

MARBLE ANALYSES OF SCULPTURES FROM THE TERRITORY OF DOBRUDJA IN THE COLLECTIONS OF THE MUSEUM OF NATIONAL HISTORY AND ARCHAEOLOGY CONSTANȚA

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Abstract: *The well known fact that the ancient sculpture in the region between the Danube and the Black Sea, especially in the Greek cities, was made of imported marble makes interdisciplinary research necessary in order to identify the sources of the material and gain insight into the economic and political life of the ancient cities and their territories. Within a research project dedicated to the study of ancient stone monuments from Romania (www.arheomedia.ro) it was possible to analyze the marble of 26 monuments in the collections of the Museum of National History and Archaeology in Constanța. The sampling and documentation (macroscopically description, determination of the maximum grain size etc) in the museum was completed with investigations of the powdered samples in the laboratories in Germany (stable isotope analysis - $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ -, and powder diffraction). The analytical results indicate that the raw materials of the investigated white marble objects originate predominantly from the Island Paros (lychnitic and non-lychnitic) and Thasos (Alikí). Some fine grained marbles might come from Penteli, Dokimeion and Miletus. In three cases the material could stem from the quarries in Yatagan, but the results of ongoing investigations (trace elements and $^{87}\text{Sr}/^{86}\text{Sr}$ isotopic analysis) will offer certitude for this identification, as for the marble identification of other five monuments, considered (based on the stable isotope analysis and maximum grain size) to come from the Thasos Alikí quarry.*

Rezumat: *Este cunoscut faptul că sculptura antică din regiunea dintre Dunăre și mare, în special în orașele grecești, era realizată din marmură de import. Această realitate face necesare cercetări interdisciplinare care să identifice sursa materialului și să ofere*

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detalii asupra relațiilor economice și politice ale orașelor antice și teritoriilor lor. În cadrul unui proiect dedicat cercetării monumentelor antice din piatră de pe teritoriul României (www.arheomedia.ro) a fost posibilă investigarea a 26 monumente din colecțiile Muzeului de Istorie Națională și Arheologie din Constanța. Documentarea (descriere macroscopică, determinarea dimensiunii maxime a cristalelor etc.) și prelevarea de probe de marmură a fost făcută la muzeu. Analizele probelor de pulbere de marmură (analiza izotopilor stabili $\delta^{18}\text{O}$ și $\delta^{13}\text{C}$ și difracția pulberii) s-au desfășurat în laboratoare din Germania. Rezultatele indică originea marmurelor albe folosite la realizarea monumentelor investigate ca fiind majoritar cariere de pe insulele Paros (lychnitică și non-lychnitică) și Thasos (Aliko). Unele marmure cu granulație fină provin din Penteli, Dokimeion și Miletus. În trei cazuri materialul pare să provină din cariere din zona Yatagan. Pentru certitudine sunt așteptate rezultatele unor analize încă în desfășurare (analiza izotopică a $^{87}\text{Sr}/^{86}\text{Sr}$ și a elementelor urmă). Asemănătoare este și situația altor cinci monumente care, în baza rezultatelor analizei izotopilor stabili și a dimensiunii cristalelor, este probabil să provină din cariera Thasos Aliko.

Introduction

Investigations on the raw materials of ancient stone monuments have been of interest in the previous decades of research of ancient art on the territory of Romania¹.

The aim of the present study was the scientific investigation and determination of the raw material origin of 26 marble objects in the collections of the Museum of National History and Archeology Constanța (MINAC)² in order to a) determine the quarry of origin and b) to enable further archaeological investigation and interpretation on history, transportation and sculpture workshop.

The monuments under investigation for the present contribution (**Table 1**) have been selected by Zaharia Covacef within the preparations for the temporary exhibition "Art and cults in Roman Dobrogea" at the museum in Constanța (2013)³. Beside monuments from the permanent exhibition there are fragmentary

¹ PENȚIA *et al.* 1999; ALEXANDRESCU VIANU 2000, p. 19-20 and 29-30; COVACEF 2002, p. 295-297; PENȚIA *et al.* 2002a (especially for depictions of the Thracian Rider), including the relief from Arsa (MINAC inv. no 42; here CT19); MÜLLER *et al.* 2012 (with the list of previous studies of the same team).

² The authors would like to acknowledge the colleagues from the Museum of National History and Archaeology in Constanța for their interest and support during the documentation in Constanța and afterwards. We are indebted to the editors of the Pontica review for accepting this contribution as a tribute to our colleague Zaharia Covacef. Her essential contribution to this study was unfortunately limited to the selection of the monuments to be investigated (in the campaign from July 2013). She will remain in our memory.

³ The present investigations as well as several publications and a temporary exhibition in Bucharest (2013) have been realised within the frame of the ArheoMedia-project [TE 113_2010-2013 / PN II/2007-2013: Human Resources - *Arheo-Media: formation, transmission and transformation of images and texts in Greco-Roman era with special regard to the use of polychromy in the Carpathian-Danubian-Pontic area*], financed by the National Council for Scientific Research (UEFISCDI/CNCS) Romania - www.arheomedia.ro] and in partnership with the Museum of National History and Archaeology in Constanța, with the precious and extraordinary contribution of Zaharia Covacef.

reliefs and sculpture kept in the deposits of the museum in Constanța⁴. The selection did not followed special criteria at that time, especially due to the difficult access to pieces in showcases, storage or special display within the museum. This was the reason for not being able to determine the maximum grain size for the monuments **CT15** and **CT21**.

The small fragment **CT23** (MINAC inv. 45535), without identification, was selected only due to the good preserved red paint⁵. It was a first attempt to use the new available database MissMarble⁶ in order to determine the provenance of the imported marble in the area. The plan was (and still is) to continue a systematic approach in the years to come in order to provide the information on used material for the publication of the monuments from Tomis and its territory within the *Corpus Signorum Imperii Romani*. Series.

With two Hellenistic exceptions (the frieze from Mangalia - **CT20** and the Cybele statuette - **CT7**, with the same provenance), the monuments are dated to the period from the first to third century AD.

For the stone monuments, especially those not bearing inscription, the information on their finding context or at least exact place of discovery is very often not available. However it is of great importance to try to find such details in the archival material and complete the presentation of each piece, besides the general information (dimensions, material, and state of conservation) and the stylistic analysis. Further of interest is the eventual reuse of the monument after its initial dedication/display, either as intentional damaging action or during the recycling of the stone as building material (in the Antiquity and/or modern times). Many finds made during intensive modern and contemporary agricultural works or building activities (mainly for dams, highways/roads or industrial buildings, for canalisation works, building of deep parking facilities or basements) lake any chance of proper documentation of initial context, being made either by workers or without possibility of extending the excavated area. The same is valid also for the pieces found during old excavations, with lost documentation, which seems to be the case of many marble sculptures from Mangalia⁷. The situation of the monuments from old collections is even more problematic, for not always is certain that they have been found on the territory of Romania or bought from the antiquities market.

The investigated lot of monuments is shortly presented in **Table 1**. The provenance of the monuments is given also on the map (**Fig. 2**). It can be noticed that the finding places are in the territory of ancient towns and fortifications and

⁴ Catalogue entries on the monuments themselves have been recently published by Z. Covacef and are therefore not included in the present paper: COVACEF 2011; COVACEF 2013a; COVACEF 2013b.

⁵ It was found in 2004 during the rescue excavations in Piața Ovidiu in Constanța, without documented archaeological context (according to the information given by Z. Covacef and I. Nastasi). The fragment is unpublished.

⁶ ZÖLDFÖLDI *et al.* 2008; ZÖLDFÖLDI *et al.* 2011.

⁷ e.g. BORDENACHE 1960, 489.

along ancient roads (Camena in the territory of the ancient Ibida/ Slava Rusă; Arsa in the territory of Callatis/ Mangalia; Ciobănița not far from the *semita* leading from Callatis via Tropaeum Traiani/Adamclisi towards Durostorum/ Ostrov-Silistra; Nisipari and Agigea in the territory of Tomis/Constanța), this explaining the way of access of imported material or even sculptures such as the investigated examples.

Of great interest are four sculptures from the so-called "hoard of sculptures" from Tomis (CT15-18). This special find has been investigated from different points of view, mainly considering the provenance of the monuments and the moment of hiding⁸. Within a previous interdisciplinary project the marble of the Thracian Rider reliefs was analysed and the results published⁹.

Materials and Methods

First examination and measurements have been carried out at the museum itself. The objects have been examined under cold light and UV source and described macroscopically; colored patches, veins, foliation or other typical characteristics of the marble were recorded. Consequently, using a magnifying glass and a millimeter scale, the representative maximum grain size (MGS_v) of the marble was measured directly on the objects, exploiting all the surface of the objects.

Subsequently, in order to damage as little as possible, have been taken only powder samples, by using a micro drill machine with diamond driller (up to 10 mg) after cleaning the surface. Places bearing sculptured artwork or aesthetic and historical information were avoided entirely. In addition, care was taken that the samples were representative for the bulk composition of the marble objects.

X-ray powder diffraction (XRD) measurements have been applied on numerous samples, in order to determine the mineralogical composition: to make decision whether the marble samples are calcitic or dolomitic on the one hand, and to determine the accessory minerals on the other hand. The XRD measurements have been carried out at the Institute of Materials Science, University of Stuttgart, by using a Bruker AXS D8, Cu-K α -radiation, Sol-X-detector.

Stable isotope analysis was performed at the Chair of Isotope Geochemistry; University of Tübingen, Germany by using a Thermo Finnigan Gasbench II device coupled with a Finnigan MAT 252 IRMS. The stable isotopic ratios of carbon and oxygen were measured relative to the international standard PDB (Pee Dee Belemnite) and expressed in delta values, $\delta^{13}\text{C}_{\text{PDB}}$ (‰) and $\delta^{18}\text{O}_{\text{PDB}}$ (‰) respectively. The standard error for the delta values is 0.1 ‰ both for carbon and oxygen. Pee Dee Belemnite is the traditional reference for carbon and oxygen stable isotopic measurements¹⁰.

⁸ COVACEF 2011, p. 26-74 (with bibliography); ALEXANDRESCU VIANU 2008-2009, p. 76-79; BAUCHHENS 2013.

⁹ PENȚIA *et al.* 2002a, table 1 and table 4, nos 1,2, 3 and 7.

¹⁰ HERZ 1987; GORGONI *et al.* 2002.

Results and Interpretation

The provenance of the raw material of the archaeological objects was determined by using a combination of oxygen and carbon stable isotopes ratios and petrographic and morphological parameters (homogeneity, maximum grain size – MGS, colour and odour) and mineralogical composition (calcitic/dolomitic marble).

Grain size measurements

Based on the maximum grain size values of the investigated objects at the Museum of Constanța, there are three main groups to be distinguished (**Table 1** and **Fig. 3**). The first group includes fine grained marbles (samples **CT2**, **CT7**, **CT12**, and **CT23**) with MGS_v -values between 1.0 – 1.4 mm. The lower maximum grain size is typical for the quarries Penteli and Mani, but samples are known with similar maximum grain size values in the quarries Hymettos, Doliana, Paros-Chorodaki, Carrara, Serravezza, Afyon, Ephesos, Miletus and Proconnesos. The second group includes medium grained marbles (**CT3**, **CT4**, **CT5**, **CT8**, **CT10**, **CT11**, **CT13**, **CT14**, **CT17**, **CT18**, **CT22**, **CT24** and **CT25**) with MGS_v -values between 1.7 – 2.5 mm. This maximum grain size values are typical for the quarries on the island Paros (both Marathi and Chorodaki), Thasos-Saliara, Aphrodisias, Hierapolis, Ephesos, Miletus and Proconnesos. There are coarse grained marbles in the third group (samples **CT1**, **CT6**, **CT9**, **CT16**, **CT19**, **CT20**, and **CT26**) with MGS_v -values between 2.7 – 3.7 mm. Similar values are typical from Thasos-Aliki and Naxos Apollonas, but samples are known with similar maximum grain size values also in the quarries Naxos-Kinidaros, Thasos-Cape Phanari and Thasos-Acropolis, sporadically occurring at Aphrodisias, Thiountas and Hierapolis as well¹¹.

Mineralogical composition

As only powder sample material have been taken, X-ray diffraction analyses (XRD) have been applied to identify the minerals present in the raw material. Based on the analyses almost all the samples are pure calcitic marbles (**Fig. 4**). Solely the sample **CT7** contains dolomite and **CT12** quartz as accessory mineral.

Stable isotopic investigation and their interpretation considering the mineralogical and petrological properties

Stable isotope data ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) of the investigated objects are listed in the **Table 1**. First of all, we checked, whether the raw material of the investigated objects could stem from “local” quarries in Romania near to the sites known as provenance of the analysed monuments. **Fig. 5** shows that none of the objects was made of local marble.

Further, the results were compared to the isotopic distribution of ancient and modern quarries in the Mediterranean and the Alpine-Carpathian Region. Because of the frequent overlapping of the isotopic signature of numerous quarries (at least 3000 pairs of $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values are available from more than

¹¹ e.g. CRAMER 2004; ATTANASIO *et al.* 2006; ZÖLDFÖLDI 2011.

400 quarries in the literature¹²), the isotopic values of the marbles and quarries have been pre-selected based on their maximum grain size for future comparison.

The samples of the first group including fine grained marbles have been compared with marbles from the Mediterranean Region that have maximum grain size up to 1.5 mm (Fig. 6). Two of the samples, CT7 and CT12 have relatively low $\delta^{18}\text{O}$ values, very similar to the marbles of Penteli. The accessory minerals and the red patina on the surface confirm this assumption. Sample CT2 falls within the isotopic field of Afyon (ancient Dokimeion, most probably in the Röder 1 - Bacakale quarry). The quarry Ridge 2 in Aphrodisias cannot be excluded based on the isotopic results, but this marble has typically higher maximum grain size. The sample CT23 has less negative $\delta^{18}\text{O}$ values, and falls into the isotopic fields of Miletus Hill2, Carrara Colonnata or Sponda, Proconnesos Altıntaş, Hymettos, Mani, also Seravezza cannot be excluded based on the isotopic values. However, Carrara and Serravezza have been excluded as possible provenance, because of the smaller grain size. Also marbles from Hymettos and Mani have smaller maximum grain size values. The marbles from Proconnesos Altıntaş have typically higher maximum grain size and smell of rotten egg, which wasn't the case for sample CT23.

The samples of the second group including medium grained marbles (CT3, CT4, CT5, CT8, CT10, CT11, CT13, CT14, CT17, CT18, CT22, CT24 and CT25) have been compared with marbles selected from the Mediterranean Region having maximum grain size between 1.5 and 3.0 mm. The sample CT17 falls within the isotopic field of Ephesos, Belevi quarry; the samples CT11 and CT13 have very similar isotopic values like the lychnitic marbles of the Marathi quarries from the island Paros. Sample CT20 has very similar stable isotopic values to the marbles from the Chorodaki quarries on the island of Paros. The samples CT3, CT4, CT5, CT8 and CT21 fall into the isotopic field of the non-lychnitic marbles of the Marathi quarries from Paros. The quarries Saraylar and Altıntaş on the island Proconnesos that supply marbles with similar isotopic signature can be excluded because the investigated samples are pure calcitic, homeoblastic, white marbles while those of Proconnesos are heteroblastic; they have frequently greyish layers and stripes and always contain dolomite as accessory mineral, and smell like rotten egg. The stable isotopic values of the objects CT10, CT14, CT18, CT22, CT24, and CT25 suggest the origin of Proconnesos, but also these samples do not have the characteristic properties of the Proconnesos marbles. Even if some pure white specimens are present in the quarries of Proconnesos, the dimensions depend on the spacing between the grey streaks and are usually rather limited, apart from the fact that the fetid odour could not be recognized during sampling of the investigated objects of the Museum of Constanța. According to Cramer only the dolomitic marbles on Proconnesos do not have this odour¹³.

Based on the distribution diagram of the $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ of the West Anatolian marble quarries there are only few quarries apart from Proconnesos having similar isotopic signature like the samples CT10, CT14, CT19 and CT25. These are

¹² ZÖLDFÖLDI *et al.* 2008; ZÖLDFÖLDI *et al.* 2011.

¹³ CRAMER 2004.

the quarries Mugla in South-West-Anatolia and Altınoluk belonging to the Kazdag Massiv (ancient Ida Mountain) in the Troad. **Fig. 5** shows that beside some marbles from Altınoluk only the marbles from Mugla-Yatagan can be taken in account as provenance for the samples **CT10**, **CT14** and **CT25** (maybe **CT19**). The maximum grain size of the marbles from Altınoluk constitutes between 1.2 and 3.0 mm, and for the marbles from Mugla between 1.1 and 5.3 mm. The marbles from Yatagan – near to the newly discovered and systematically investigated ancient quarries in Göktepe¹⁴ - are white or white-greyish in colour, have granoblastic texture and consist almost 100% of calcite, and up to 4% of dolomite content are described. In the contrary, the marbles from Altınoluk have dolomite content between 5-12% and they are rich in accessory minerals (apatite, quartz, phlogopite, diopside, titanite, perovskite, rutile, etc.)¹⁵. Therefore, the provenance of Yatagan is more likely than Altınoluk. Asgari wrote: "Die Gegend von Yatağan,...ist reich an Marmorbrüchen, die auch heute abgebaut werden. Gleich nördlich von Stratonikeia, bei Aladağ, befinden sich antike Brüche, die ich aber noch nicht untersuchen konnte"¹⁶. In order to obtain a reliable answer to the question of the origin, future investigations are necessary. Trace element and ⁸⁷Sr/⁸⁶Sr analyses are in progress; unfortunately the results were not available as yet. Further sampling of some of the monuments (for thin section analysis) would be preferable as well¹⁷.

The origin of the samples **CT18**, **CT22**, **CT24** that fall into the isotopic field of Proconnesos as well, but do not have the characteristics of the Proconnesian marbles, is also undefined. They have very similar isotopic values to the marbles from Thasos Alikı, but those marbles have higher maximum grain size. Trace element and ⁸⁷Sr/⁸⁶Sr analyses are in progress for these samples as well.

Based on the stable isotopic values all the samples of the third group having bigger maximum grain size than 2.7 mm can be assigned to the Alikı quarries on the island Thasos (samples **CT1**, **CT6**, **CT9**, **CT16**, **CT19** and **CT26**). The values of the sample **CT20** fall into the field of the marbles of the Chorodaki quarry on the island Paros.

Conclusions and Outlook of the investigation on the marble provenance

In the framework of this study 26 monuments from the collections of the museum in Constanța have been investigated. The objects were made up of white calcitic marble. The observation and description at the museum and the analytical results of the investigated material indicate that the raw materials have a

¹⁴ ATTANASIO *et al.* 2013.

¹⁵ ZÖLDFÖLDI & SATIR 2003.

¹⁶ ASGARI 1977, p. 345, note 37: (translation) 'The area of Yatağan ... is rich in marble quarries, which are mined even today. Just north of Stratonikeia in Aladağ, there are ancient quarries, which I still could not investigate'.

¹⁷ It is obvious that prior attempts to establish the provenance of the marble took samples for thin sections (eg PENȚIA *et al.* 2002a; ALEXANDRESCU VIANU 2008-2009; MÜLLER *et al.* 2012). Unfortunately there was not always clear how the publication and the storage of the technical data of such analysis has to be organized in order to allow the research in the future to use the same sample, without additional intervention on the monument.

widespread origin. Summarizing the stable isotopic and grain size analytical properties, the origin could be determined for most of the samples: there is strong evidence that the raw material for the samples **CT7** and **CT12** stems from Penteli, for the samples **CT1**, **CT6**, **CT9**, **CT16** and **CT26** stems from Thasos Alikí, the sample **CT2** comes from Dokimeon, the raw material of the samples **CT3**, **CT4**, **CT5**, **CT8**, probably **CT21** comes from the non-lychnitic, but the samples **CT11** and **CT12** from lychnitic marble quarries on the island of Paros, the sample **CT20** from the Chorodaki quarries on Paros. Trace element and $^{87}\text{Sr}/^{86}\text{Sr}$ analyses are in progress; they could confirm the origin¹⁸. Further sampling of some of the objects would be preferable as well.

The raw material of the sample **CT17** comes most probably from Ephesos Belevi, and **CT23** from Miletus. The origin of the raw material of the samples **CT15**, **CT18**, **CT19**, **CT22** and **CT24** is presumably Thasos Alikí, but future verifications are needed. The samples **CT10**, **CT14** and **CT25** could stem from the quarries in Yatagan, future investigation is needed here as well.

Comments on the monuments

The Fortuna with Pontos statue has been in the literature considered to belong to the school of Nicomedia. The marble of this statue has been sampled (also for thin section!) and investigated in the 90s. However the technical results are not published, only the conclusion is mentioned in the archaeological study of M. Alexandrescu-Vianu¹⁹. The assertion there is that the marble is either from Proconessos or Dokimeion, meaning very different from the result of the present investigation (**CT15**: Thasos Alikí)²⁰. Even if the style analysis concludes that the statue was made by the Nicomedian artists the result of the present investigation on the marble (using a significantly wider reference database!) is not surprising or unique. There are examples of artists from the region working in areas with import of marble material and working in other available marbles or even in local limestone²¹.

Within the discussion of crafts from Nicomedia working in the region of Dobrudja quite puzzling is the case of the main Mithra relief from the so-called "La Adam"-cave, very well known due to its inscription mentioning the artist: Phoibos of Nicomedia²². The analysis of the stone material of the monuments found on the same spot²³ identified it as local Jurassic limestone. However, this

¹⁸ PENTIA 2002b.

¹⁹ ALEXANDRESCU VIANU 2008-2009, p. 56, T10.

²⁰ Dokimeion can be excluded with high degree of certainty, based on the stable isotopic values. Similar stable isotopic values have the marbles from Proconessos - the Altintas quarry. But they all have the fetid odour which is missing in the sample **CT15**.

²¹ Athens: WARD-PERKINS 1980, p. 33; Leptis Magna: BIANCHI *et al.* 2011.

²² ISM I 374.

²³ Four monuments (two altars, one table, one Mithras relief) from the so-called "La Adam"-cave have been investigated by the geologist dr. A. Baltres (Geological Institute of Romania, Bucharest) within the ArheoMedia-project (see above note 3). The fifth piece found in the same spot, a second Mithras relief, without inscription, was kept in a showcase not accesible for the investigation: ALEXANDRESCU VIANU 2000, p. 138, cat. no 192, pl. 77b (the lithic material is identified as limestone).

relief seams to have been investigated in the 90s of the last century with the identification of the material as marble from Dokimeion²⁴.

During the study of ancient stone monuments and use of stone material (locally available and imported) in the area of the ancient Troesmis, in the north-western corner of the province of Moesia inferior it was observed the great awareness of the available resources and the economic use and recycling process of the various kinds of stone, depending upon the final project: fortification, private or public building, funerary monument, honorary or votive monument etc.²⁵

The lot of monuments under investigation here confirms the observations. While in the Greek cities on the shore of the Black Sea the imported marble was used in great quantities²⁶, in their territory the local stone was preferred even if the crafts could have been either foreign or locals trained in the workshops of the foreign crafts in the centers of the region. One further example is Camena (Tulcea County) from where several stone monuments are known and where the local limestone from the northern Dobrudja was used for architectural elements, large scale inscriptions and public buildings but also for monuments usually made of marble, like a beautiful funerary stela with the deceased on a kline, holding a dove²⁷. Votive reliefs of imported marble - like the here investigated CT25 - are also attested as found within the same locality²⁸.

An interesting observation - in relation to the determined provenance of the marble - is that the three votive reliefs CT10, CT14 and CT25 are small thin slabs of marble presumably from the Yatagan quarry²⁹. The small scale votive reliefs could have been imported as already finished products, needing only an inscription to be carved. The depictions are completely different and quite particular, indicating a special order respectively the availability of specialised crafts for their execution. The example of the reused marble slab from Cernavodă (CT 24), bearing the simplified depiction of the Thracian Rider in the "benedictio latina"-gesture³⁰ on one side, and the badly started depiction of a standing figure (Jupiter?) on the backside proves that the reliefs were sometimes carved in the

²⁴ ALEXANDRESCU VIANU 2000, p. 137, cat. no 191, pl. 77a: the lithic material is identified as limestone. - However in ALEXANDRESCU VIANU 2008-2009, p. 57, T 3: the lithic material is identified as marble. Puzzling is further the inventory number given in the table with the results: MINAC 38. Three pages further (ALEXANDRESCU VIANU 2008-2009, p. 60, note 23) the relief is identified with the number MINAC 33118.

²⁵ ALEXANDRESCU (forthcoming).

²⁶ ALEXANDRESCU VIANU 2000, p. 19 mentions that at Histria only the marble was used for sculpture (even if some exceptions in limestone, of bad craftsmanship, were found).

²⁷ ISM V 222; SAUCIUC-SĂVEANU 1934; BĂRBULESCU 2001, p. 95.

²⁸ The relief has been bought by the museum in Constanța from a private person: COVACEF 2013a, p. 50. - On the reality of dealing with antiquities in the villages and especially with monuments of stone see e.g. BUJDUVEANU 2010, p. 11-12. Similar habits are known from further localities in the region.

²⁹ CT 10: 20.5x16 cm; CT 14: 25x25 cm; CT 25: 12x9.5x1 cm.

³⁰ OPPERMANN 2006, p. 26-27. - On the finds of Thracian rider depictions in the Xiapolis/Cernavodă area see HAMPARTUMIAN 1979, p. 35-36, cat. no 12 and 13; OPPERMANN 2006, p. 100; BĂRBULESCU 2001, p. 189.

region³¹. The unfinished depiction on the backside seems even to have been sketched on a higher slab.

From Nisipari, in the territory of Tomis, from the same finding spot, are known to have been found during the works at the dam of the Carasu river (in 1968, 4 km north of the village), two statues of Hercules, of limestone, and the fragmentary marble relief depicting Cybele (CT 6)³². The statues are of particular interest for their bases are carved in the same block. Actually from the statues only the legs are preserved and the trace of the Hercules club near his right foot. There is no inscription preserved. The identification of the initial monuments is made only by remains from the statues and by the depiction of two of Hercules labours on one of the bases. All three monuments are damaged and the context of discovery was not investigated in detail. It is hence not known if they have been reused in modern times or intentionally destroyed without recycling purpose³³. The association of the two deities - Hercules and Cybele - is not uncommon in relation to fertility and agricultural activities. The sculptures could have been initially dedicated within a shrine or a temple in the territory of Tomis³⁴ or the statues could have been also part of the decoration of a villa.

The head of a Dionysos statue (CT3) and the large votive relief (32.5x20x6.5 cm) depicting the wine god (CT4) have been found during agricultural works at Agigea, near Constanța³⁵. Around the Agigea lake was a large settlement with a tumular necropolis along the road towards Mangalia. The site was never systematically investigated but discoveries of various categories of artifacts (dated between the second century BC to the third century AD) are known³⁶.

On the votive relief for Cybele (CT21) from Mangalia the traces of red paint on the borders of the relief and on the altar beside the seated goddess are quite well preserved³⁷. The practice of putting red (or darker) lines in order to provide a depth or a movement to the depiction seem to have been no exception³⁸. The

³¹ The relief was found by locals on the shore of the Danube, between Cernavodă and Seimeni, closer to the first locality (MOSCALU & PETOLESCU 1972, p. 659 with note 3) and was in a private collection before entering the collections of the museum in Constanța - HAMPARTUMIAN 1979, p. 36, cat. no 13.

³² COVACEF 1975, p. 416-419; COVACEF 2002, p. 145-146, notes 326-327; COVACEF 2011, p. 118-119, cat. no 51.

³³ They came to light at only 15-20 cm from the actual walking level. At Nisipari is recorded a settlement dated to the first-third century AD: BĂRBULESCU 2001, p. 56, note 273. - The dimensions of the slab (25x32x2 cm) and of the bases are quite regular (25x22x18 cm, 27.5x32x24 cm), suitable for building activities etc. COVACEF 1975, p. 416, note 58 mentions that the slab was found between the two bases.

³⁴ The find is interpreted as such also by BĂRBULESCU 2001, p. 56 and p. 294, no 64.

³⁵ COVACEF 1998, p. 163-164, fig.1.

³⁶ BĂRBULESCU 2001, p. 59 with note 304.

³⁷ Colour illustration in COVACEF 2011, fig. 70. - We need to mention here one unsolved matter regarding the provenance of this relief: in the publications is Mangalia but Z. Covacef skope always of Constanța as finding place.

³⁸ It could be observed on several marble votive reliefs investigated within the project

traces are not always observed prior to the cleaning of the surfaces or disappear after the discovery, depending on the used materials.

The fragment interpreted as hand of Cybele sitting on the throne (CT5) is only one of the possible interpretations. In the region there are no examples of such a depiction. Other plausible hypothesis would be to think at a standing figure. As examples we would mention the statue of the Mithras Petrogenitus in the Brukenthal Museum in Sibiu³⁹ and two statuettes depicting Liber Pater from the temple of Liber Pater in Apulum/Alba Iulia⁴⁰. All three examples have in common the massive strut bridging from the head of the deity to the upraised left arm holding a torch respectively the thyrsus. In the case of the hand from Constanța, the details of the attribute resemble more like a thyrsus, with the details of the pine cone on the top, leaves and ribbons on the staff. The examples from Dacia are also made of imported marble and were considered even related to a similar statue found in the area of Aphyon⁴¹. One further example would be a Genius statuette from Carnuntum⁴², made of Parian marble.

The small fragment CT23 (MINAC inv. 45535) is difficult to identify. Plausible would be to think at an attribute (like *cornucopia*) or the head of a sceptre or a thyrsus, marked with colour⁴³.

The Thracian rider relief from Ciobănița (CT8) was found within the territory of Callatis/Mangalia. However the finding context was a reuse of the marble slab for a fourth century building⁴⁴. The stylistic analysis of the monument found best analogies within the province of Moesia inferior, at Tomis and Galata⁴⁵, sometimes in monuments carved in limestone. M. Oppermann even considers plausible that the slab was brought to Ciobănița from farer away, eventually from a workshop in Tomis⁴⁶. The dimensions of the slab make however possible an initial purchase from the sea shore and display in the country side shrine⁴⁷ from where the late Roman reuse gained building material. This was the case also for the special votive relief from Arsa (CT19), attesting also a particular epitheton of the deity⁴⁸. The shape and the dimensions of the relief (large rectangular slab of 31x27x16 cm) and the iconographic similarities with further less skilfully made pieces in Tomis make the hypothesis on the practice of copies

and will be the subject of a separate publication.

³⁹ MÜLLER *et al.* 2012, p. 105, TR1.

⁴⁰ DIACONESCU 2001, p. 175-176, fig. 22 and 23.

⁴¹ MÜLLER *et al.* 2012, p. 56, AP31; DIACONESCU 2001, p.176.

⁴² KREMER 2012, p. 41, cat. no 31, pl. 14.

⁴³ D. BOROȘ , in: DIACONESCU 2001, p.179: mentions that the Liber Pater statuette was bearing traces of initial paint on the head of the thyrsus.

⁴⁴ BĂRBULESCU 2001, p. 69.

⁴⁵ OPPERMANN 2006, p. 9 and p. 322, pl. 2.

⁴⁶ OPPERMANN 2006, cat. no 11, p. 87.

⁴⁷ Roman settlement at Ciobănița for the second to fourth century AD: BĂRBULESCU 2001, p. 69 and p. 296, no 121.

⁴⁸ ISM III 239; OPPERMANN 2006, cat. no 763, p. 87. - The marble of this relief was analysed also by PENȚIA *et al.* 2002a, table 1 and 4, no 9 (identification Paros-Chora2). The isotopic values are similar, but CT19 dos not fall into the Chorordaki field, see also fig. 7.

of a particular composition over a larger area plausible⁴⁹. In the area (to the north of the modern village, towards Pecineaga) is attested a Hellenistic settlement as well as Roman time rural settlement with a tumular necropolis⁵⁰. There is assumed that the local limestone was used also for buildings in Callatis⁵¹.

Related in the provenance of the material is also the fragment **CT9** of a large relief with unknown finding place (registered to be Dobrudja). Still to be recognized is the depiction of a rider to the left and a tree at the left margin of the field of depiction. The identification as Thracian rider is common, however the fact that he rides towards the left is rather unusual⁵².

Among the rare pieces of the collections in Constanța are the marble sarcophagi, especially the decorated ones. Z. Covacef published 1974 the two fragments of columnar sarcophagi⁵³, the material of the one with the depiction of a muse being investigated here (**CT22**). The latest study considering the sarcophagi from the region postulates also that the two fragments in Constanța and one from Odessos might belong to one coffin⁵⁴, a possible product of the so-called "late antique group from Rome" of artists coming from Asia Minor and Athens in the later third century AD. However Z. Covacef pointed out that the two fragments in Constanța, due to the differences in the thickness of the coffin wall, are not from the same piece⁵⁵. In order to properly answer the question would be, of course, necessary to re-examine all the fragments and to analyse the marble of the two other fragments as well⁵⁶.

The Thanatos head from Ostrov (**CT26**) was part of the decoration of a funerary monument⁵⁷.

For the statuette of a seated boy (**CT11**), which could be the depiction of Eros⁵⁸, it is also possible to think at a child depiction, with or without funerary function, eventually part of a larger architectural ensemble, like a fountain⁵⁹.

The results of the material analyses provide a valuable insight in the trade of marble and the marble workshops within the region, with an important role

⁴⁹ For the discussion on this aspect see COVACEF 1978; OPPERMANN 2006, p. 62.

⁵⁰ POENARU BORDEA 1963, p. 292-293, no 3; BĂRBULESCU 2001, p. 66-67 and p. 296, no 110;

⁵¹ IONESCU & GEORGESCU 1997, p. 162-163, no 7 and 9.

⁵² At OPPERMANN 2006 there is only one example, cat. no 982 from Philippopolis/Plovdiv - see also OPPERMANN 2006, p. 182.

⁵³ COVACEF 1974, p. 303-304, nr. 1-2, fig. 5-7; KOCH 2013, p. 104, 124 fig. 4.

⁵⁴ KOCH 2013, p. 104, 123 fig. 3, 124 fig. 4 125, fig. 5.

⁵⁵ COVACEF 1974, p. 304.

⁵⁶ ALEXANDRESCU VIANU 2008-2009, p. 56, T20 mentions the investigation of a "sarcofag coloane" - we assume it is the same fragment in the permanent exhibition, investigated within our lot as CT 22. The identification of the marble was however Proconessos.

⁵⁷ ARICESCU 1970, p. 489; BĂRBULESCU 2001, p. 131-132, especially note 1083; COVACEF 2002, p. 140.

⁵⁸ COVACEF 2013a, 41; it is known only that it was found in Constanța, in Piața Unirii.

⁵⁹ e.g. LIPPOLD 1956, 194 cat. no. 55, pl. 92; GERCKE 1968, 108-109, FK 34.

played by the city of Tomis/Constanța. The import of Parian and Thasos marble - remaining to be further investigated in which form and at what extent - is well attested by the reliefs and sculptures from Tomis and its territory.

Perspectives

The intention to continue the investigations on the provenance of imported marbles are still valid. Looking back at the previous sampling campaigns and the results or more exactly at the evolution of the investigation it is of great importance to pay attention to the way of publication and storage of samples and information in order to allow re-evaluation without making necessary re-sampling, which might be not possible in some cases.

It would be of great interest to make possible systematic investigation of monuments found in the same archaeological context - like, in order to give two well known examples from Constanța itself, the so-called "hoard of sculptures" or the finds from the so-called "marble workshop". Special analyses of marble used for architectural elements and architectural decoration would be also helpful. The coloured marble attested to have been used in this context has never been investigated.

The trade connections of the area of Dobrudja (the West-Pontic region, between the sea shore and the Danube) with Asia Minor and the Greek islands are indisputable and still to be investigated⁶⁰. The details regarding the sculpture, used lithic material and artists, are far from being clarified and the need of further systematic studies is imperious.

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⁶⁰ On the trade between the Pontic area and Rome see for instance RIZZO 2014; especially on marble trade p. 566-569.

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Sample	MINAC inv.nr.	Object	Excavation	$\delta^{13}\text{C d}^{13}\text{C}$ (‰ VPDB)	$\delta^{18}\text{O d}^{18}\text{O}$ (‰ VPDB)	MGSv (mm)	Main minerals	Provenance	Bibliography
CT 1	16041	Dioscuri relief	Constanța	2,81	-2,06	3,2	white, heteroblastic, translucent	Thasos Aliki	Covacef 1972, 517-519, fig. 4; Covacef 2013b, cat. 84
CT 2	35583	Dionysos statuette	Constanța	-0,20	-4,48	1,2	white, homeoblastic, calcitic	Dokimeon Röder 1	Covacef 2013b, cat. 91
CT 3	38701	Dionysos relief	Agigea	2,83	-3,13	2,2	white, homeoblastic, calcitic	Paros non lychn.	Covacef 1998, 163, fig. 1; Covacef 2013b, cat. 92
CT 4	15759	Dionysos head	Agigea	2,69	-2,14	1,7	white, homeoblastic, calcitic	Paros non lychn.	Covacef 2013b, cat. 93
CT 5	5428	Hand of Cybele?	Constanța	2,81	-2,50	2,3	white	Paros non lychn.	Covacef 2013b, cat. 115
CT 6	17949	Cybele relief	Nisipari	3,05	-2,28	3,6	homeoblastic, white	Thasos Aliki	Covacef 2002, 151, pl. 24, fig. 4; Covacef 2013b, cat. 116
CT 7	6814	Cybele statuette	Mangalia	2,51	-6,92	1	homeo, white, cc+dol+Q+Musc	Penteli	Covacef 1972, 514, no 2, fig. 2; Covacef 2013b, cat. 117
CT 8	34356	Thracian Rider relief	Ciobanita	2,89	-2,62	2,4	white, homeoblastic	Paros non lychn.	Covacef 2013b, cat. 103
CT 9	1976	Thracian Rider relief	Dobrogea	2,97	-1,35	3,1	white, homeoblastic	Thasos Aliki	Hampartumian 1979, 86, no 126; Covacef 2013b, cat. 106.
CT 10	3520	Jupiter and Juno	Mangalia	2,86	-0,52	2,2	white, homeoblastic, translucent, grey strips, calcitic	Yatagan???	Covacef 2013b, cat. 5
CT 11	11869	Statuette of a boy	Constanța	4,27	-2,57	2	white, homeoblastic, calcitic	Paros lychn	Covacef 2013a, p.41
CT 12	45650	Male torso	Constanța	2,65	-5,38	1,1	homeoblastic, red patina, calcitic	Penteli	Covacef 2013a, p.57
CT 13	32	Statue of Iupiter Dolichenus	Hârșova or Constanța	3,86	-2,27	1,8	white, with black spots, calcitic	Paros lychn	Rădulescu 1963, 90, no 9; Rădulescu 1964, 154-155, no 9; Tacheva-Hitova 1974, 64, no 11; ISM V 109; Covacef 2013b, cat. 118.
CT 14	1973	Mithrasrelief	Constanța	2,68	-0,69	2,1		Yatagan???	Covacef 2013b, cat. 120
CT 15	2001	Fortuna with Pontos	Constanța	3,35	-1,87	not measured	white, homeoblastic, calcitic	Thasos Aliki?	Covacef 2011, 28-31, no 6
CT 16	2004	Nemesis-Aedicula	Constanța	3,92	-1,95	2,7	white, homeoblastic, calcitic	Thasos Aliki	ISM II, 148; Covacef 2011, 36-37, no 9; Bauchhens 2013
CT 17	2002	Bust of Isis	Constanța	3,16	-4,48	2,4	white, homeoblastic, calcitic	Ephesos Belevi	Covacef 2011, 32-33, no 7
CT 18	2003	Snake Glykon	Constanța	2,92	-1,40	2,2	white, homeoblastic	Thasos Aliki?	Covacef 2011, 34-35, no 8
CT 19	42	Thracian Rider relief	Arsa	2,65	-0,70	2,6	white, homeoblastic	Thasos Aliki (Yatagan?)	ISM III 239; Covacef 2013b, cat. 102
CT 20	38101	Fries with Centauri	Mangalia	2,16	-1,07	2,7		Paros Chorodaki	Covacef 2011, 242-243, cat. 114
CT 21	1914	Cybele relief	Mangalia	2,42	-2,49	not measured		Paros non lychn.	Covacef 2011, 128-129, cat. 56
CT 22	20617	Sarcophagus with muses	Constanța	3,22	-1,38	2		Thasos Aliki?	Covacef 1974, p. 303 – 305, fig. 6-7; Covacef 2011, 222-223, cat. 104
CT 23	45535	Fragment of a statuette with red paint	Constanța	2,60	-1,62	1,4	white, with black spots, calcitic	Miletus Hill 2	unpublished
CT 24	6546	Thracian Rider relief/Dionysos	Cernavoda	2,98	-1,15	2,1	white, translucent	Thasos Aliki?	Covacef 2013b, cat. 99
CT 25	47431	Danubian Riders relief	Camena	2,75	-0,50	2,1	white and light	Yatagan???	Covacef 2013b, cat. 108
CT 26	2763	Thanatos head	Ostrov	2,89	-1,56	3,7	white, homeoblastic	Thasos Aliki	Aricescu 1970, 489-492; Covacef 2013b, cat. 68

Tab. 1



Fig. 1 - Snapshots of the investigated monuments (listed in Table 1) in the MINAC collections.



Fig. 2 - Map with the localities of provenance of the investigated monuments (I. Barnea, Institutul de Arheologie Vasile Pârvan).

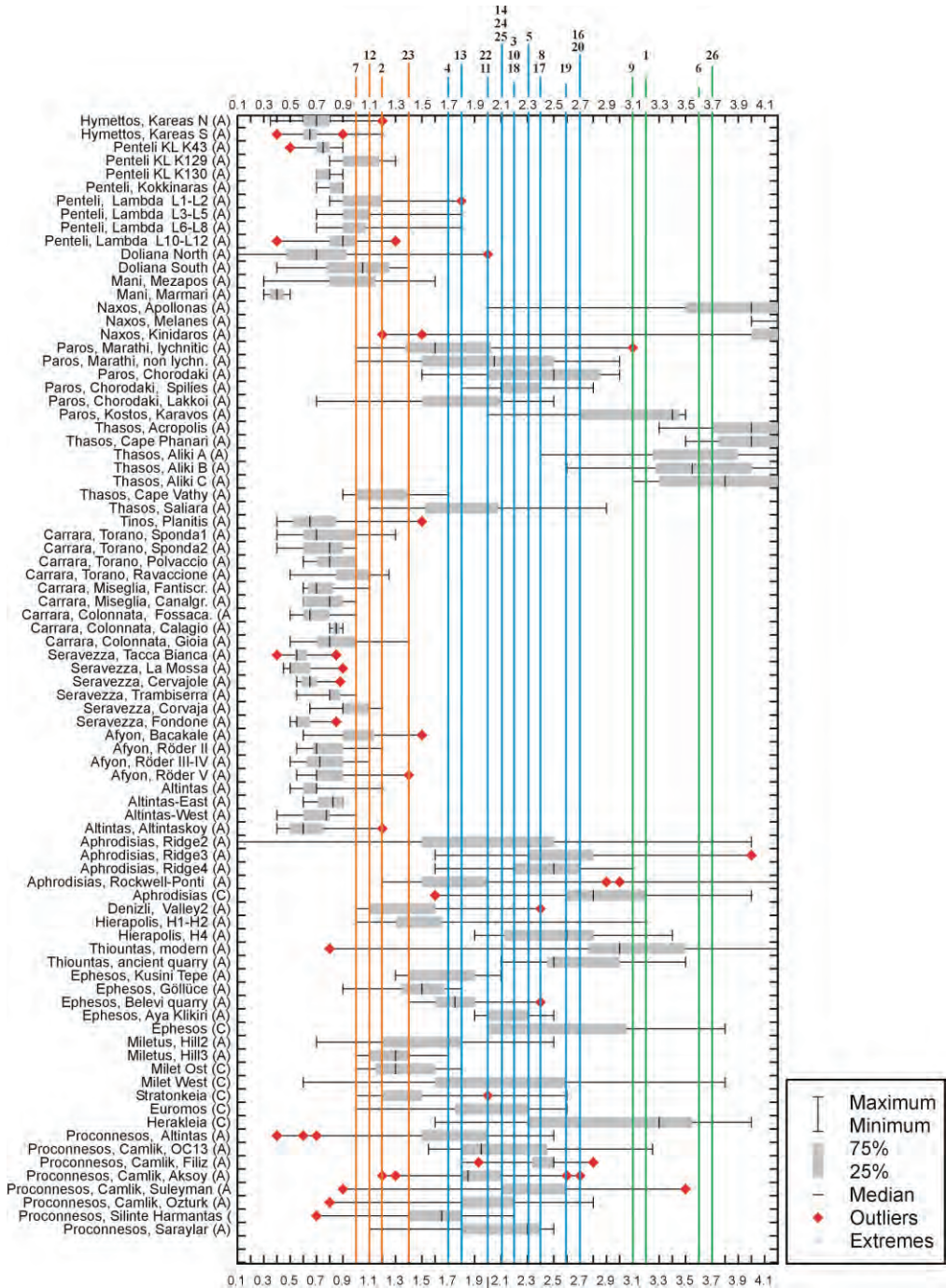


Fig. 3 - Box plot diagram of the maximum grain size values of known ancient and modern quarries in the Mediterranean Region (CRAMER 2004; ATTANASIO *et al.* 2006; ZÖLDFÖLDI 2011) and the analysed samples from MINAC.

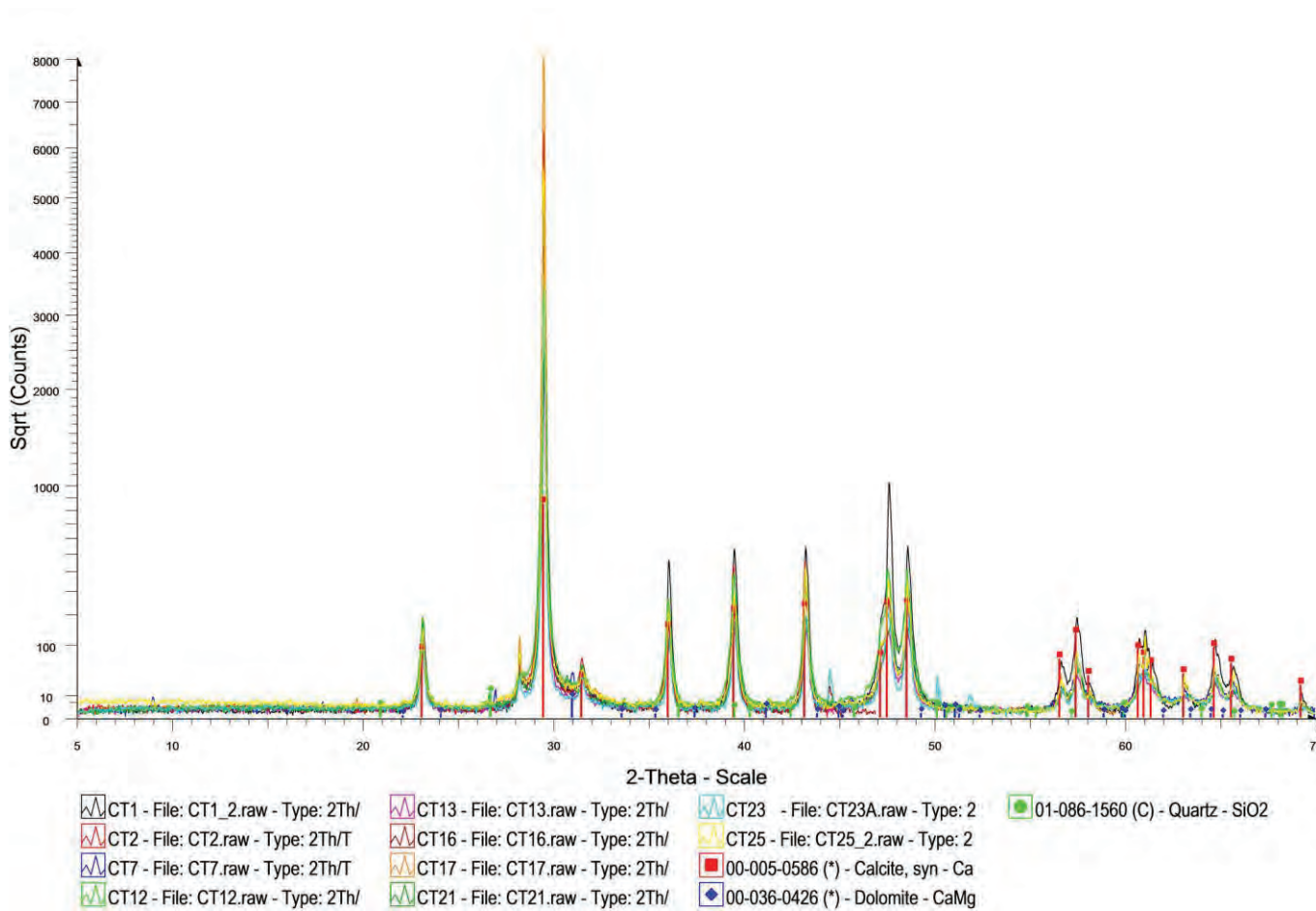


Fig. 4 - Mineralogical composition based on X-ray diffraction analyses of the samples from MINAC.

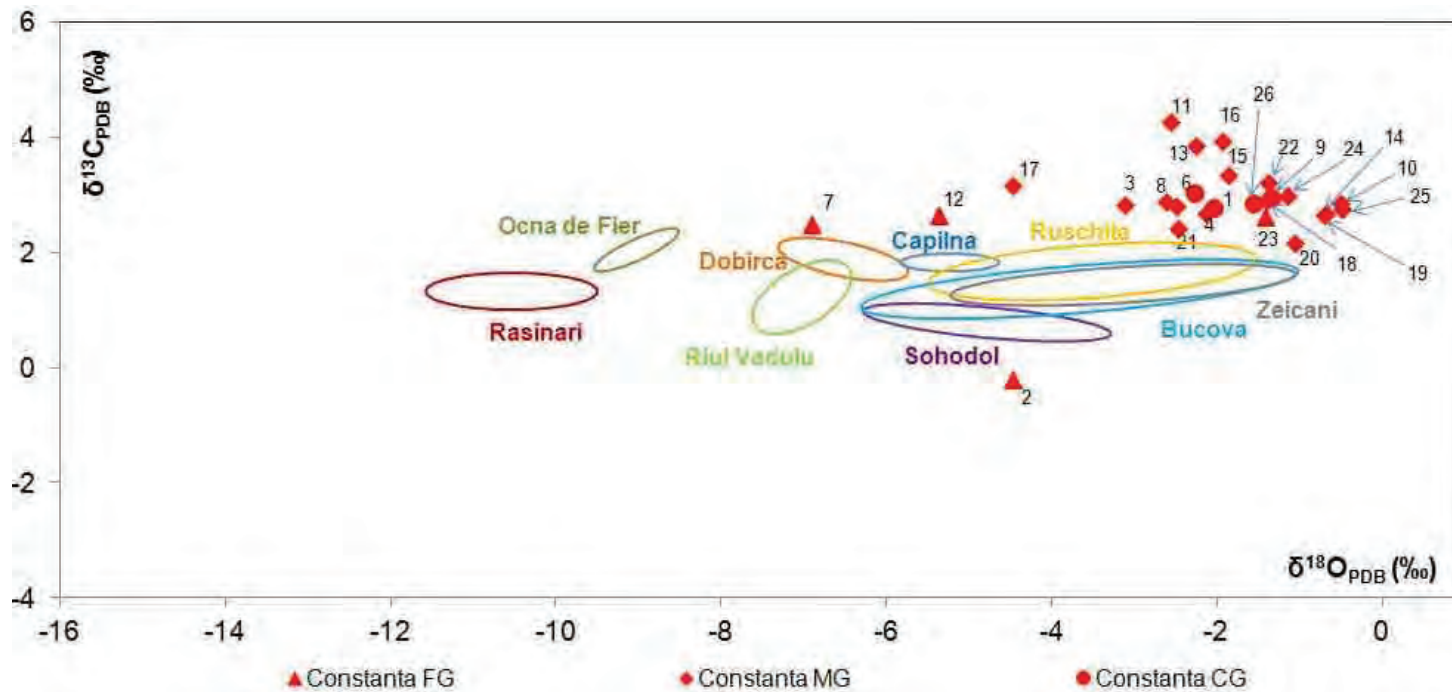


Fig. 5 - $\delta^{13}\text{C}$ versus $\delta^{18}\text{O}$ diagram of known ancient and modern quarries in Romania (MÜLLER *et al.* 2012) and the analysed samples from MINAC.

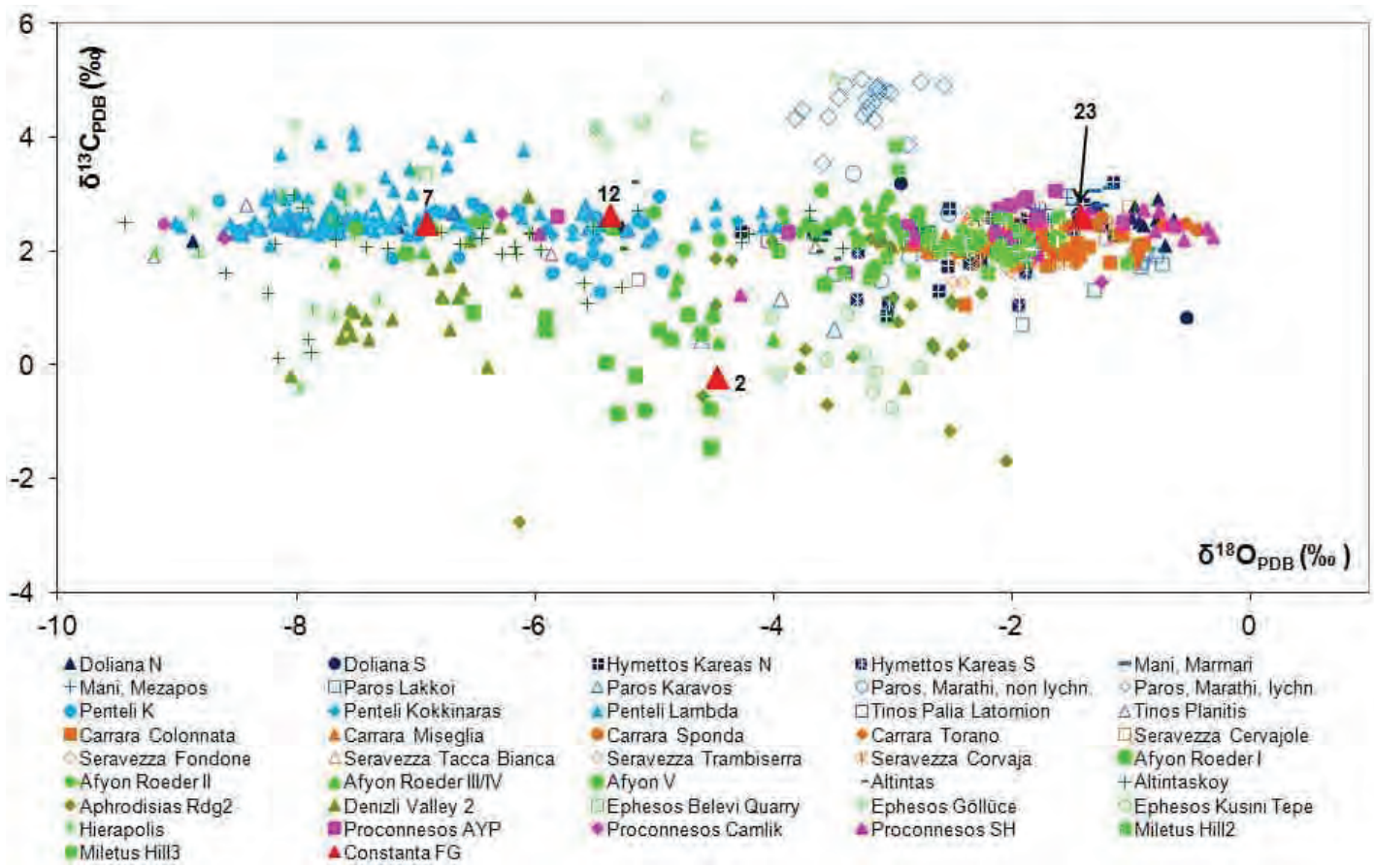


Fig. 6 - $\delta^{13}\text{C}$ versus $\delta^{18}\text{O}$ cross plot diagram of known ancient and modern quarries in the Mediterranean Region, having calcitic marble samples with a maximum grain size up to 1.5 mm and the analysed samples from MINAC.

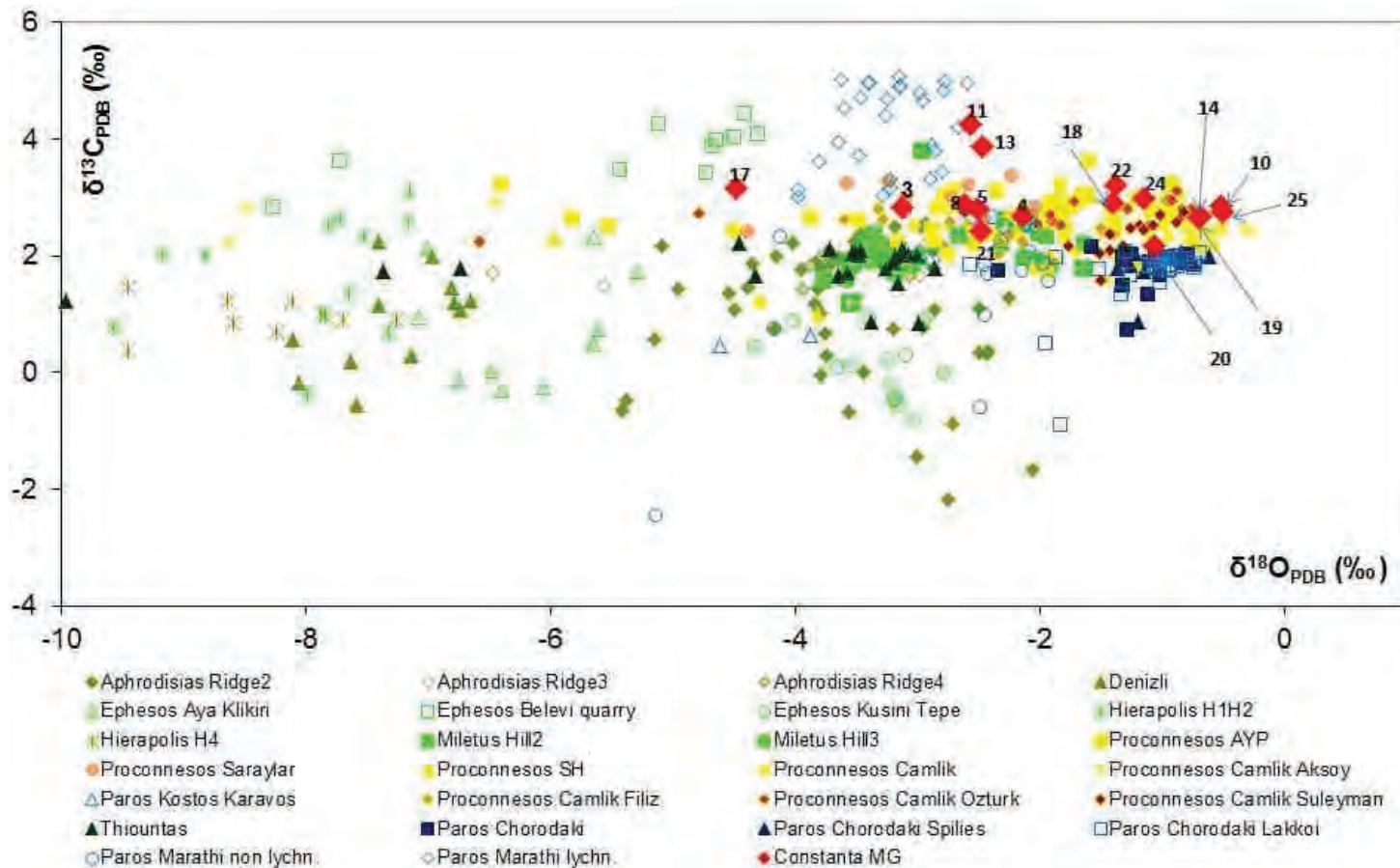


Fig. 7 - $\delta^{13}\text{C}$ versus $\delta^{18}\text{O}$ cross plot diagram of known ancient and modern quarries in the Mediterranean Region, having calcitic marble samples with a maximum grain size between 1.5 and 3 mm and the analysed middle grained samples from MINAC.

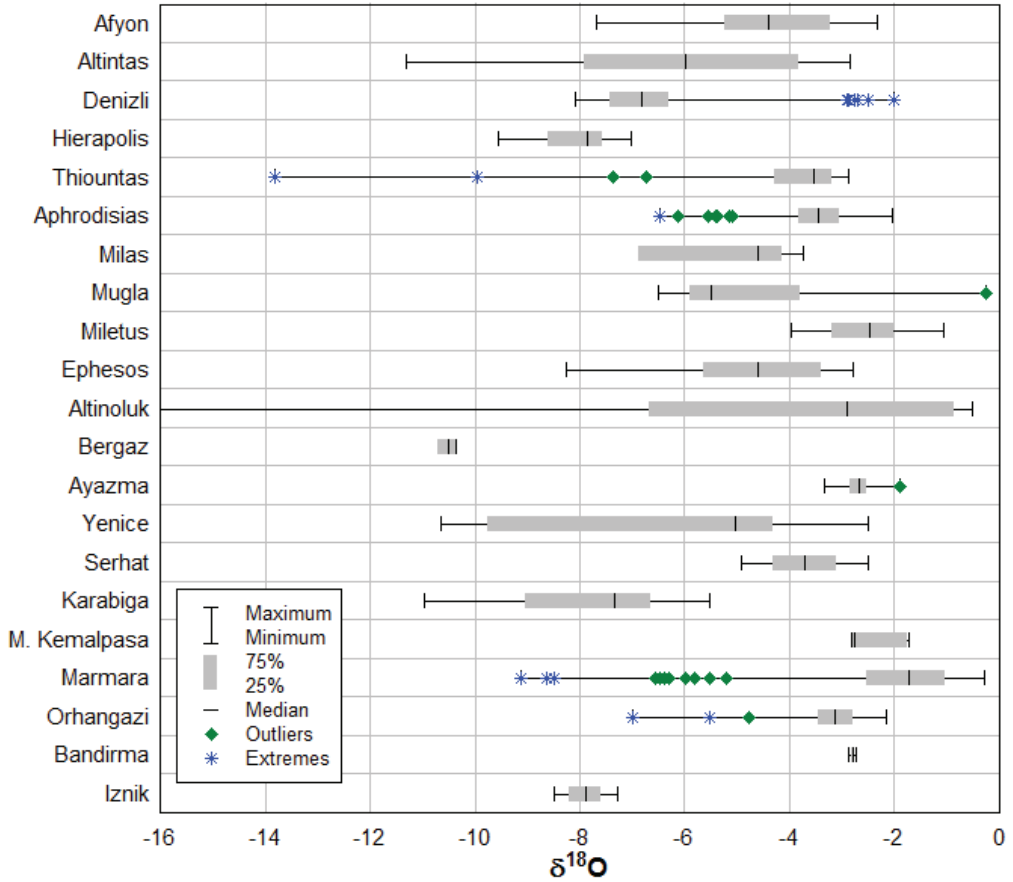


Fig. 8 – Box-whisker plots of distribution of the $\delta^{18}\text{O}$ values (‰, relative to PDB) of the West Anatolian marble quarries.

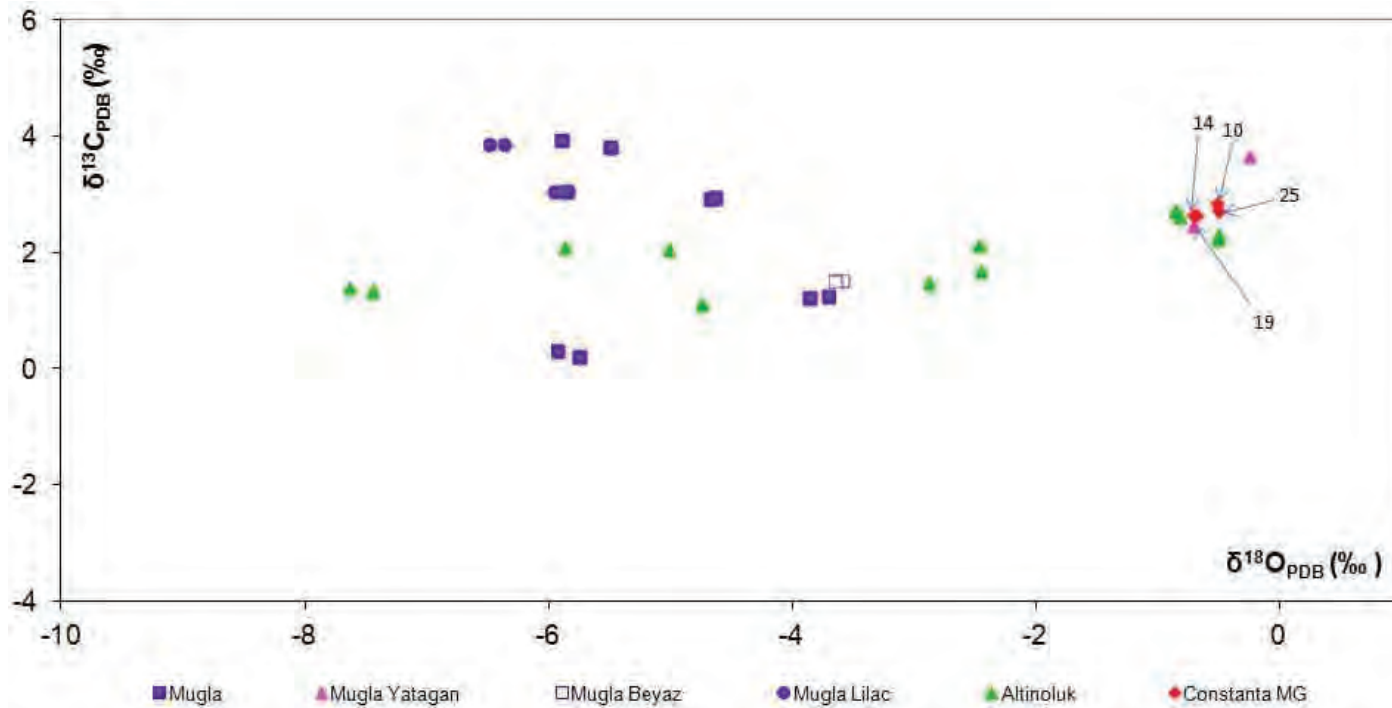


Fig. 9 - $\delta^{13}\text{C}$ versus $\delta^{18}\text{O}$ cross plot diagram of the quarries Altinoluk and Mugla having calcitic marble samples and the analysed samples CT10, CT14, CT19, CT25 from MINAC.

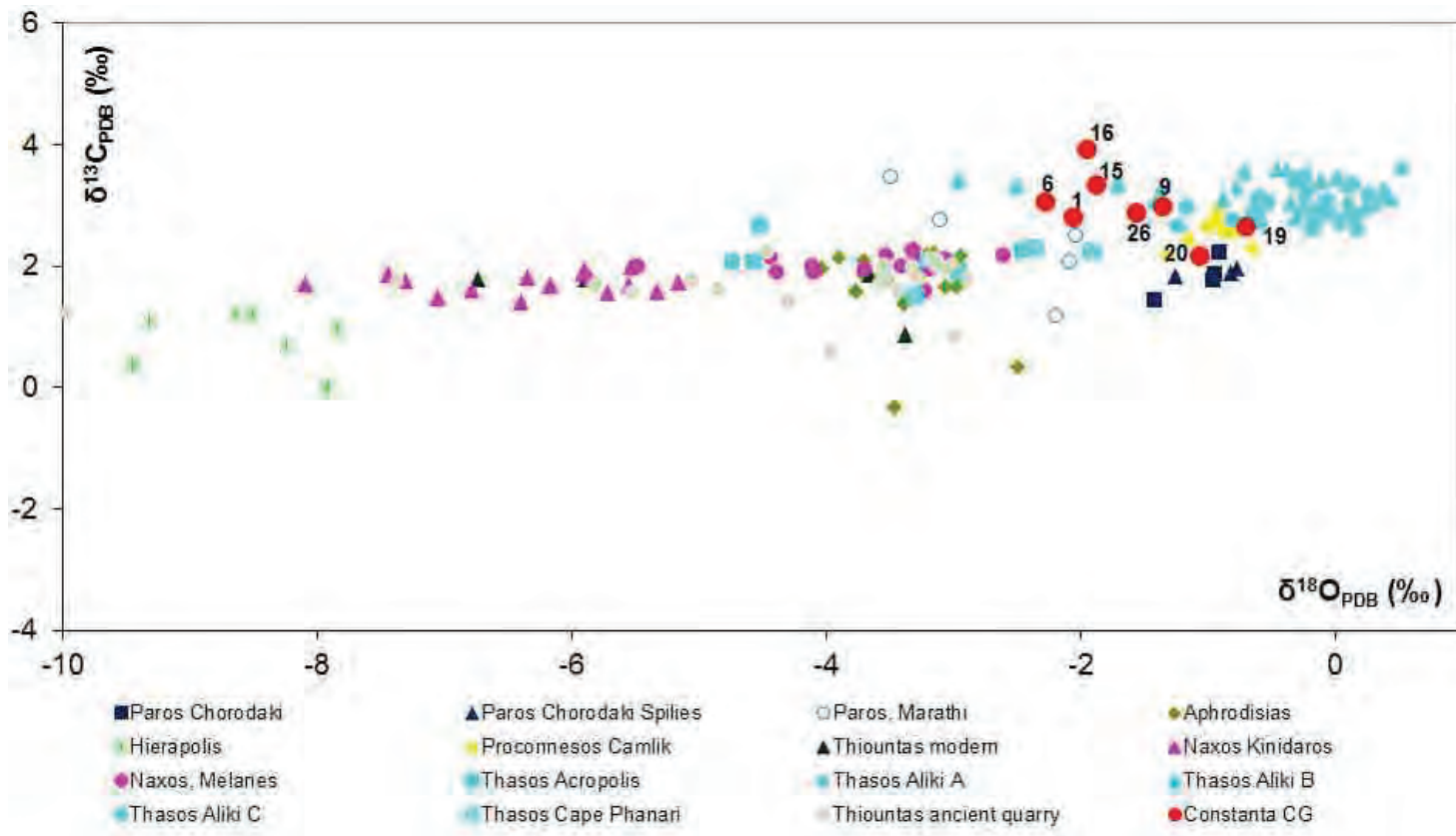


Fig. 10 - $\delta^{13}\text{C}$ versus $\delta^{18}\text{O}$ cross plot diagram of known ancient and modern quarries in the Mediterranean Region, having calcitic marble samples with a maximum grain size of more than 2.7 mm and the analysed samples at MINAC consisting of coarse grained marbles.