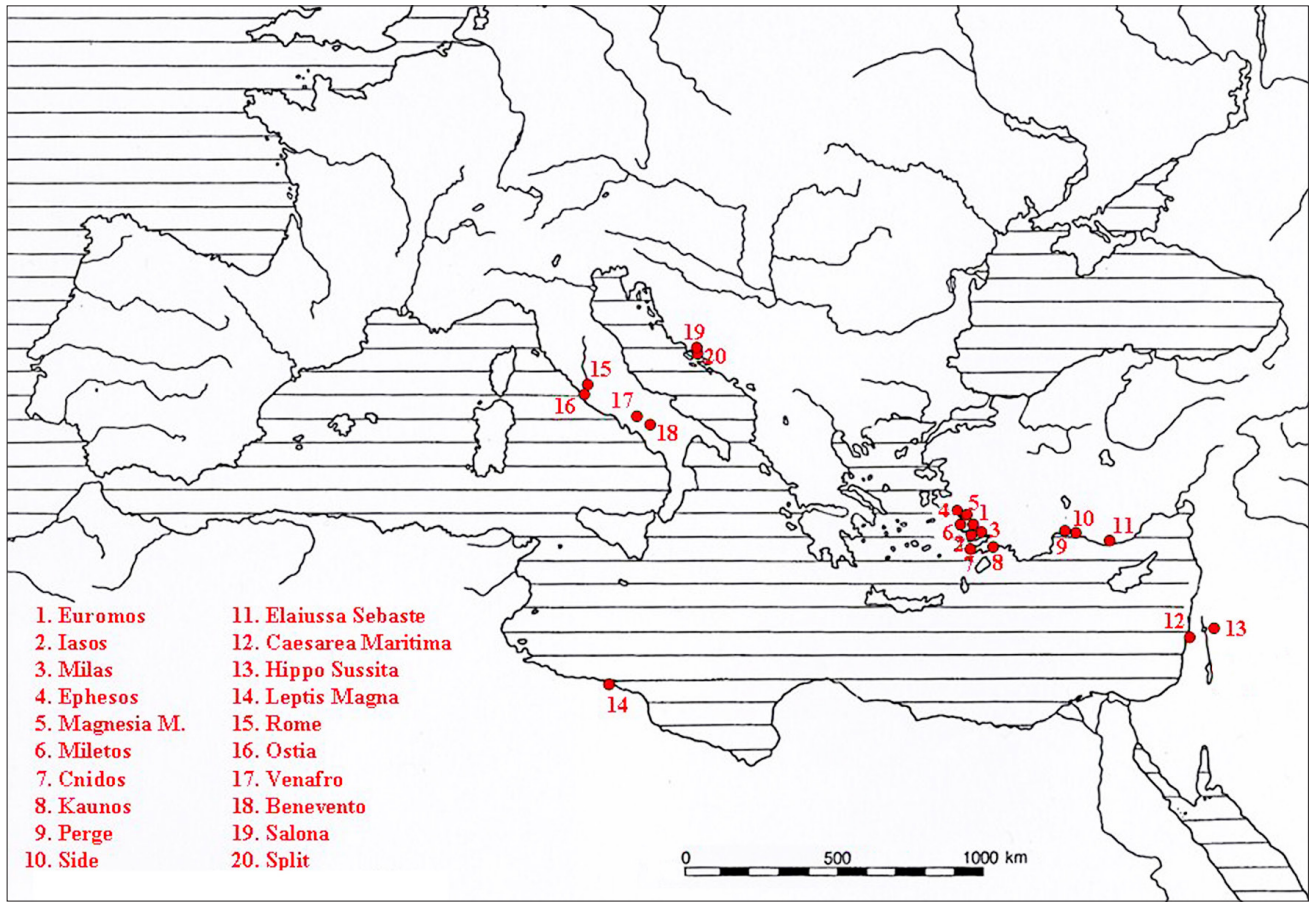


Fig. 18. Distribution map of the grey veined stepped Euromos marble in the Mediterranean Basin

There is no certainty regarding the exact opening of the quarries and the starting of extraction activities at Euromos; at the beginning, the quarries were most likely the property of the city, standing in the urban territory. It seems evident that production increased exponentially in the Hadrianic period, so as to satisfy the growing demands not only local but also more distant clients, as confirmed by the construction of the Temple of Zeus in Euromos, the Colonnaded Street in Perge and the porticoes of the Agora in Iasos, all to be dated to the middle and the end of Hadrian's age, while the State agora complex in Side can generically only be attributed to the second century AD. Very probably the management during this flourishing production period in the Euromos quarries was controlled by the central authority, or at least was given in management to third parties according to the *locatio – conductio* scheme, hence allowing the imperial administration to earn an appropriate amount of money. It is also very probable that grey veined stepped Euromos marble was not a particularly expensive marble, thus satisfying the “marble” needs of the local elites who perhaps did not have the opportunity to obtain other more valuable polychrome marbles while, due to its striking macroscopic aspect, it could have been considered as a Roman imperial coloured marble. Its presence

even in other cities of the Mediterranean basin, at times attested by one single example such as *Elaiussa Sebaste*, *Caesarea Maritima* or *Leptis Magna*, also seems to indicate the unplanned spread of Euromos marble that might have taken place even in a totally sporadic and random way, as products accompanying other loads of artefacts that were exported by sea towards other cities in the Mediterranean basin.

The use of grey veined stepped Euromos marble seems to have been linked almost exclusively to the production of column shafts of small, medium or large dimensions, highlighting its remarkable macroscopic aspect; the two *labra* that have been discovered, a semi-finished one lying in the quarry and a broken one in the central area of the State agora in Side, seem to be the only two exceptions in the use of this marble that did not seem to have been employed for veneer slabs for floors or walls.

In conclusion, it can be noted how the discovery of the Euromos quarries and the exact attribution of a marble that was particularly noticed previously in different ancient monuments allows us not only to expand the panorama of coloured stones used during Roman times, but perhaps also to indicate new and different ways for the administration of some quarries and the distribution of their marble.

BIBLIOGRAPHY

- ABBASOĞLU H. 2001: "The founding of Perge and its development in the Hellenistic and Roman periods, in D. PARRISH (ed.): *Urbanism in Western Asia Minor. New studies on Aphrodisias, Ephesos, Hierapolis, Pergamon, Perge and Xanthos*, JRA suppl. Series, 45, Portsmouth, Rhode Island, 173-188.
- AKURGAL E. 1985: *Ancient Civilizations and ruins of Turkey*, Ankara.
- BARRESI P. 2003: *Province dell'Asia Minore. Costo dei marmi, architettura pubblica e committenza*, Roma.
- BINGÖL O. 2007: *Magnesia am Mäander – Magnesia ad Maeandrum*, Istanbul.
- BRUNO M., BIANCHI F. 2015: *Marmi di Leptis Magna*, Roma.
- BRUNO M., ELÇI H., YAVUZ A. B., ATTANASIO D. 2012: "Unknown ancient marble quarries of Western Asia Minor", in *ASMOSIA IX*, 562-572.
- BURRELL B. 2015: "Multiple reuse of imported marble pedestals at Caesarea Marittima in Israel", in *ASMOSIA XI*, XI International Conference, Split, Croatia, 18 - 22 May 2015, Abstracts, 83.
- CORSI F. 1845: *Delle Pietre antiche. Edizione III con notevole aggiunta al III libro*, Roma.
- HARPER R. P. 1978: "Two Carian Notes", in *Studien zur Religion und Kultur Kleinasiens: Festschrift für F. Dörner*, Leiden, 384-388.
- HEINZELMANN M. 2003: "Städtekonkurrenz und kommunaler Bürgersinn. Die Säulenstrasse von Perge als Beispiel monumentaler Stadtgestaltung durch kollektiven Euergetismus", *AA*, 1. Halbband, 197-220.
- ÖGÜN B. 1995: "Kaunos", *EAA*, 2° suppl. 1971-1994, III, Roma, 178-180.
- PINNA CABONI B. 1996: "Perge", *EAA*, 2° suppl. 1971-1994, IV, Roma, 323-328.
- PINNA CABONI B. 1997: "Side", *EAA*, 2° suppl. 1971-1994, V, Roma, 254-259.
- PUGLIESE CARATELLI G. 1987: "Le due dediche della stoà orientale", in *PAGELLO et al. (eds.): Studi su Iasos di Caria*, Suppl. BdA, Roma, 151-154.