McDONALD INSTITUTE MONOGRAPHS

The Marble Finds from Kavos and the Archaeology of Ritual

Edited by Colin Renfrew, Olga Philaniotou, Neil Brodie, Giorgos Gavalas & Michael J. Boyd

The sanctuary on Keros and the origins of Aegean ritual practice VOLUME III

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with contributions from
Myrto Georgakopoulou, Anno Hein, Jill Hilditch, Vassilis Kilikoglou, Daphne Lalayiannis, Yannis Maniatis, Peggy Sotirakopoulou & Dimitris Tambakopoulos

The sanctuary on Keros and the origins of Aegean ritual practice: the excavations of 2006–2008
Volume III

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Cover image: *The Special Deposit South from the southeast (foreground) with Dhaskalio in the background.* Inset: *(front) Head* **351**, *from Trench D2, layer 1; (back) Torso* **25055** *from Trench RA, layer 14.*

Frontispiece image: *Torso, waist, pelvis and upper legs of folded-arm figurine of Spedos variety (***30028** *from Area P on Kavos).*

Edited for the Institute by James Barrett (*Series Editor*) and Anne Chippindale.

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Chapter 4 The Stone Vessels
Data tables
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Abbreviations

cm	centimetre
D.	diameter
g	gram
H.	height
km	kilometre
L.	length
m	metre
mm	millimetre
PPL	plain polarized light
SEM-EDS	Scanning Electron Microscopy with Energy Dispersive Spectroscopy
SEM-BSE	Scanning Electron Microscopy with Back Scattered Electron imaging
SF	special find
T.	thickness
W.	width
Wt	weight
XPL	cross polarized light

Unless otherwise stated, the scale for finds is in centimetres.

Preface

Colin Renfrew & Michael J. Boyd

The status of Kavos on Keros as the earliest maritime sanctuary in the world is documented by the present volume, which includes (in Part A) the full publication of the marble finds from the Special Deposit South at Keros. These constitute the largest assemblage of Early Cycladic sculptures and vessels ever recovered in a controlled excavation, although they were all found in fragmentary condition. They add significantly to the already substantial corpus of finds from well-documented contexts in the Cycladic islands. They open new possibilities for the study of the production and the use of the rich repertoire of Cycladic artefacts of marble and thus to the understanding of ritual practice in Early Cycladic societies. The marble sculptures from the looted Special Deposit North at Kavos that have been recovered in systematic excavations will be discussed in Volume VII.

Also included here (in Part B) are chapters offering our concluding assessment of the roles of the settlement on Dhaskalio and of the two Special Deposits at Kavos. The publication The Settlement at Dhaskalio constitutes Volume I of the present series, while Kavos and the Special Deposits forms Volume II. The Pottery from Dhaskalio and The Pottery from Kavos, Volumes IV and V respectively, both by Peggy Sotirakopoulou, will complete the publication of the 2006 to 2008 excavations of the Cambridge Keros Project.

The existing and projected volumes of the Cambridge Keros Project are as follows:

Volume I: The Settlement at Dhaskalio (2013, edited by C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas & M.J. Boyd).

Volume II: Kavos and the Special Deposits (2015, edited by C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas & M.J. Boyd).

Volume III: The Marble Finds from Kavos and the Archaeology of Ritual (2018, edited by C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas & M.J. Boyd).

Volume IV: The Pottery from Dhaskalio (2016, by P. Sotirakopoulou).

Volume V: The Pottery from Kavos (in preparation, by P. Sotirakopoulou).

Volume VI: The Keros Island Survey (in preparation, edited by C. Renfrew, M. Marthari, A. Dellaporta, M.J. Boyd, N. Brodie, G. Gavalas, J. Hilditch & J. Wright).

Volume VII: Monumentality, Diversity and Fragmentation in Early Cycladic Sculpture: the finds from the Special Deposit North at Kavos on Keros (in preparation, by C. Renfrew, P. Sotirakopoulou & M.J. Boyd).

Here we present first the marble sculptures and vessels recovered from the Special Deposit South, which are fully described and illustrated in the chapters which follow. Their contexts are given in detail in Volume II where each is listed in the detailed tables accompanying chapter 4 of that volume. There the tables are organised by trench and then by layer number, each sculptural or vessel fragment being listed by its special find number, which is unique to the excavation. The other finds from the Special Deposit South are all dealt with in detail in that volume, with the exception of the pottery, whose publication will form Volume V. The weathering of the marble finds is discussed by Maniatis & Tambakopoulos in chapter 11 of Volume II. Various features of the contexts of the finds are analysed by Michael Boyd in chapter 12 of Volume II. The potential joins noted among the sculptures recovered from the Special Deposit South are discussed in appendix 13B of Volume II and those among the marble vessels in appendix 13A (see further Chapter 4 in this volume). The lack of joins observed between finds from the Special Deposit North and the Special Deposit South is noted there. The characterisation of the marble used to produce the sculptures and vessels from the Special Deposit South is discussed in Chapter 5 of the present volume.

The finds, among the various categories, from the settlement at Dhaskalio and from the two Special Deposits at Kavos are then compared and contrasted in Part B. This allows the differing functions of the settlement and of the Special Deposits to be brought into focus, and the intensity of their use during the different phases of activity in the early bronze age to be considered further. An attempt is then made, in Chapter 10, to set the ritual functions of the sanctuary on Keros into the wider context of early ritual practice in the Aegean and beyond.

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The excavation personnel in the 2006 to 2008 excavation seasons were thanked by name in the acknowledgements of Volumes I and II and we are grateful for their participation. We are grateful also for the continuing support of our co-workers on Ano Kouphonisi, where we were based for the excavation seasons of 2006-2008 and the study season of 2009.

The study of the figurines and marble vessels was carried out in the Naxos Museum, as was the sampling for the marble study. We are grateful to the Museum, its director, Irini Legaki, and its staff, especially Daphne Lalayannis, Ilias Probonas and Vasiliki Chamilothori.

The drawings of finds have been contributed by Jenny Doole and Tassos Papadogonas.

Photographs of finds and many of the site photographs are by Michael Boyd, with other site photographs (and some finds) by Thomas Loughlin and by other members of the excavation team. We are grateful to Vicki Herring for undertaking final work on the figures during the production process, and to Anne Chippindale, for her work on the text, and for seeing the volume through the press, and to Jenny Doole for compiling the index.

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Chapter 5

The Provenance of the Marble Artefacts

D. Tambakopoulos & Y. Maniatis

Introduction

One of the most fascinating questions about the multitude of marble figurine and vessel fragments found at Kavos concerns their production centres: where were they made? Is it possible that the marble figurines, numbering over 500 from the Special Deposit South only, and the thousands of marble vessels, were made on Keros itself? Or were they made on another island or islands and brought to Keros in a ceremonial or ritual process which would define the island as a prehistoric ritual centre? The answer to the question of the provenance of the marble and hence the provenance of the figurines and vessels depends on the scientific analysis of the objects in combination with the creation of databases for possible marble sources. This is the purpose of the present study, using a combination of scientific techniques and methodologies.

Previous work to determine the marble provenance of early bronze age figurines and vessels using scientific techniques include: a) a study of 145 objects, 111 of them mainly vessels from the Naxos Museum from previous Keros excavations, using stable isotope analysis (Herz & Doumas 1991); b) study of a small number of figurines and vessels from the Naxos Museum using Electron Paramagnetic Resonance (EPR) spectroscopy (Mandi 1993); c) study of diverse figurines and kandiles from various collections abroad (Getz-Gentle *et al.* 2003); and, more recently, d) analyses of a series of figurines reportedly from the so called 'Keros Hoard' in the collection of the N.P. Goulandris Museum of Cycladic Art in Athens and the J. Paul Getty Museum in Los Angeles, by stable isotopes, by EPR spectroscopy and by Maximum Grain Size (MGS) measurements (Maniatis *et al.* 2005; 2009a). The reference databases used for these works consisted mainly of samples coming from the archaic and later period quarries of Naxos and Paros and a number of samples from marble outcrops on Keros, southeast Naxos, Ios and Paros. The results of these studies, and especially those on the so-called 'Keros Hoard', showed that:

1. Keros itself was a possible marble source for vessels and figurines, but only for a small number of them;
2. Ios was a possible marble source for a small number of vessels;
3. A large number of vessels and a small number of figurines were made of marble from southeast Naxos, where many marble outcrops exist;
4. The marble of the areas where the known archaic and later marble quarries on Naxos (Melanes, Potamia, Apollonas) and Paros (Marathi, Lakkoi) exist was very unlikely to have been used for making figurines, although several Early Cycladic *kandiles* are made of Parian marble;
5. Many of the so-called 'Keros Hoard' figurines were made of marble that was not in the existing databases of the time.

The determination of the provenance of the marble used in the manufacture of Cycladic figurines and vessels is no trivial task. The creation of a reference database was restricted by the limitation that, in prehistoric times, so-called 'quarrying' activity was limited to the occasional removal of small pieces of stone from an outcrop for making figurines or vessels, most probably also taking advantage of the natural flaws and cracks, a practice which is not expected to leave traces that can be found today. Moreover, the marble in the various neighbouring Cycladic islands is geologically similar.

It was therefore clear that, in order to increase the discrimination in the provenance determination of the figurines and vessels excavated during the Cambridge Keros Project, it was crucial to update and extend the reference database. A difficult and quite demanding project was then undertaken to include almost every possible marble outcrop in the Cyclades that might have been used in prehistoric times for making figurines or vessels. A further task was to combine and amalgamate, wherever possible, the older and newer databases produced from the same or different samples and techniques.

Figure 5.1. *Overview of the geological sampling areas in the Cycladic Islands. Dots show sampling locations within a much wider survey area.*

The methodologies followed for surveying the Cycladic Island marbles, extending the databases and determining the provenance of the Keros figurines and vessels are described below.

Geological sampling and surveying methodology

The Cycladic islands are very rich in marble, a circumstance making necessary a considerable number of samples and analyses to give an effective coverage of the full range of marble appearances and qualities. To reduce this work to a more manageable and coherent project, we first examined and identified the physical properties and main qualities of the different kinds of marble used in making the prehistoric artefacts (figurines and vessels), so that in the field we could narrow down the sampling to similar types of marble, excluding types that do not appear at all in the artefacts.

The early examination of a large number of the marble figurines and vessels during the excavations of the Cambridge Keros Project gave us a good overview of the types of marble used, although the heavy weathering (see Volume II, chapter 11) of several objects imposed difficulties in the identification. In addition, the detailed examination and analysis of the prehistoric figurines of the so-called 'Keros Hoard' collection (Maniatis *et al.* 2005; 2009a; Sotirakopoulou 2005), as

well as a number of Neolithic vessels from Limenaria, Thasos (Maniatis *et al.* 2009b), provided an excellent initial source of information about the types of marble used in prehistoric times for making ritual and utilitarian objects. This, combined with the new data from the study of the figurine and vessel fragments from the present Keros excavations, provided a much better ground for defining the qualities of marble to search for.

Since there is no evidence, so far, for systematic quarrying of marble at specific locations in prehistoric times (Mandi 1993; Waelkens *et al.* 1988), it appears that the sculptors must have been using marble pieces that they could find loose or remove, probably with wooden levers, along natural fissures at irregular marble outcrops. These might have been located near their settlements or workshops (if such existed), or at more distant locations. Taking this into account, we started our search for marble near the known prehistoric settlements in the Cyclades and then expanded the search to other outcrops in each island. The geological maps of IGME (the Institute of Geology and Mineral Exploration) for the Cyclades were useful. Very helpful also was information from local marble workers, contractors and the local Archaeological Service personnel (archaeologists and antiquities guards), which in many cases led us to marble sources of the desired quality in places where there was no reference on the maps, and in other cases verified the absence of the marble types we were looking for in the survey areas. Furthermore, we performed a thorough field exploration and survey of almost every possible marble formation on the Cycladic islands, on foot and by car, boat and caique, recording the marble qualities and sampling the sources of marble of similar quality and type to that used for prehistoric artefacts. Reference samples were also taken for the qualities not met in artefacts.

Following this approach, a large number of samples was obtained from the islands of Keros, Naxos, Ios, Syros, Nikouria (an islet near Amorgos), Schinousa and Herakleia, and these, together with previously collected samples from Paros, Naxos and Keros, formed the new and expanded Cycladic Prehistoric Sample Bank and Data Base.

Experimental techniques

The collected geological samples, as well as the samples from artefacts, were submitted to optical examination and further physico-chemical analysis at the Laboratory of Archaeometry, at the then Institute of Materials Science, National Centre for Scientific Research 'Demokritos', using the following well-established techniques for marble provenance (Maniatis 2004):

1. Measurement of Maximum Grain Size (MGS) under a stereoscopic microscope and qualitative examination of the marble crystalline features;
2. Electron Paramagnetic Resonance spectroscopy (EPR);
3. Stable isotope analysis of carbon and oxygen using Isotope Ratio Mass Spectrometry (IRMS).

All the collected geological samples were first examined under the optical microscope and the MGS, as well as the marble crystallization characteristics, were measured and recorded. However, not all the samples were submitted to physico-chemical analysis, since several were loose stones of doubtful origin or of extremely low quality, unsuitable for making objects. About 5 per cent of the samples were rejected and not taken into account.

The samples to be analysed were then cleaned mechanically from any weathered layers, and a small sample of each was ground gently in an agate mortar and sieved to retrieve fractions between 63 and 180 μm for the EPR analysis and below 63 μm for the stable isotope analysis. The EPR parameters Mn^{2+} and Fe^{3+}, expressed in relative units (r.u.), and *Width* expressed in Gauss (G), were measured as described in Polikreti & Maniatis (2002), while the isotopic ratios for carbon ($\delta^{13}C‰$) and oxygen ($\delta^{18}O‰$) compared to the international standard PDB (*Pee Dee Belemnite*), were measured (Herz 1985; 1987; 1988).

The Cycladic marble characteristics: extension of databases

An overview of the sampling locations on the Cycladic islands can be seen in Figure 5.1. As mentioned earlier, the survey and examination of marble outcrops covered a much wider area. The sampling locations were selected out of very many areas whose marble was examined thoroughly and their characteristics recorded. Below is a detailed description of the marble types and characteristics on every island.

Keros and Dhaskalio

Field work

An initial, preliminary, survey on the island was performed in 1990 by Y. Maniatis and V. Mandi, accompanied by Y. Bassiakos, N. Herz, O. Filaniotou and C. Doumas. The marble outcrops on Kavos, Konakia and Kavo Spili and other locations on the northeast and northwest part of the island were surveyed on foot and by boat (Mandi 1993), resulting in a number of samples that formed the first sample bank and database. However, the significance of Keros, which emerged from the great number of marble figurines

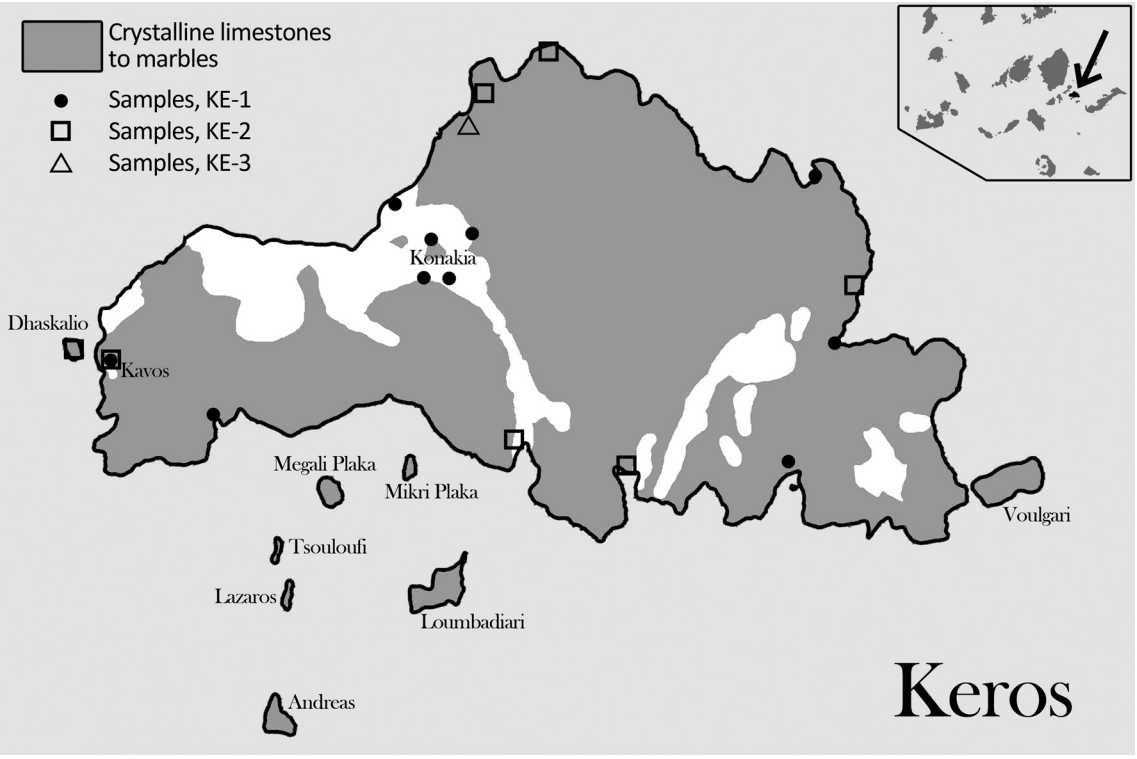

Figure 5.2. *Keros: the shaded areas are crystalline limestones and marbles; the dots, squares and triangles show sampling locations of different qualities of marble.*

and vessels being unearthed during the early phases of the 2006–08 excavations at the Special Deposit South through the Cambridge Kavos-Dhaskalio project, demanded a broader and more thorough investigation. For that reason, two new surveys were undertaken in 2006 and 2007, on the various marble outcrops over and around the island. A total of 26 new samples, from 14 different areas, were collected, which extended the initial database of Keros marble.

The island of Keros has an area of about 15 sq. km and its geological deposits are composed mostly of marble (Fig. 5.2, shaded areas), although the rocky surface and the steep slopes, especially on the south and east part of the island, make these deposits difficult to reach. For that reason, during the 2006 survey, the areas around the coastline were reached by boat and their marble characteristics and features were examined and recorded, while several samples were collected (survey and sampling locations shown as dots, squares and triangles on Fig. 5.2). In the second survey (2007), the whole north part was surveyed again and all the stream valleys up to their higher parts, and especially the Aghios Georgios valley in the northwest part of the island was examined thoroughly and sampled up to its highest level, as it is rich in surface finds, such as prehistoric pottery fragments and obsidian blades and cores, indicating intense prehistoric human activity. During both surveys (2006 and 2007) the marble of the areas near the excavation sites of the Special Deposit North and the Special Deposit South and on Dhaskalio Islet was also systematically examined and sampled.

Marble characteristics

The results of the repeated surveys and examination of Keros showed that its marble can be found in white or dark grey colour varieties, from very fine-grained and almost semi-crystallized to really coarse-grained (MGS >8.0 mm). Its composition is generally calcitic, rarely containing about 10 per cent dolomite.

The fine-grained whitish or greyish variety is very fragmented and displays closely spaced argillaceous veins. The grey variety is more compact and contains white or yellowish fine striations which are parallel and closely spaced (every few mm). The whiter variety is of very low or zero transparency and usually semi-crystallized. This fine-grained and poor-quality marble can be found on several locations on the island, but its veined and brittle character makes it highly unsuitable as a material for producing artefacts.

The coarse-grained marble is white in colour, relatively opaque or of low transparency, exhibits

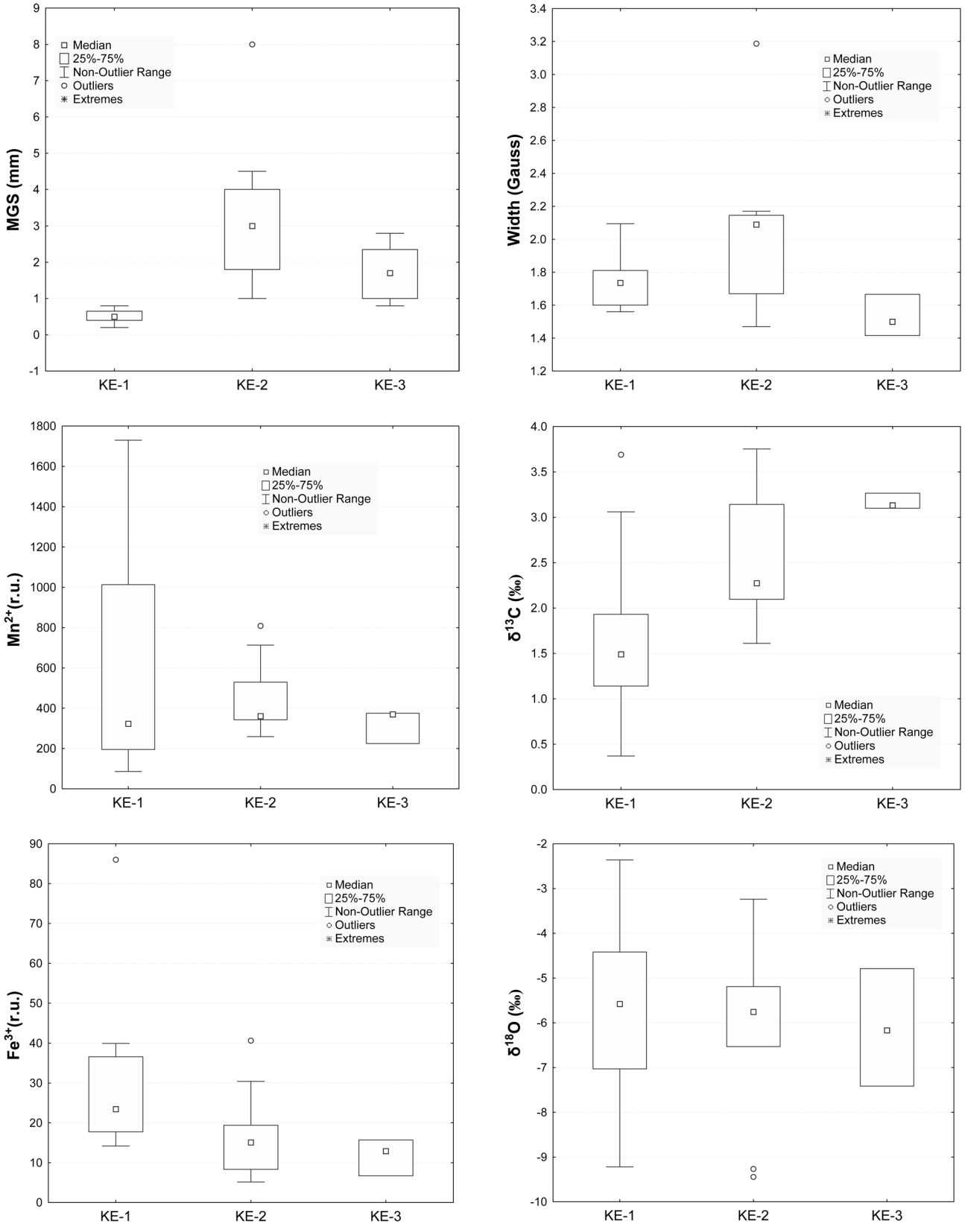

Figure 5.3. *Box plots of the measured parameters for the Keros marble. The parameters are: MGS; intensity of Mn^{2+}; intensity of Fe^{3+}; Width; $\delta^{13}C$‰; $\delta^{18}O$‰.*

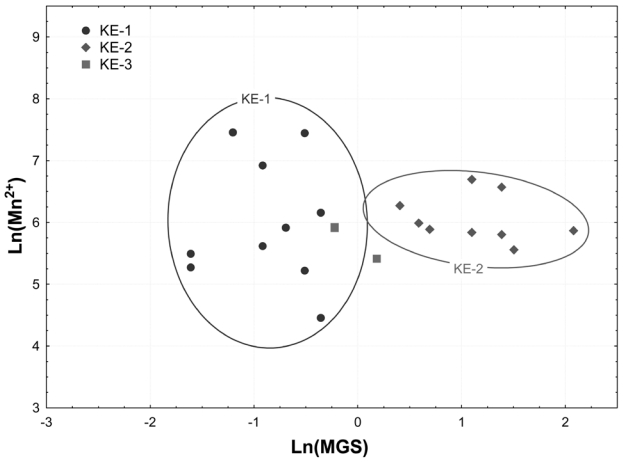

Figure 5.4. *Bivariate diagram of Ln(Mn^{2+})* versus *Ln(MGS) for the 3 groups of Keros marbles: KE-1, KE-2 and KE-3.*

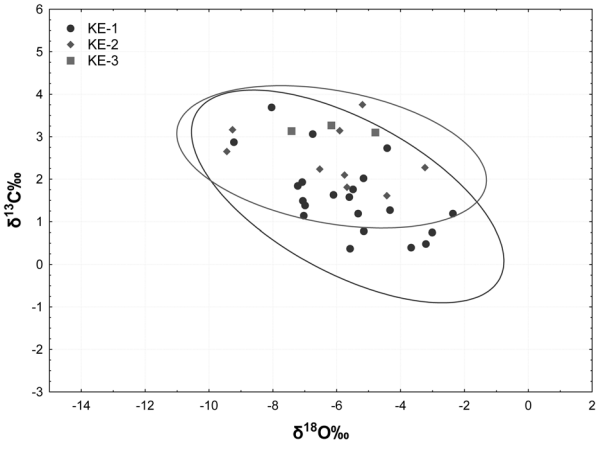

Figure 5.5. *Bivariate diagram of stable isotope signatures, $\delta^{13}C$‰* versus *$\delta^{18}O$‰, for the 3 groups of Keros marbles: KE-1, KE-2 and KE-3.*

homoblastic structure and usually has dense, bunched, yellow or red veins. It can be found in large massifs forming the natural bedrock of Kavos and of the islet of Dhaskalio, but can also be found on the sharp cliffs at the east and on the north side of the island. The use of this marble would require hard metal tools (iron) to cut it from the solid bedrock, which were not available during the early bronze age. For this reason also, marble slabs from the opposite cost of southeast Naxos, easily obtained by simple leverage and hitting, were brought for building the walls of housing structures at Dhaskalio. The macroscopic characteristics of this coarse-grained bedrock marble on Kavos and Dhaskalio distinguish it from any other Cycladic or Aegean marble variety.

A good-quality pure white and relatively translucent marble, with grain sizes between 1 and 3 mm, was found on the north-central coastline of Keros, but only as small pieces of maximum volume of 1 dm^3 (0.001 m^3), embedded inside sandstone-conglomerates. These inclusions are very small, hard to remove and hence completely unsuitable for any artefact production. Also, some small tectonic windows of higher-grade, good-quality marble were found by the late John Dixon. These samples, with the geological description of the location, were kindly provided to us by John Dixon, who was surveying the island for limestone and schist deposits. Two samples were taken from these really small outcrops, one being a well-crystallized white marble and the other a pinkish marble of lower quality, but still much better than the marble on the rest of the island.

No evidence of quarrying or working of marble was found anywhere on the island.

Analysis results

The results of MGS measurement and of the spectroscopic analysis by EPR and IRMS are presented in the box plots of Figure 5.3. The above data are divided into three groups, which were selected in a way to maximize the discrimination of the different marble qualities. The first, KE-1, contains all the fine-grained (MGS <1.0 mm) marble, white, whitish or grey; the second, KE-2, contains the coarse-grained (MGS >1.0 mm) marble, and the third, KE-3, contains various samples from conglomerates, which will not be included in the further statistical treatment of the overall results, as it was clear from the field examination that these small deposits could not have been used for making artefacts.

As can be seen from Figure 5.3, all the parameters except MGS, which was chosen to be different, show a greater or lesser degree of overlap between the various types of marble. However, as mentioned above, the coarse-grained types (KE-2) are quite characteristic macroscopically, and can easily be discriminated from the fine-grained (KE-1) or the KE-3 group. We also examined the discrimination between the various types of Keros marbles, using two parameters each time, in the bivariate plots of Figures 5.4 and 5.5. The first plot uses the natural logarithm of the intensity of Mn^{2+}, Ln(Mn^{2+}), *versus* the natural logarithm of MGS, Ln(MGS), and the second plot the stable isotope signatures, $\delta^{13}C$ *versus* $\delta^{18}O$. These two plots present a treatment of the databases typically used for provenance determination (Maniatis *et al.* 2010; Polikreti & Maniatis 2002). Only the MGS, as expected, offers discrimination between the different types of Keros marble. The Mn^{+2} and especially the stable isotopes are very similar.

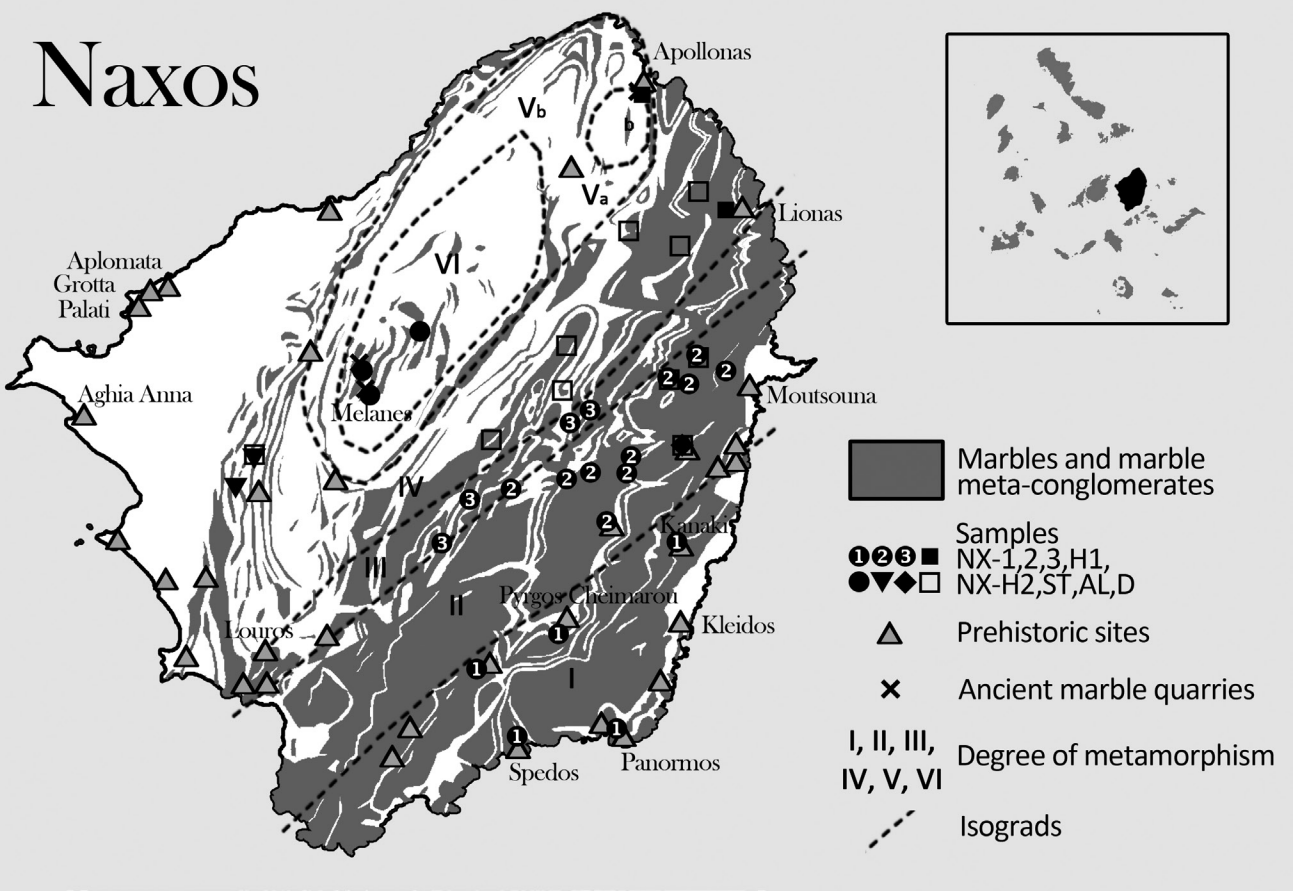

Figure 5.6. *Map of Naxos showing marble zones, sampled areas (dots), prehistoric sites (triangles), and ancient marble quarries (crosses).*

Naxos

Field work

Naxos is the biggest island of the Cyclades, with an area of 429 sq. km, and has a remarkably rich geological profile, containing amongst other features extended marble deposits, granite, mica schist, gneiss and emery. Equally remarkable is the wealth of prehistoric cultures found on Naxos, as witnessed by the number and importance of prehistoric settlements discovered on this island (Fig. 5.6) and the fragments of prehistoric pottery, obsidian (cores and blades) and other remains scattered all over the island. The abundance of marble in combination with the frequency of prehistoric settlements made the more detailed survey and sampling of this island necessary. But at the same time the task of covering all the possible sources of marble proved quite challenging. During repeated surveys, 120 new samples were collected from 38 different locations and added to the samples previously collected and analysed from the areas of the known archaic and classical quarries of Melanes and Apollonas and from marble outcrops in the areas of southeast Naxos and Apeiranthos.

Marble characteristics

There are six metamorphic zones in Naxos, symbolized from lower to higher grade as: I, II, III, IV, V, VI (Jansen & Schuiling 1976; Fig. 5.6). The lowest metamorphic grade marble (grade I) exists on the southeast and progressively passes to higher grades towards the northeast. The highest grade (VI) can be found on Mount Kinidaros (Fig. 5.6). Consequently a large variety of marble types and qualities is present on the island, observable from south to north and mainly on its eastern half. Most of the marbles are pure calcitic, or with a small percentage of dolomite, but there are also occurrences of pure dolomitic marble in most of the metamorphic zones. Also, calcitic marbles containing varying amounts of dolomite can be found in several locations and especially in the central-east. One of the most frequent varieties of marble, appearing from south to north, is a stratified or laminated and fragmented bluish or greyish marble, containing white

Figure 5.7. *A large marble deposit located on the east hill above the Spedos bay in southeast Naxos, where slabs of marble can be easily removed. Some evidence of slab removal is present but of unknown period.*

Figure 5.8. *Marble deposit of grey colour south of Volakas 'port' in southeast Naxos, where slabs from different levels have probably been removed in earlier times.*

or lighter grey veins, alternating with schist deposits. This type of marble was recorded and a couple of samples were collected for reference, as it is almost unsuitable even for building stone walls.

On southeast Naxos, in the areas of metamorphic grade I, very fine-grained whitish or greyish marble can be found, with MGS from below 0.1 mm and up to 0.8 mm, which usually exhibits thin, blue or beige veins and low transparency. It can be found in small veins or in larger quantities, for example in the Spedos area not far from the prehistoric settlement (Fig. 5.7), where it is stratified and fissured producing large slabs (2×2×0.2 m). Evidence of some quarrying activity in the form of removal of slabs was found at this location; however, it is not easy to say when this activity could have taken place. A similar situation was found south of the bay of Volakas, between the prehistoric sites Kleidos and Panormos (Fig. 5.6), which is used nowadays as a small port for the boats that transfer people from Naxos to Kouphonisi. The marble on that bay is fine-grained and dark blue to grey in colour, or banded with white and grey bands. Stratified and fragmented in slabs, it can easily be removed and used for several applications, but mainly as building material. A few tens of metres south of the 'port' and by the beach, a dark grey marble profile shows evidence of past quarrying in the form of slabs removed in earlier times (Fig. 5.8). There is a high probability that this area was quarried in prehistoric times for building material for the structures of Dhaskalio (Fig. 5.9). There is also evidence of recent quarrying activity a small distance north of the Volakas 'port' to obtain banded white and grey slabs for building. Further inland in southeast Naxos and near Pyrgos tou Cheimarou, we found a small vein of a fine-grained white marble, very well crystallized and exhibiting very high transparency. The quality of this marble resembles that of the Dhaskalio sub-variety of the figurines of Apeiranthos variety found on Dhaskalio during the excavations of the Cambridge Keros Project. Marble of similar quality was observed in some of the most famous figurines from Keros in the National Archaeological Museum in Athens, for example the 'Harpist', examined visually by the authors (Tambakopoulos & Maniatis 2017). No other deposits of this type of marble were located, anywhere else in the Cyclades.

Moving up to central and north Naxos, calcitic marbles of a higher degree of metamorphosis (II, III and IV) and with larger grain sizes appear. However, there are several formations of dolomitic marble north of Moutsouna bay and along the road from Moutsouna to Apeiranthos (Fig. 5.6) of very fine-grained (MGS <0.5 mm) white or greyish semi-crystallized marble which is pure dolomitic. Other dolomitic formations are located in northeast Naxos near the village of Lionas, where the marble is well crystallized (MGS ~1.0 mm), white and translucent, and near the village of Apeiranthos, along the road from Apeiranthos to Koronos, where the marble is again white with MGS around 1.0 mm, but inferior in quality. Grey-blue, coarser-grained (~2.0 mm) dolomitic marble was found also near the prehistoric acropolis of Aïla (Fig. 5.6).

In central-east Naxos and in the area between Moutsouna, Apeiranthos and Kasteli and among dolomitic and grey-blue fragmented marble, we found deposits of white, calcitic and well-crystallized marble, with average MGS around 1.0 mm (from 0.8 mm up to 2.0 mm) and medium to high transparency (Fig. 5.10), often exhibiting thin yellow or orange veins, separated by a few centimetres. Marble with similar characteristics was observed in a large number of Cycladic figurines found on Keros. Until this survey such marble was expected (due to grades of metamorphosis and MGS) to be present on Naxos, but north of Moutsouna (Maniatis *et al.* 2009a).

On the two higher metamorphic zones (V and VI) lie the ancient (archaic and later periods) quarries of Apollonas (V) and Melanes (VI) and the modern quarries on Kinidaros Mountain. The marble of those quarries is already well sampled and studied (Attanasio *et al.* 2006; Mandi 1993; Polikreti 1999). It is white or light greyish or white on a light grey background. Its MGS begins from ~1.5 mm and goes up to 5.0 to 6.0 mm. In the modern Mount Kinidaros quarries grain sizes up to more than 10.0 mm have been detected.

The known ancient quarries at Apollonas and Melanes-Potamia are well documented as ancient quarries bearing traces of ancient tool marks and abandoned incomplete Archaic sculpture. Nowhere else on the island, neither near the prehistoric settlements nor further away from them, did we find clear evidence of ancient marble quarrying or working. However, evidence of slab removal in early times for building material was found at Spedos and Volakas, although the period of this activity could not be determined.

Analysis results

The geological samples from Naxos were divided into five different groups according to the geographic location and degree of metamorphosis. The spread of the values in the form of box-plot diagrams for each measured parameter is shown in Figure 5.11. The first group, NX-1, contains the samples from metamorphic zone I of southeast Naxos; the second and third, NX-2 and NX-3, the samples from metamorphic zones II

Figure 5.9. *House-wall built of grey and dark-blue marble on Dhaskalio.*

Figure 5.10. *Veins of good quality calcitic marble in central-east Naxos close to Moutsouna Bay.*

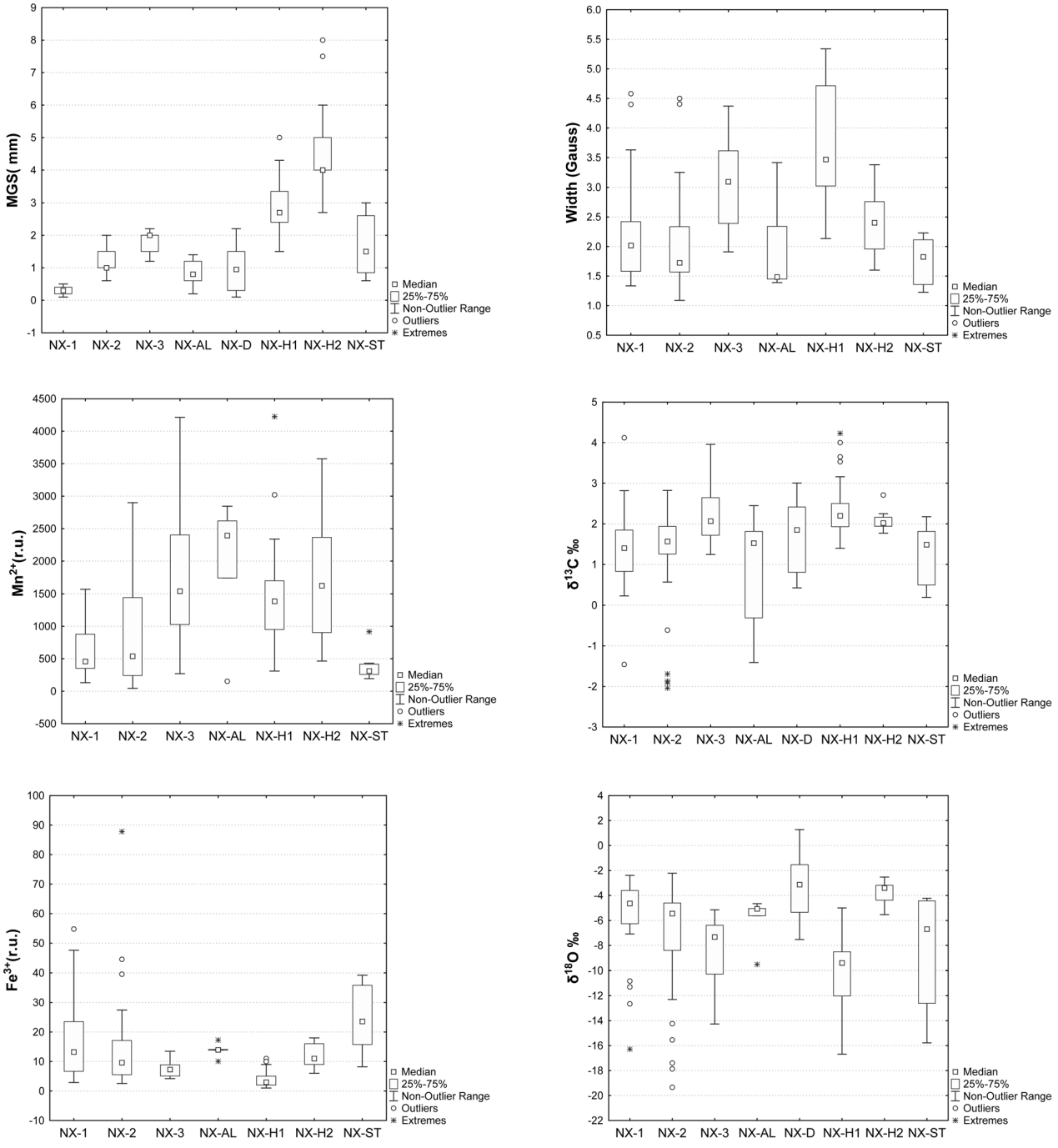

Figure 5.11. *Naxos box plots of the measured parameters (MGS; intensity of Mn^{2+} and Fe^{3+}; Width; $\delta^{13}C‰$; $\delta^{18}O‰$) for the various marble groups. NX-1=metamorphic zone I; NX-2=metamorphic zone II; NX-3=metamorphic zone III; NX-H1=metamorphic zones IV–V; NX-H2=metamorphic zone VI; NX-AL=marble from Aïla; NX-ST=marble from modern quarries at Stavropigi (in southwest Naxos); NX-D=dolomitic marble from various places.*

and III of central-east Naxos; the fourth, NX-H1, the samples from zones IV and V; and the fifth, NX-H2, the samples from zone VI on central and north Naxos (Fig. 5.6). The NA-D group contains all the dolomitic samples from various places around the island and here only the MGS and isotopic data are presented, since the EPR spectrum of dolomitic marbles is not comparable to that of calcitic marble. The samples

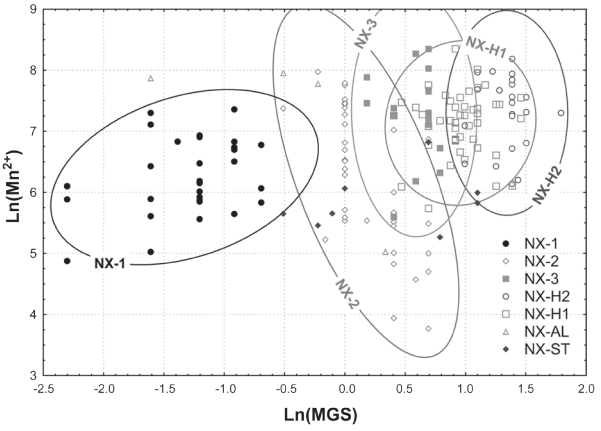

Figure 5.12. *Bivariate plot of Ln(Mn^{2+})* versus *Ln(MGS) for Naxos. The marble groups are: metamorphic zone I (NX-1); metamorphic zone II (NX-2); metamorphic zone III (NX-3); metamorphic zones IV–V (NX-H1); metamorphic zone VI (NX-H2); marble from Aïla (NX-AL); and marble from modern quarries at Stavropigi (NX-ST).*

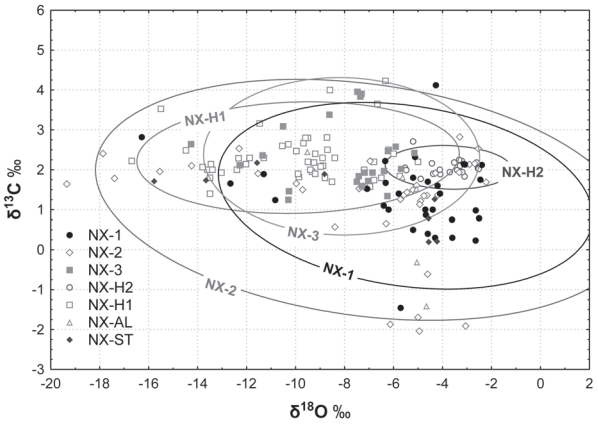

Figure 5.13. *Bivariate plot of stable isotope ($\delta^{13}C$‰* versus *$\delta^{18}O$‰) signatures for Naxos. The marble groups are: metamorphic zone I (NX-1); metamorphic zone II (NX-2); metamorphic zone III (NX-3); metamorphic zones IV–V (NX-H1); metamorphic zone VI (NX-H2); marble from Aïla (NX-AL); and marble from modern quarries at Stavropigi (NX-ST).*

from two modern quarries at Stavropigi, close to the Aphendika site in the west (Fig. 5.6), are presented as group NX-ST. These quarries also produce dolomitic marble which is included in the dolomitic marble group (NX-D). Furthermore, the calcitic marble of Stavropigi is very fragmented and of very low quality. The NX-AL group which contains samples from Aïla is similar. Again, the dolomitic samples are included on NX-D group, but the calcitic samples were collected from loose rocks along the road to the Byzantine church of Aïla at the top of the mountain and their origin is not securely known. The last two groups are omitted from any further statistical treatment for provenance investigation.

On the Ln(Mn^{2+}) *versus* Ln(MGS) bivariate plot diagram (Fig. 5.12), it can be seen that the various marble outcrops of Naxos are discriminated to a greater or lesser degree mainly based on the MGS which gradually increases according to the degree of metamorphosis. The level of discrimination with the carbon and oxygen isotopes (Fig. 5.13) of this grouping is less effective, but still useful to a certain extent. The discrimination between all the calcitic and all dolomitic marbles of Naxos using stable isotopes exhibits an overlap in the range –2 to –8‰ in $\delta^{18}O$ and 0 to 2.5‰ in $\delta^{13}C$ (Fig. 5.14). This diagram is quite useful for observing the overall distribution of the isotopic signatures of the Naxian marbles. Note the very characteristic bimodal distribution of the isotopic values of the calcitic marbles: one mode shows an extended horizontal spread along the $\delta^{18}O$ axis with not much variation in $\delta^{13}C$, characteristic of the NX-2 and NX-H1 marble groups, and the other mode exhibits a vertical spread along the $\delta^{13}C$ axis in a relatively narrow range of $\delta^{18}O$ values (–2 to –8‰), characteristic of the NX-2 and NX-1 marble groups (Figs 5.14, 5.13).

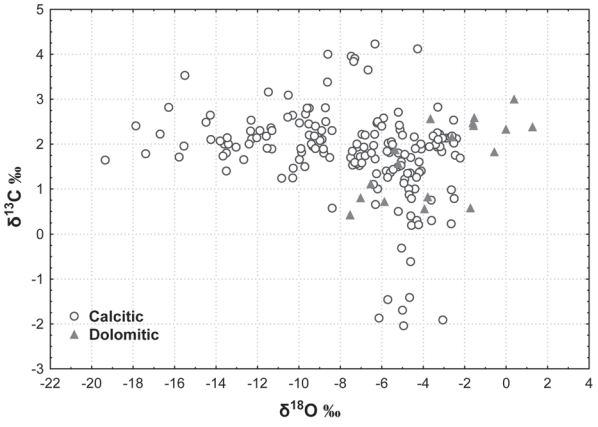

Figure 5.14. *Bivariate plot of stable isotope ($\delta^{13}C$‰* versus *$\delta^{18}O$‰) signatures for all the calcitic and all dolomitic marbles of Naxos.*

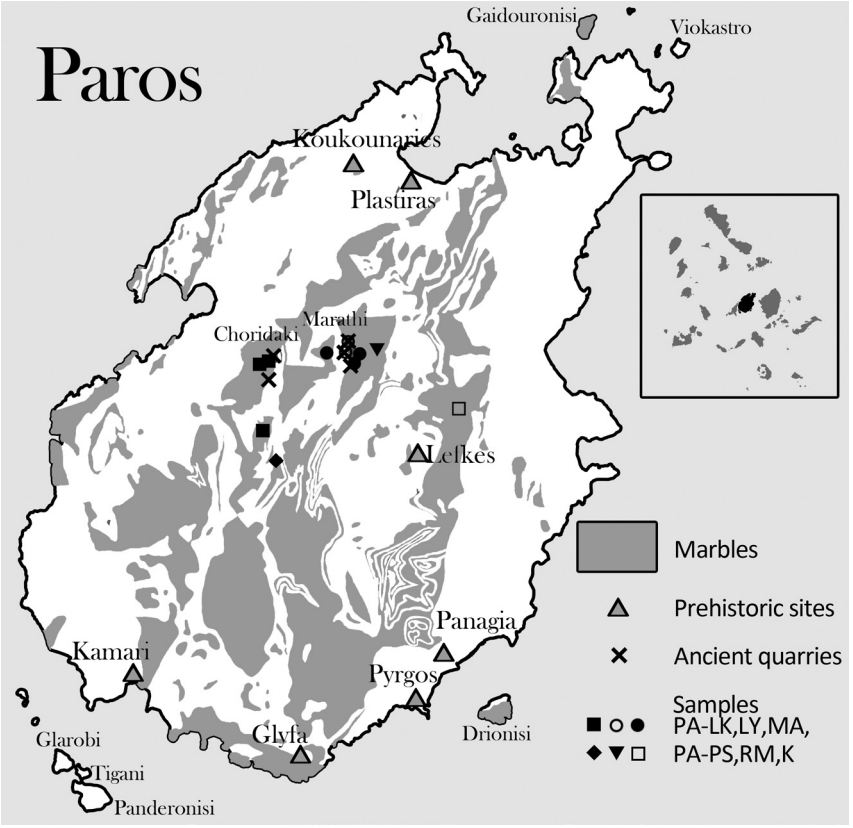

Figure 5.15. *Map of Paros with marble zones and sampling areas (dots).*

Paros

Field work

The samples forming the Paros database were collected on previous surveys during the 1990s and come from various places around the island (Fig. 5.15). The main sources are the areas where the ancient quarries lie, at the Marathi Valley and in the Lakkoi Valley (near Choridaki), while several other samples were collected from the quarry of unknown age at Karavos and the modern quarry of Psara-Gremna, high up the mountain of Aghioi Pandes (Maniatis & Polikreti 2000). The marble varieties in these areas are representative of all the qualities of Parian marble, so no further sampling was required. The stable isotope IRMS database contains measurements published in the literature (Attanasio e*t al.* 2006; Herz 1988), as well as our own measurements.

Marble characteristics

Paros is presented in three main groups, the PA-LY (Lychnites), PA-MA (Marathi) and PA-LK (Lakkoi), and in three minor, the PA-K (Karavos), PA-PS (Psara-Gremna) and PA-RG (Rigas). In particular, the PA-LY group contains samples from the Classical and Hellenistic underground Quarry of the Nymphs, located in the Marathi Valley, famous for the extraction of the high quality 'Lychnites' marble (Attanasio *et al.* 2006; Herz 1988; Maniatis & Polikreti 2000) used for important ancient sculptures, such as the Nike of Samothrace (Maniatis *et al.* 2012), the Prima Porta statue of Augustus (Pollini *et al.* 1998) and many others. This marble, although quarried underground in Classical and later times, may also have been at the surface in earlier times. The PA-MA group contains samples from the rest of the Marathi Valley, except the Quarry of the Nymphs, and in particular the more recently discovered underground Quarry of Pan, and from other open quarries and outcrops in the same valley. The PA-LK group contains samples coming from the quarries in Lakkoi Valley, defined as the area starting from the public road and going all the way up to the Thapsana Monastery (Attanasio e*t al.* 2006; Maniatis & Polikreti 2000). The marble from Marathi and Lakkoi is quite similar in quality, white, highly translucent and very well crystallized. However, it should also be noted that, beside the white marble, grey or light grey marble can be found in all the quarries of the Marathi valley. The finer-grained white marble can be found in the galleries of the Quarry of the Nymphs, having a MGS from 0.8 mm to 1.8 mm, but coarser marble with MGS up to 2.5 mm can also be found there, along with some inferior quality white or grey-blue marble. Marble with grain sizes from 1 mm up to 4 mm can be

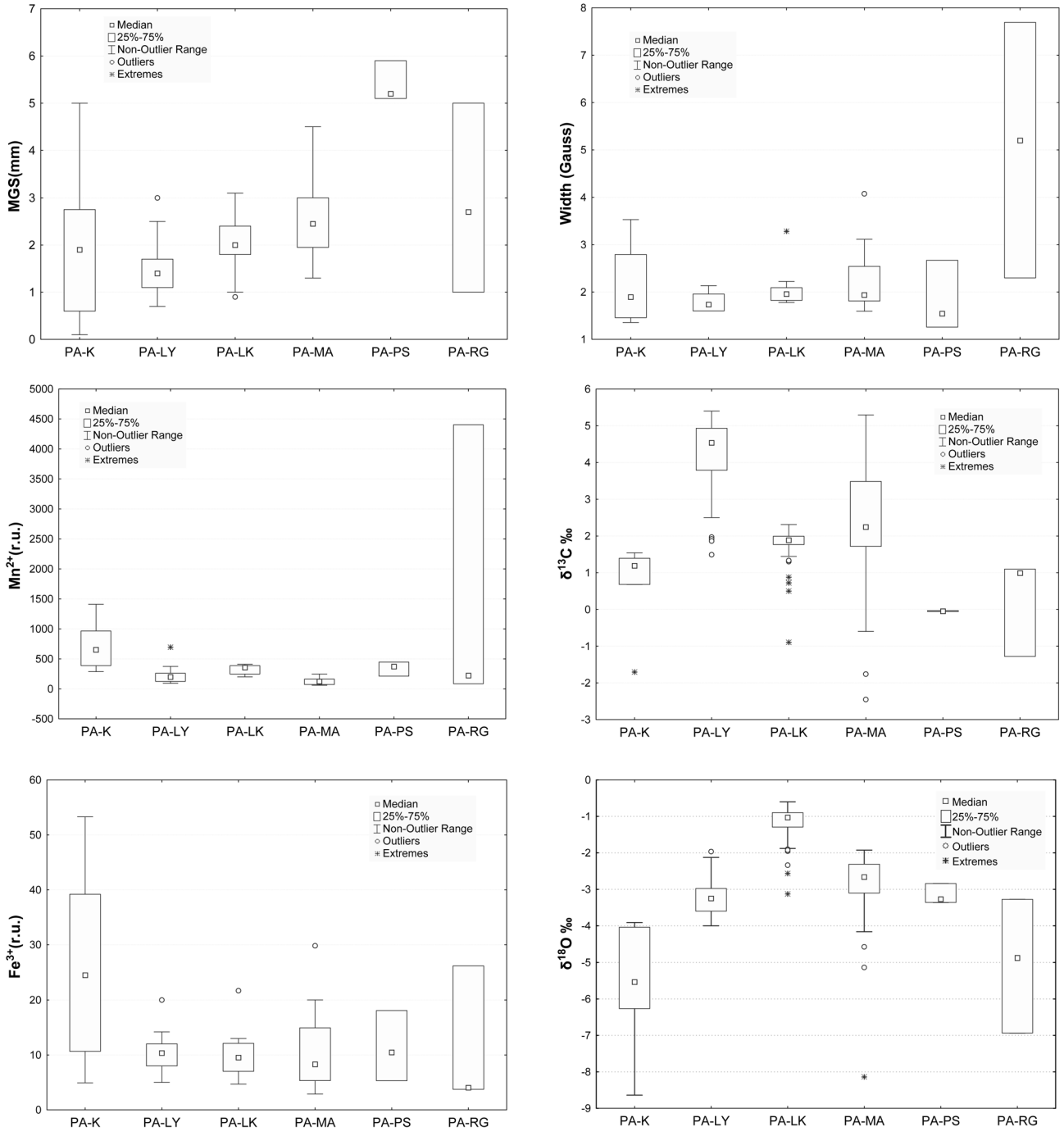

Figure 5.16. *Box plots of the measured parameters (MGS; intensity of Mn^{2+} and Fe^{3+}; Width; $\delta^{13}C‰$; $\delta^{18}O‰$) for the Paros marbles. PA-K=Paros-Karavos; PA-LY=Paros-Lychnites; PA-LK=Paros-Lakkoi; PA-MA=Paros-Marathi; PA-PS=Paros-Psara Gremna; PA-RG=Paros-Rigas.*

found in the other quarries of the Marathi and Lakkoi valleys, on the whole of very good quality.

The Karavos quarry (PA-K group), which has traces of ancient tool marks, produced white or whitish marble, but it is very heteroblastic, exhibiting grain sizes from 0.2 mm to 5 mm. Another quarry sampled is that of the Rigas Company at Marathi (PA-RG). This quarry produces a unique and characteristic type of white marble with thick, parallel, black striations and MGS from 1 mm to 5 mm. The marble from the Psara-

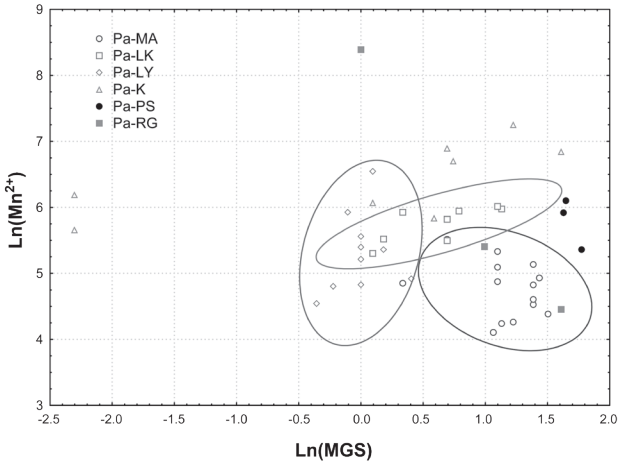

Figure 5.17. *Bivariate plot of Ln(Mn^{2+})* versus *Ln(MGS) for the Paros marble groups. PA-K=Paros-Karavos; PA-LY=Paros-Lychnites; PA-LK=Paros-Lakkoi; PA-MA=Paros-Marathi; PA-PS=Paros-Psara Gremna; PA-RG=Paros-Rigas.*

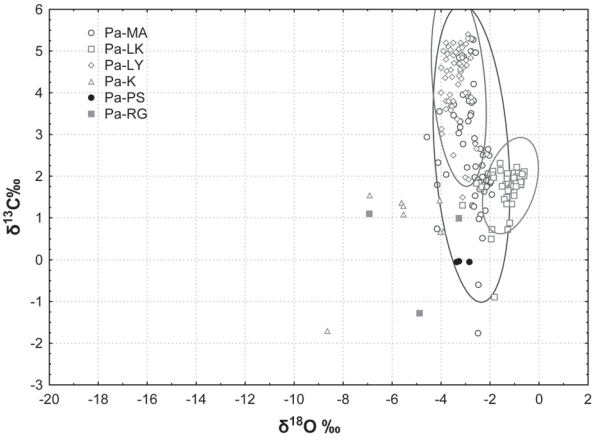

Figure 5.18. *Bivariate plot of stable isotope signatures $\delta^{13}C‰$* versus *$\delta^{18}O‰$ for the Paros marble groups. PA-K=Paros-Karavos; PA-LY=Paros-Lychnites; PA-LK=Paros-Lakkoi; PA-MA=Paros-Marathi; PA-PS=Paros-Psara Gremna; PA-RG=Paros-Rigas.*

Gremna (PA-PS) modern quarry is the coarsest marble found on Paros, with MGS above 5 mm. It is white or whitish in colour and with schistolithic veins. No prehistoric artefacts have been found with the qualities seen in the modern quarries, so these will be omitted from the provenance investigation of the artefacts.

Analysis results

The results of the analysis of the Paros geological samples are presented in the box plots of Figure 5.16. As can be seen, the $\delta^{18}O‰$ parameter offers a fairly good discrimination between the samples from the Marathi Valley as a whole (PA-L and PA-M) and the samples from the Lakkoi Valley (PA-LK) as a whole, while the other parameters overlap. The good quality 'Lychnitic' type of marble coming from the underground Quarry of the Nymphs and possibly of the Quarry of Pan with MGS 1.0–2.0 mm, of white colour with a yellow tint and extreme transparency, tends to have $\delta^{13}C‰$ values higher than 3‰ and to some extent can be discriminated from the other types of marble (Fig. 5.16).

The standard bivariate plots of Ln(Mn^{2+}) *versus* Ln(MGS) show a relatively good discrimination between Paros-Marathi and Paros-Lychnites and relatively good discrimination with Paros-Lakkoi and Paros-Karavos (Fig. 5.17). Similarly, the stable isotope bivariate plot (Fig. 5.18) shows a good discrimination between Paros-Lakkoi and Paros-Lychnites. The marble from Lakkoi shows a weaker discrimination from Marathi. The marble of Karavos separates from the rest.

Amorgos and Nikouria

The marble of the main island of Amorgos, wherever it outcrops, is fine grained, uniformly grey to dark grey, with some whitish inclusions. We did not sample the main Amorgos marble in this survey, as it is obvious that, apart from one figurine and perhaps a couple of vases in the Amorgos Archaeological Museum, no other prehistoric artefact was made of this kind of marble. Sampling was therefore restricted to Nikouria.

Field work

Nikouria is a small island northwest of Amorgos and opposite the bay of Aghios Pavlos. It is uninhabited today. Surface pottery indicates that some human activity took place there in the past, especially on the coast opposite Aghios Pavlos. Initially, we examined and sampled the marble all over the eastern part of

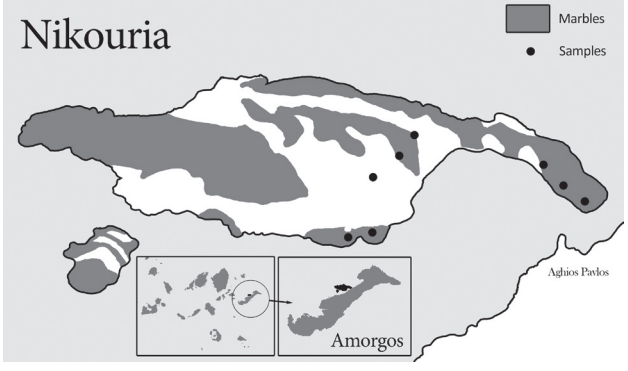

Figure 5.19. *The island of Nikouria, showing marble distribution and sampling points.*

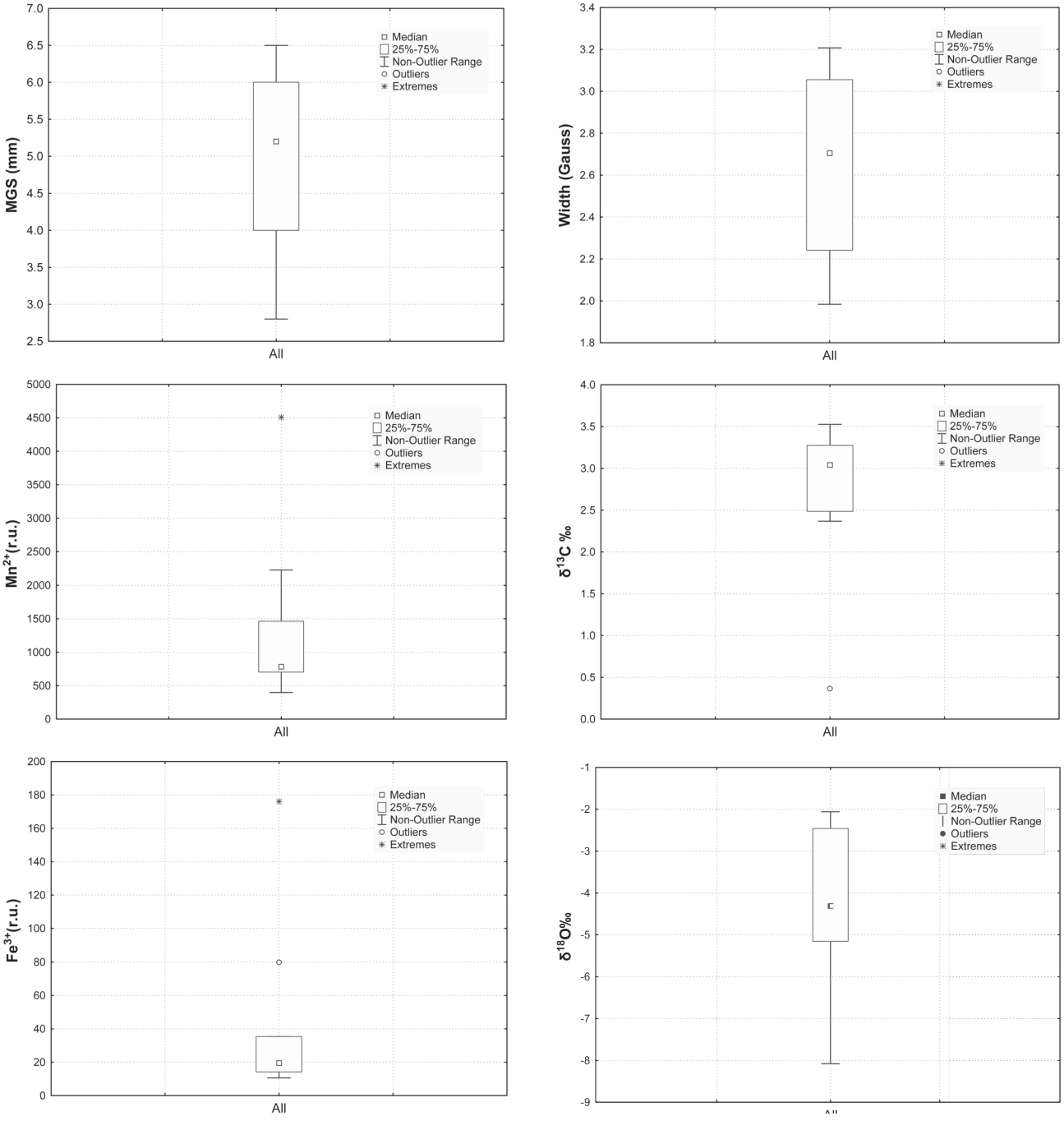

Figure 5.20. *Box plots of the measured parameters (MGS; intensity of Mn^{2+} and Fe^{3+}; Width; $\delta^{13}C‰$; $\delta^{18}O‰$) for the Nikouria marbles.*

the island (Fig. 5.19), where obvious white marble outcrops are present. The rest of the island has sharp, high rock faces and is difficult to reach. However, we examined the marble exposures at sea level all around the southwest coast from a fishing boat. These exposures are part of the marble massif that descends from the mountain down to the sea. The nature of this marble is of the same grain size and quality as that at the east side which we sampled. Thus, we consider the samples collected from the locations shown on the map (Fig. 5.19) to be representative of the Nikouria marble.

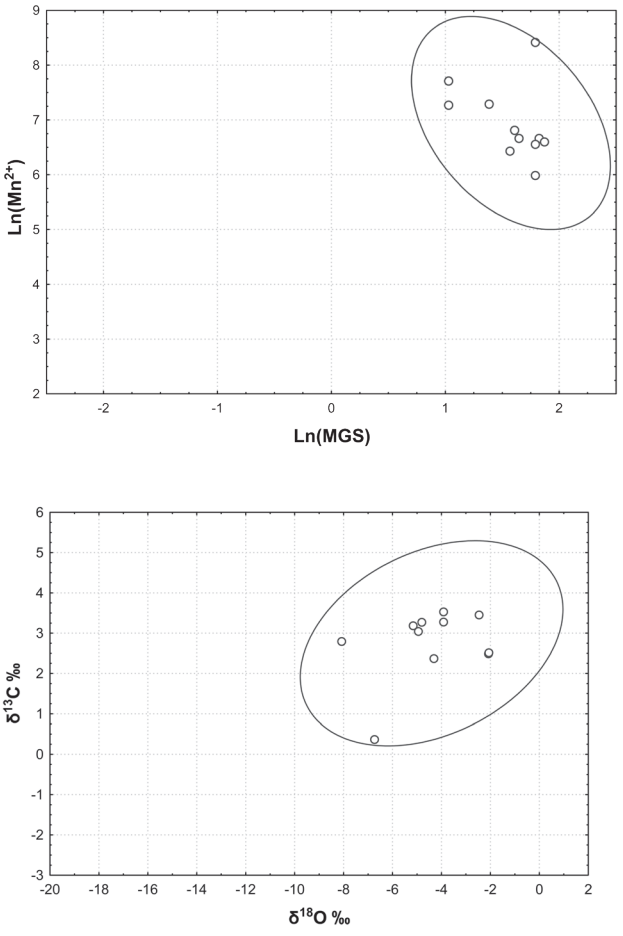

Figure 5.21. *Bivariate plots of Ln(Mn^{2+})* versus *Ln(MGS) and stable isotopes $\delta^{13}C$‰* versus *$\delta^{18}O$‰ for the Nikouria marbles.*

Marble characteristics

Unlike the marble of Amorgos, that of Nikouria is white or whitish, with thin yellow veins. It is generally coarse grained and of rather poor quality. The coarsest variety is found on the East Cape, with MGS 4.8–6.5 mm, while a slightly less coarse variety of the same quality can be found in the middle of the island where the MGS ranges from 2.8 to 6.0 mm.

No evidence of ancient marble quarrying or marble working was found.

Analysis results

The results of analysis of the Nikouria samples are presented in the box plots of Figure 5.20. Since only one type of marble was found and sampled on Nikouria, no grouping was made. Figure 5.21 presents the position of the Nikouria marbles in the two databases, the Ln(Mn^{2+}) *versus* Ln(MGS) and the $\delta^{13}C$ *versus* $\delta^{18}O$.

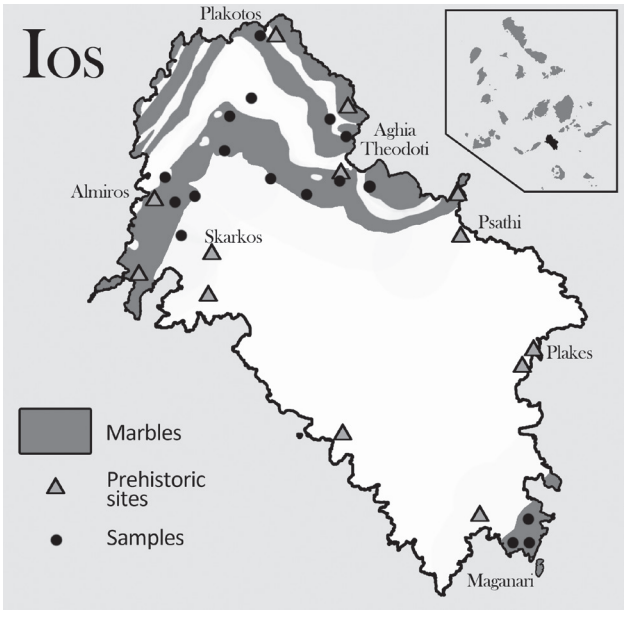

Figure 5.22. *Map of Ios showing marble distribution, sampled areas (dots) and prehistoric sites (triangles).*

Ios

Field work

Ios has fewer marble deposits than Keros or Naxos as a percentage of island area (Fig. 5.22) and they are concentrated mainly in the north part of the island, with a small outcrop in the southeast. The sampling was undertaken by car, and on foot in places with no roads (mountains, hills, etc.). More than 80 samples were collected from 20 different locations over the island during two surveys in 2007 and 2008.

Marble characteristics

There are several different qualities and types of marble on Ios. The usual type is either light grey with MGS 0.4–1.0 mm and high transparency or intensely banded with parallel light and dark grey colour bands. In some cases, marble can be found in blue and white colours with low to intermediate grade of metamorphosis, similar to that of southeast Naxos, according to van der Maar & Jansen (1983).

Very fine-grained (MGS <0.5 mm) white marble, of extremely high transparency, but dolomitic (98 per cent dolomite), was found along the northwest coastline of Aghia Theodoti bay. On the hills southeast of Aghia Theodoti and close to Palaiokastro there is a large, modern quarry, dating to the twentieth century, as the abandoned gear indicates. The marble in this quarry contains dolomite in the range from 10 to 44 per cent and is either uniform light grey or has layers of white and light grey bands. It exhibits rather high

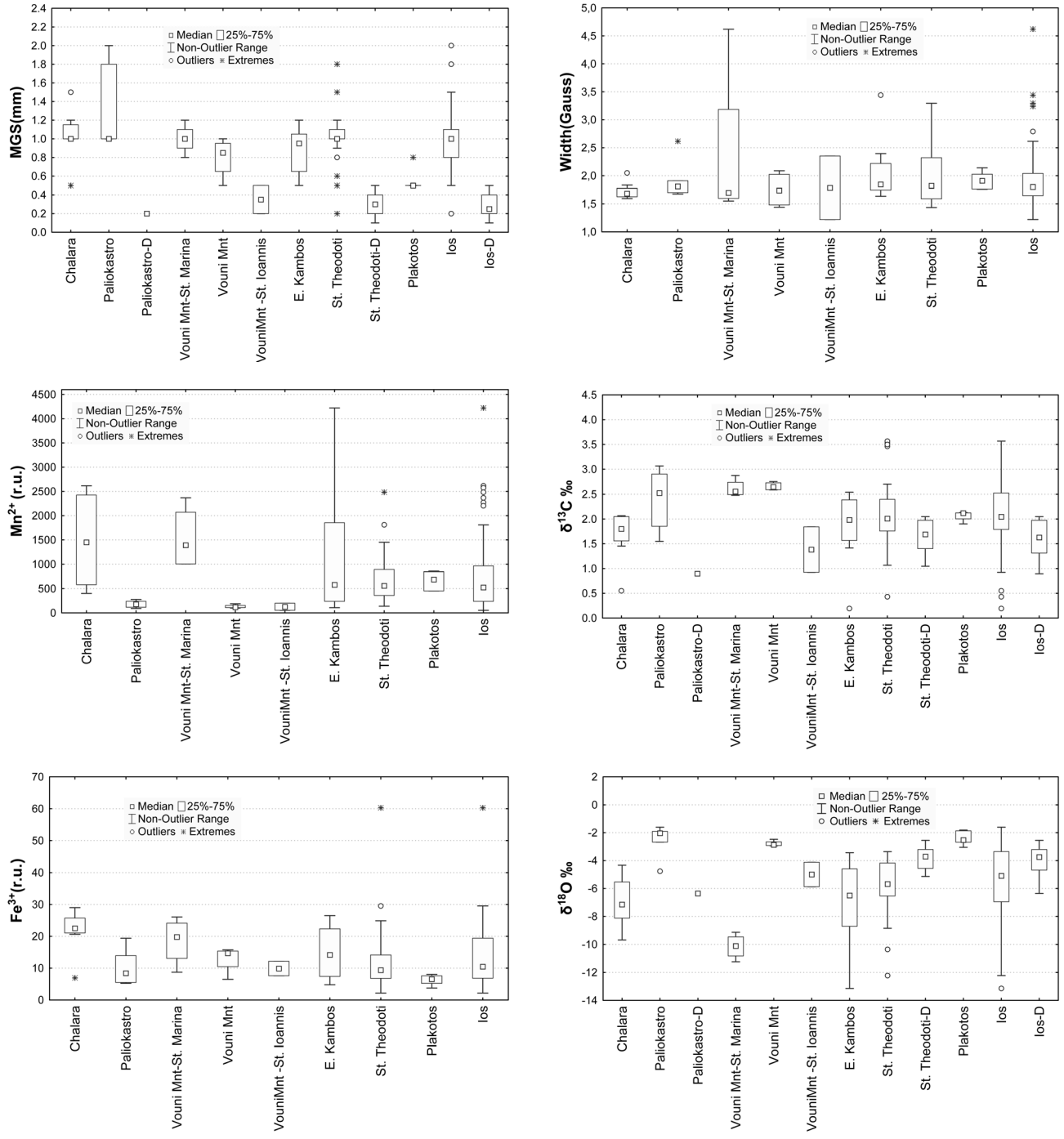

Figure 5.23. *Box plots of the measured parameters (MGS; intensity of Mn^{2+} and Fe^{3+}; Width; $\delta^{13}C$‰; $\delta^{18}O$‰) for the Ios marble groups.*

transparency and its MGS varies from 1.0 to 2.0 mm. The marble close to and above the present-day small settlement of Aghia Thoedoti (Katoikies), where there is also evidence for a prehistoric settlement as well as a Roman cistern, is grey or whitish with thin beige veins, of low transparency and MGS around 1.0 mm.

Southwest of Aghia Theodoti and on the mountain above it there exists a large marble formation, cut and exposed by the road to Psathi for about a kilometre. The marble on this cutting, alternating with thin schist veins, varies from pure white or whitish with a high transparency and MGS 1.0–1.8 mm to

grey or greyish with medium to low transparency and MGS around 0.5 mm. Layers of low-quality, fine-grained whitish marble, containing thin beige, yellow or red argillaceous veins and layers of marble with alternating blue and grey bands are present in the same exposure. Northwest of this exposure, almost halfway between Aghia Theodoti and Almiros, there exists another small exposure (about 50 m long) of snow-white marble with high transparency and MGS around 0.8–1.0 mm. However it contains thin yellow argillaceous veins and spots with soil inclusions.

On the west side of Ios, between Skarkos (a hill with an important early bronze age site) and Almiros (Fig. 5.22), a fine-grained white marble with grey striations can be found, along with beige limestone and schist. This we can now call the characteristic Ios marble, since its properties compare well with those of the principal vessel and figurine finds documented as found on Ios, notably at Skarkos. Often there are small veins of white or light greyish marble exhibiting thin, yellow or red schist veins very narrowly separated. The MGS of the marble in this area varies from 0.5 to 1.5 mm. Similar to this, white or whitish marble appears on the north and south part of Ios (Cape Chalara, next to Maganari) in veins together with grey or banded marble.

Nowhere on Ios did we find traces of prehistoric marble quarrying or marble working, although some quarrying activity evidently took place in recent times to obtain building blocks or slabs.

Analysis results

The results of the analyses of the Ios samples are presented as box plots in Figure 5.23. The samples are grouped initially in two major categories, calcitic and dolomitic, called Ios and Ios-D, which contain all the calcitic and dolomitic samples, respectively. Additionally, there is a further grouping designated according to the sampling area. This further grouping uses location names and contains sampling areas as described below (Fig. 5.22):

Chalara: samples from the southeast cape close to Maganari.

Palaiokastro: samples from the old quarry south of Aghia Thoedoti and east of Palaiokastro.

Aghia Theodoti: samples from the bay of Aghia Theodoti and from the hills south of the bay and by the road to Psathi.

Aghia Theodoti-D: dolomitic samples from the hill northwest of Aghia Theodoti bay.

Plakotos: samples from abandoned marble blocks at the bay of Plakotos, which according to local people come from an old quarry high up the mountain south of Plakotos.

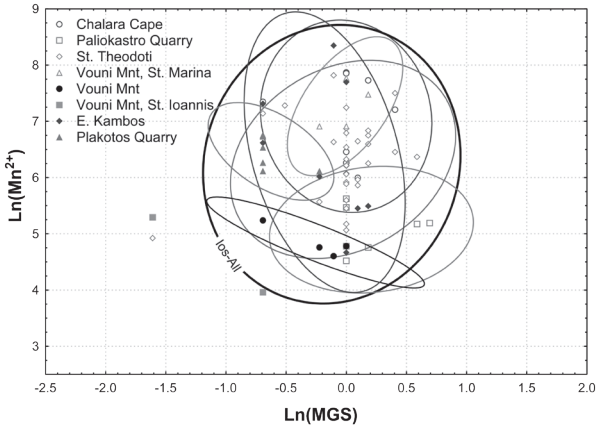

Figure 5.24. *Bivariate plot of Ln(Mn^{2+})* versus *Ln(MGS) for the Ios marble groups. For the areas and geological samples contained in each group, see text.*

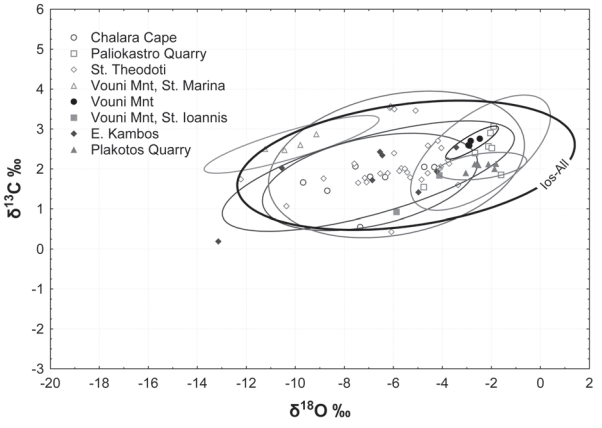

Figure 5.25. *Bivariate plot of the stable isotopes $\delta^{13}C$‰* versus *$\delta^{18}O$‰ for the Ios marble groups. For the areas and geological samples contained in each group, see text.*

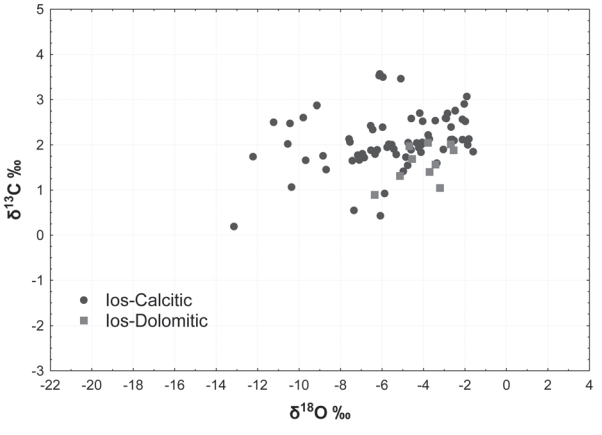

Figure 5.26. *Bivariate plot of the stable isotope ($\delta^{13}C$‰* versus *$\delta^{18}O$‰) signatures of all calcitic and all dolomitic marbles of Ios.*

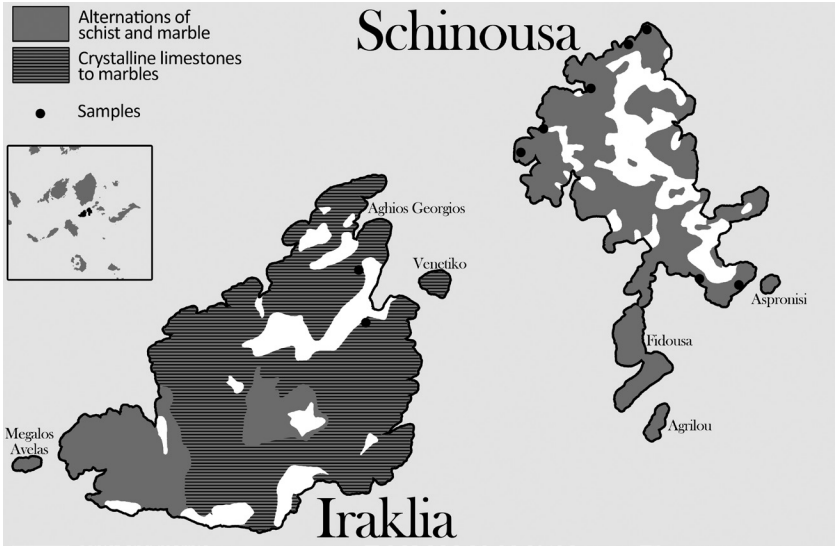

Figure 5.27. *Map of Schinousa and Iraklia with distribution of schist and marble. The dots show the sampling areas.*

E. Kampos: samples from the plateau, called Epano Kambos, north of the Chora and also around the hill with the prehistoric settlement of Skarkos.

Vouni, Vouni-Aghia Marina and Vouni-Aghios Ioannis: three groups from the mountain on north Ios, called Vouni.

As can be seen from the variation of the parameters in the box plots of Figure 5.23, the spread of the values overlap to a greater or lesser extent between the different groups and locations. This is also evident in the bivariate plots of the two databases (Figs. 5.24, 5.25). The isotopic signatures of all the calcitic and all dolomitic marbles of Ios are presented in Figure 5.26, on the same scale as for Naxos (Fig. 5.14). It should be noted here that the Ios calcitic marbles exhibit a different behaviour in their isotopic distribution to those of Naxos. In particular, apart from one sample that separates by virtue of its low $\delta^{13}C$ and $\delta^{18}O$ values, all the rest seem to group together in an inclined ellipse that is close to a circle. The Ios calcitic marbles do not show the characteristic bimodal behaviour of the Naxos marbles (Fig. 5.14), i.e. they do not distribute along the $\delta^{18}O$ axis in a narrow $\delta^{13}C$ range, nor spread along the $\delta^{13}C$ in a narrow $\delta^{18}O$. This behaviour may be important in distinguishing the Ios marbles from some groups of Naxian marbles.

Because of this uniform behaviour in all the Ios marbles, we will treat Ios as a unified group in the statistical treatment for the investigation of the provenance of the figurines and vessels found on Keros when using the data of all the islands together. But when, after the first step of analysis, it appears that some of the figurines or vessels have an increased probability of being made of Ios marble, then in the second step of the more detailed analysis the different groups and locations are taken into account the better to define the place of origin.

Schinousa and Iraklia

Field work

The islands of Schinousa and Iraklia and the two Kouphonisia (Ano Kouphonisi and Kato Kouphonisi) are in close proximity to Keros, and all together belong to the so called 'Small Cyclades' group. They have all been surveyed and it appears the two Kouphonisia are made of limestone and sedimentary calcareous soils with no marble outcrops. Schinousa and Iraklia, however (Fig. 5.27), contain marble deposits in their bedrocks. Both islands were surveyed by boat along their coastline with a landing at several locations where the marble looked relevant and examination of the marble outcrops on foot. In addition, surveys on foot were performed at locations on the islands where the geological maps showed the existence of marble. Reference samples were collected from several areas shown as dots on Figure 5.27.

Marble characteristics

The marbles of Schinousa and Iraklia are quite similar: grey or pale grey fine-grained marble, which is fragmented. One or two deposits with laminated grey and white marble together with dark grey breccia were found, but only on Schinousa. This is of bad quality and unsuitable for making artefacts, or even for use as building material. It is of no surprise that all present-day local needs for marble, including building, fencing, paving and decoration, are met by material imported from Naxos or Amorgos, since the local stones are unsuitable for anything other than gravel production. No evidence of ancient marble quarrying or marble working was found on either of the two islands.

Analysis results
Due to the very bad quality of the marble from both islands, we did not proceed to analyse the reference marble samples collected from Schinousa and Iraklia, since no marble with similar characteristics has been found among any of the figurines or vessels from Keros.

Syros

Field work
Following the geological maps and descriptions on the quality of marble by John Dixon, who studied the geology of Syros and directed us to the most promising marble outcrops, we surveyed the island by car and on foot. Our survey, examination and sampling concentrated on the marble deposits in the middle and the north of the island, as the southern deposits are unsuitable for making figurines and vessels. The sampling locations are shown in Figure 5.28. These locations naturally include the areas close to and around the prehistoric settlements of Chalandriani and Kastri, as well as other areas. A total of 23 samples was collected, and the marble of many more locations was examined.

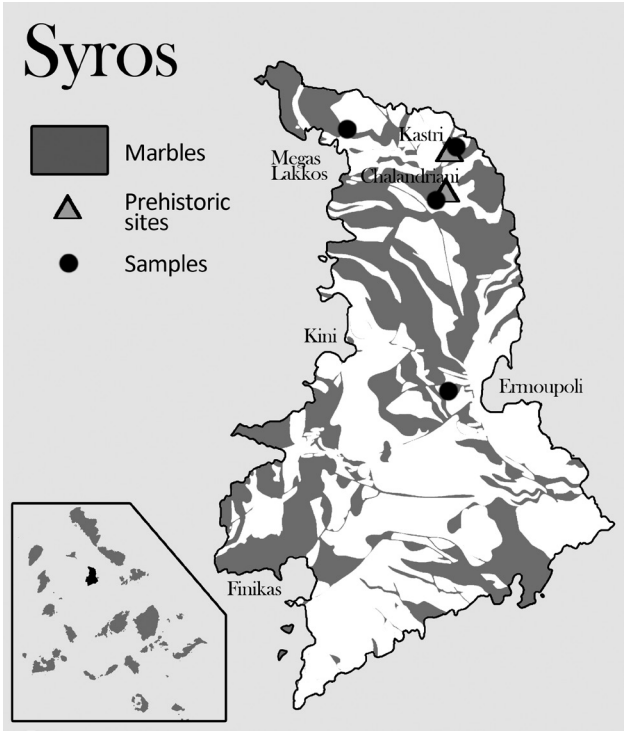

Figure 5.28. *Map of Syros showing marble zones, sampled areas (dots) and prehistoric sites (triangles).*

Marble characteristics
The marble of Syros is quite distinctive and differs from the other Cycladic marbles. The marble of most outcrops on Syros exhibits a characteristic foliation in its fabric. This foliation is generally almost horizontal and is associated with a stretching lineation, whose orientation and density varies across the island (Cheney *et al.* 2001; Dixon & Ridley 1987). In addition to lineation, the boundaries of calcite crystals are obscure and hard to define, making the MGS difficult to measure, and in some cases the values were probably overestimated.

More specifically, the marble of north Syros exhibits the same characteristics in the areas close to the prehistoric sites of Kastri and Chalandriani and on the hill about 1 km northwest of Kampos village where an old (?early twentieth-century) quarry exists. The characteristics of the marble are: brownish or whitish in colour, with quite high transparency and with MGS of the collected samples ranging around 2.1±0.9 mm. Also strong horizontal foliation and obscure crystal boundaries are exhibited by all samples. In addition, a high percentage of dolomite, exceeding 20 per cent in most cases, is present in 15 out of 17 samples. Large quantities of marble were used in prehistoric times for building the protective walls and the houses of the Kastri settlement at the top of the hill. It is obvious that this marble comes from the area around the site, but no evidence of quarrying was found, most probably since it was removed in the form of slabs and small blocks from the naturally fissured and layered outcrops.

The marble from central Syros, on Mount Romanou between Ermoupolis and Kini, lacks the strong horizontal foliation present in north Syros, but horizontal layers are also visible, as well as obscure crystal boundaries. The marble is clear white and of high transparency, but highly dolomitic; either pure dolomite (3 out of 7 samples) or dolomite containing about 20 per cent of calcite. The MGS of the samples ranges from 0.8 to 3.0 mm (mean: 1.8±0.8 mm).

Analysis results
The results of the analysis of the Syros samples are shown in the box plots of Figure 5.29, which show the range of values for every parameter measured. As mentioned above, the various sources of north Syros have identical marble and it is all calcitic. On the other hand, central Syros has only dolomitic marble. Therefore, the Syros marbles were divided into two general groups, calcitic and dolomitic, coinciding also with north Syros and central Syros, respectively. The EPR spectra for dolomite are not comparable to those of calcite so the EPR spectroscopy parameters (Mn^{2+}

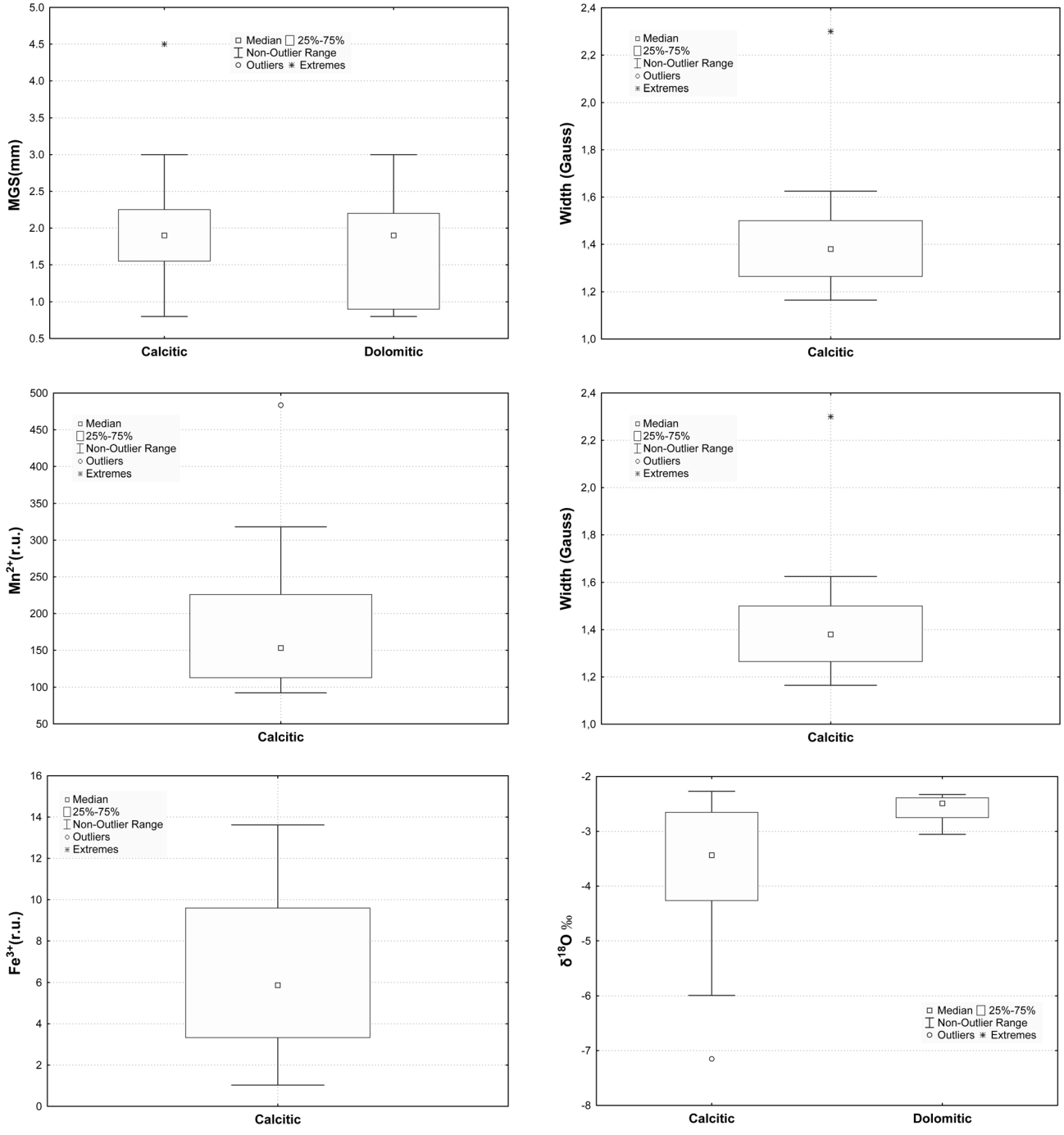

Figure 5.29. *Box plots of the measured parameters (MGS; intensity of Mn^{2+} and Fe^{3+}; Width; $\delta^{13}C$‰; $\delta^{18}O$‰) for the Syros marbles. Only a general grouping between calcitic (north Syros) and dolomitic (central Syros) marble has been used for the MGS and the isotopic signatures. For the EPR parameters (Mn^{2+} and Fe^{3+} and Width) only the calcitic marbles have been considered.*

and *Fe^{3+}* and *Width*) of the dolomitic marbles have not been considered. The MGS and isotope value ranges greatly overlap between the calcitic (north Syros) and dolomitic (central Syros) marbles.

The standard bivariate plots of Ln(Mn^{2+}) *versus* Ln(MGS) (Fig. 5.30) and stable isotopes $\delta^{13}C$ *versus* $\delta^{18}O$ (Fig. 5.31) show a relatively tight distribution of values for the Syros marbles.

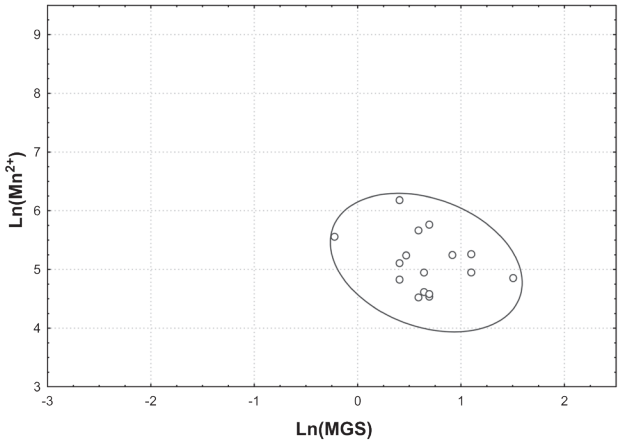

Figure 5.30. *Bivariate plot of Ln(Mn^{2+})* versus *Ln(MGS) for the north Syros calcitic marbles.*

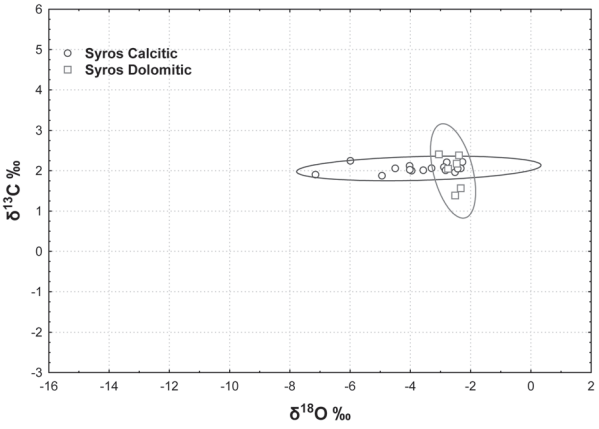

Figure 5.31. *Bivariate plot of stable isotope signatures $\delta^{13}C$‰* versus *$\delta^{18}O$‰ for the Syros marble groups, calcitic (north Syros) and dolomitic (central Syros).*

Combined results and discrimination of Cycladic sources

The above results constitute the new database for the Cycladic marble sources used for the provenance investigation of the marble figurines and vessels found on Keros. The range of each measured parameter for all the islands and marble groups together is presented in the box plots of Figures 5.32–5.37. The standard bivariate plots of Ln(Mn^{2+}) *versus* Ln(MGS) and stable isotope signatures $\delta^{13}C$ *versus* $\delta^{18}O$ (Figs 5.38, 5.39) present the global database with all the geological samples for Cycladic marbles. These are used for the first-stage statistical treatment and discrimination between the various marble groups.

There is a large degree of overlap between the different Cycladic islands and marble groups

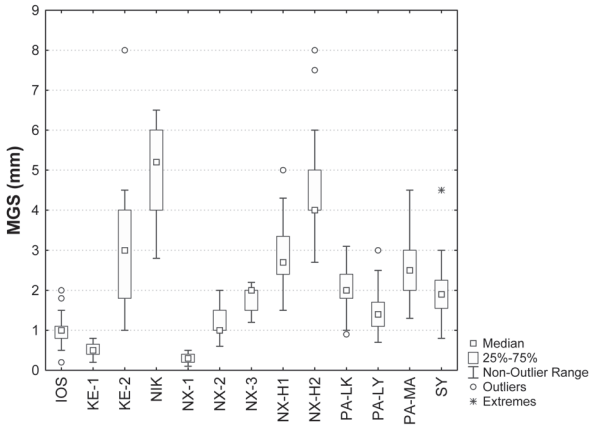

Figure 5.32. *Box plot diagram of the MGS for the various groups of Cycladic Marbles: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY). Data for groups PA-LY, PA-MA, PA-LK, NX-H1 and NX-H2 amalgamated from Attanasio* et al. *(2006) and our own data.*

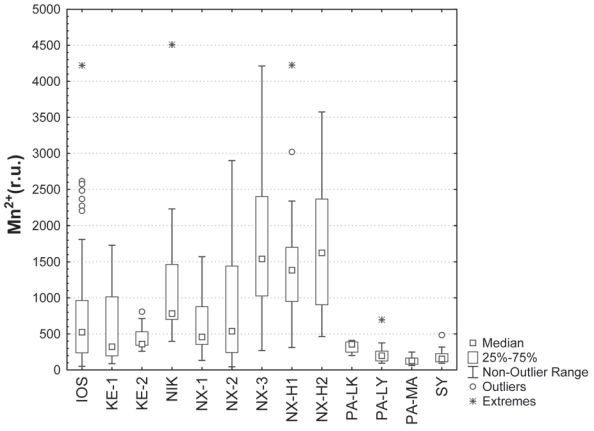

Figure 5.33. *Box plot diagram of the Mn^{2+} parameter expressed in relative units for the various groups of Cycladic marbles: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

which makes discrimination of the sources no trivial task. Discriminant analysis using all the parameters together and all the marble groups does not necessarily improve the discrimination, and in some cases can make it even worse (Polikreti & Maniatis 2002). For some groups, namely Naxos (NX-H1, NX-H2), Keros and Paros, the databases are constructed from different samples, raising some problems in the use of all parameters taken together in the statistical treatment.

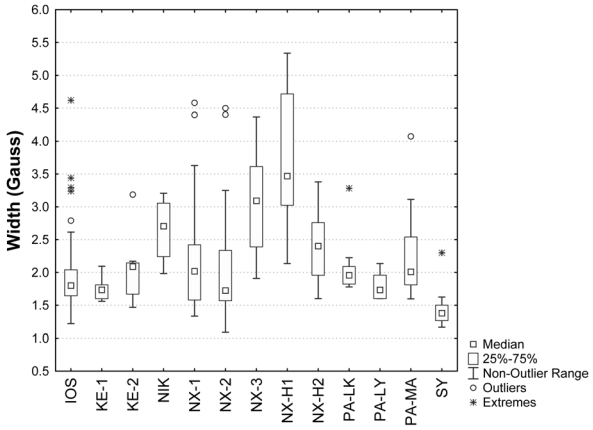

Figure 5.34. *Box plot diagram of the Width parameter for the various groups of Cycladic marbles: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

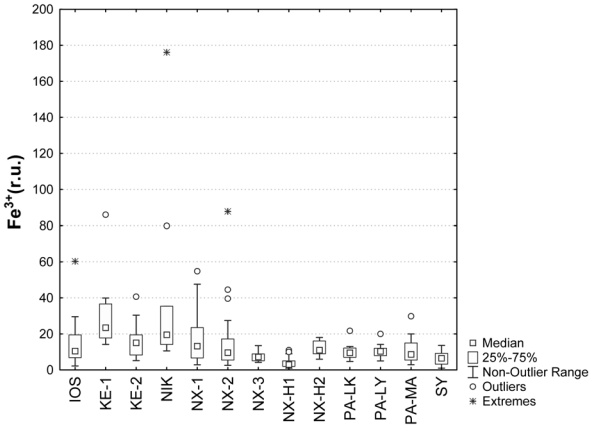

Figure 5.35. *Box plot diagram of Fe^{3+} parameter expressed in relative units, for the various groups of Cycladic Islands: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

In addition to the recently collected samples submitted for MGS measurement, EPR and IRMS analysis simultaneously, many samples have been analysed in the past only by EPR spectroscopy or by IRMS. The former were collected in the last 25 years by the Laboratory of Archaeometry and were submitted for MGS and EPR analysis and the latter are samples collected by other groups and submitted for isotopic (IRMS) and MGS analysis and are published in the literature. This obliges us to keep the two databases

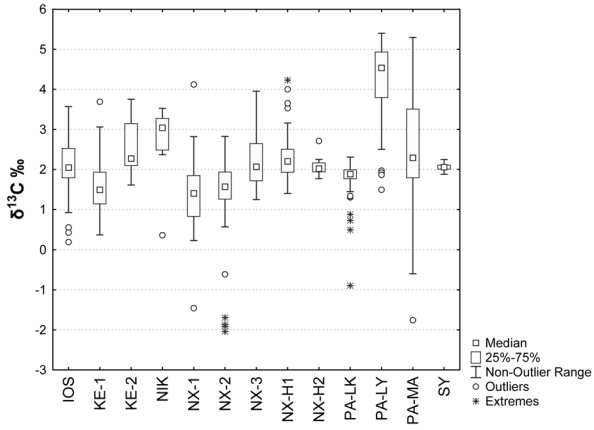

Figure 5.36. *Box plot diagram of the $\delta^{13}C$‰ parameter for the various groups of Cycladic marbles: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY). Data used for groups PA-LY, PA-MA, PA-LK, NX-H1 and NX-H2 amalgamated from Herz (1988), Attanasio* et al. *(2006) and our own data, and for groups KE-1, KE-2 and NX-1 amalgamated from Herz (1988) and our own data.*

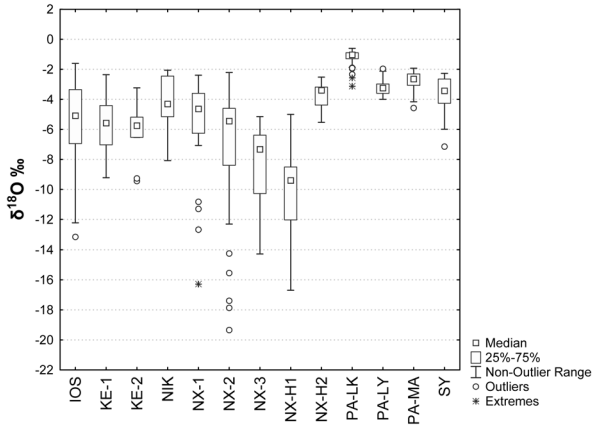

Figure 5.37. *Box plot diagram of the $\delta^{18}O$‰ parameter for the various groups of Cycladic groups: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY). Data used for groups PA-LY, PA-MA, PA-LK, NX-H1 and NX-H2 amalgamated from Herz (1988), Attanasio* et al. *(2006) and our own data, and for groups KE-1, KE-2 and NX-1 amalgamated from Herz (1988) and our own data.*

separate and to carry out the statistical treatment for these groups using either IRMS and MGS, or EPR and MGS parameters, but not both together, as we can do for the other groups.

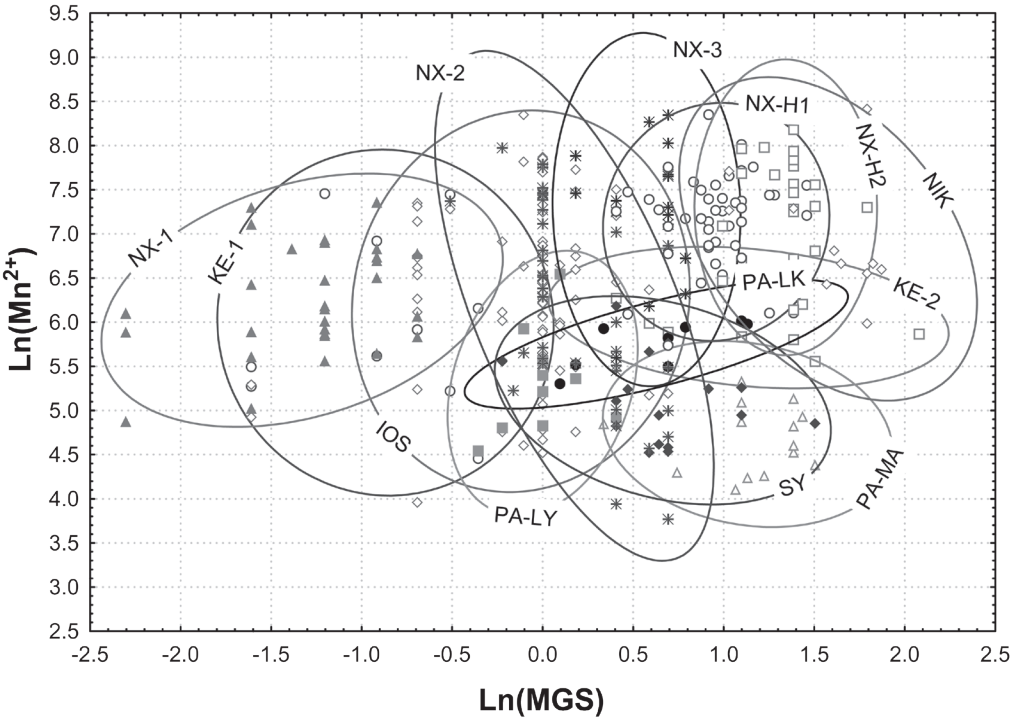

Figure 5.38. *Bivariate diagram of Ln(Mn^{2+})* versus *Ln(MGS) for the various Cycladic marble groups: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

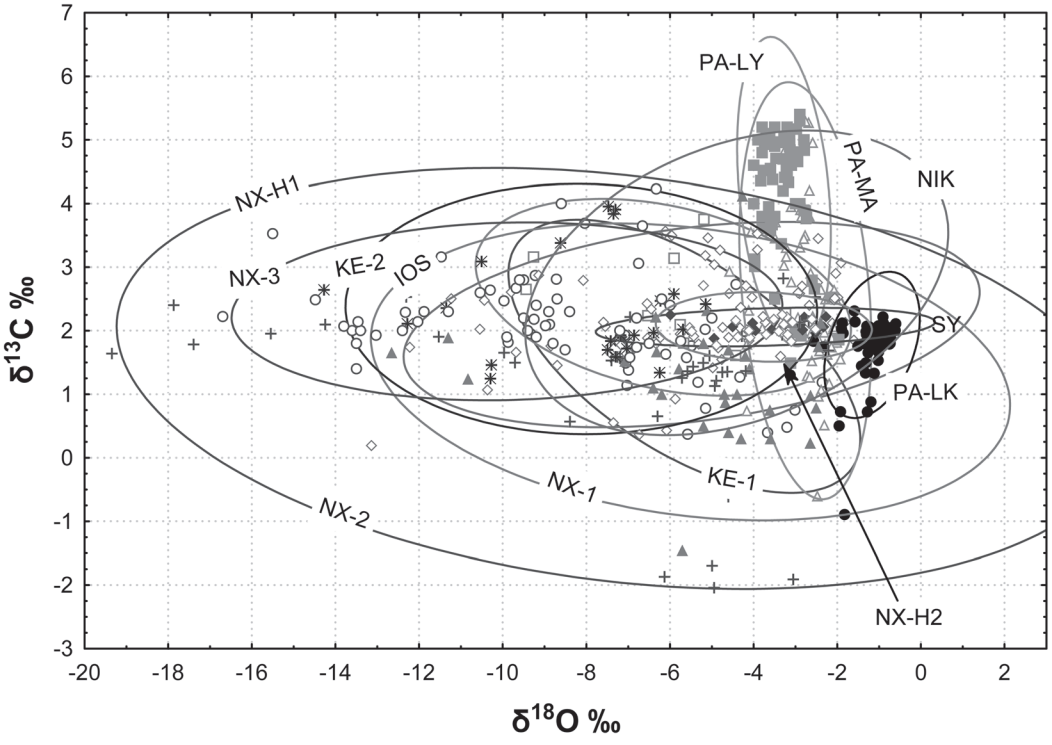

Figure 5.39. *Bivariate diagram of $\delta^{13}C$‰* versus *$\delta^{18}O$‰ for the various Cycladic marble groups: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

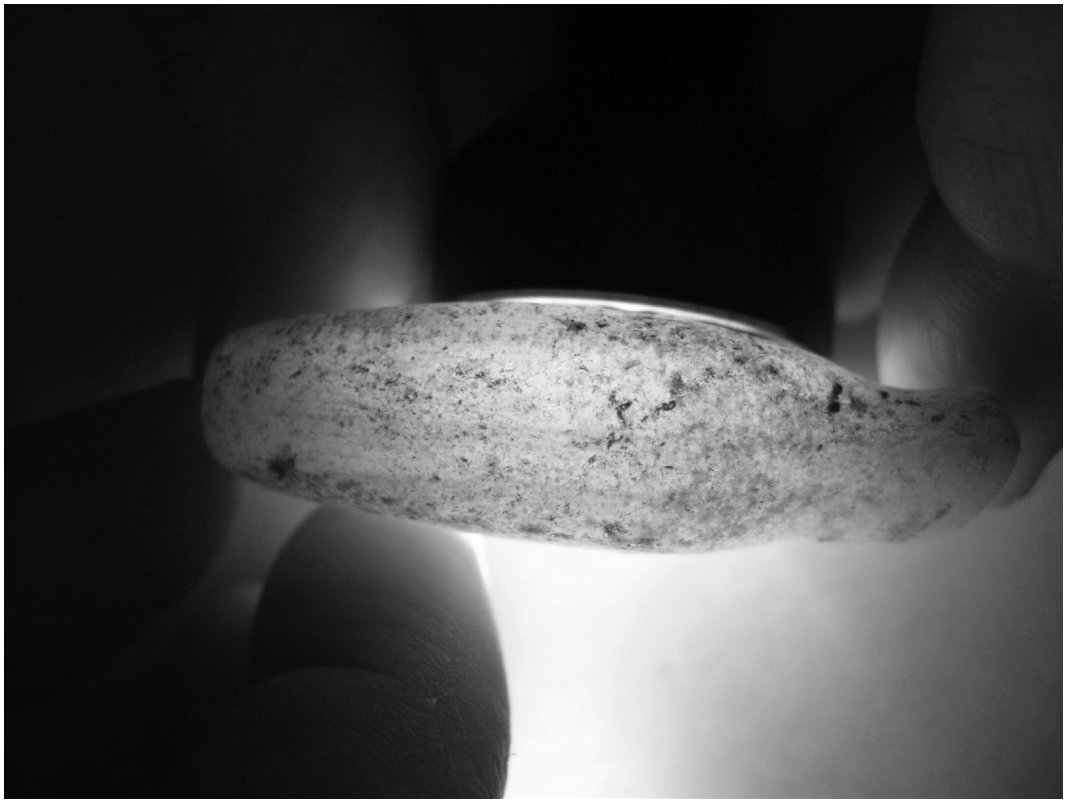

Figure 5.40. *Example of transparency and grain size examination with a cold light source (***10793***).*

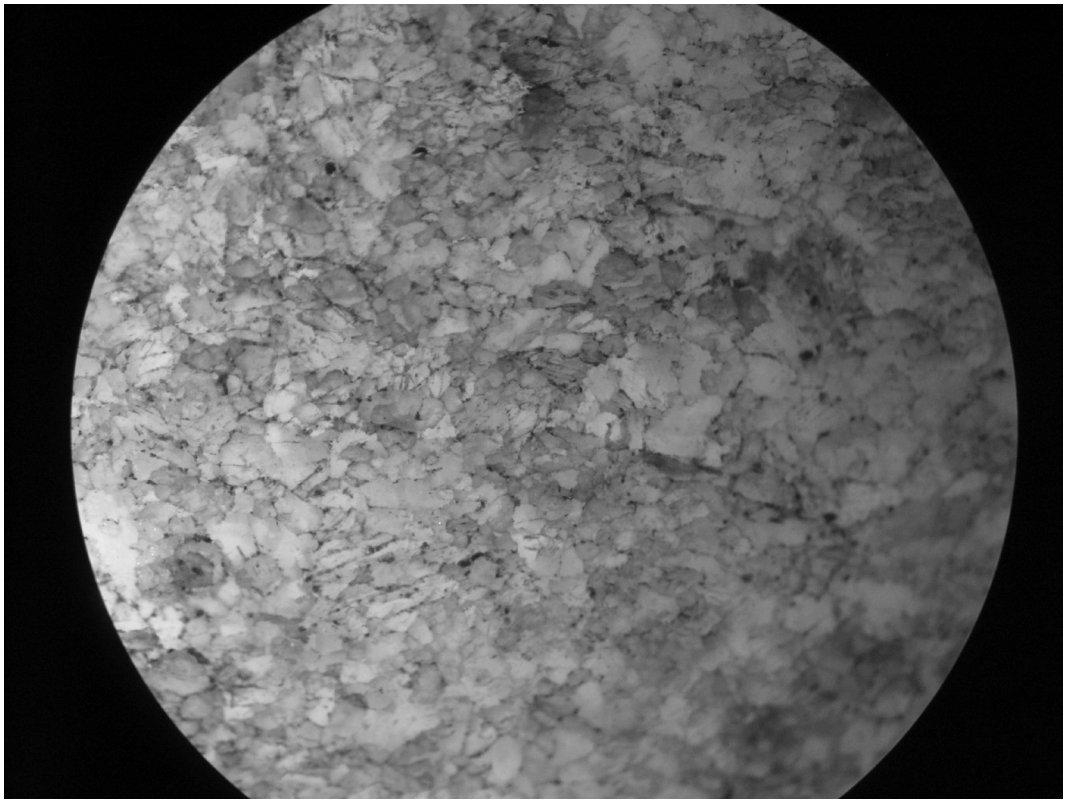

Figure 5.41. *Heavily weathered figurine: the grain sizes can be examined by measurement at the surface under an optical stereoscopic microscope (***2393***).*

Figure 5.42. *Typical figurine sampling spot: white mark in old broken surface (***6478***).*

For the provenance investigation of the Keros figurines and vessels, a stepwise inter-correlated methodology is followed. This proceeds by confining the provenance to two to three sources using the exclusion principle between the two different databases and then applying a combination of parameters which best discriminate the specific groups, along with qualitative information for the physical characteristics of the marble types in each source.

Provenance of the figurines from the Special Deposit south and Dhaskalio on Keros

Samples and experimental techniques

All figurines were examined during the excavation period on Kouphonisi or in the following years in the storerooms of the Naxos Archaeological Museum. A strong cold light source was used for this purpose in conjunction with a magnifying lens and a micro scale. In many instances a stereoscopic microscope was used for better results. This non-destructive examination resulted in the determination of the MGS, the colour, transparency and other features of the marble, as well as the degree of weathering of all figurines (Fig. 5.40). The total number of figurine fragments examined was 564. The heavy weathering of many restricted the estimates of transparency and colour; however, the MGS was measured in all figurines with the help of a microscope (Fig. 5.41). This information proved very valuable, since it gave us statistically meaningful data on the different types of marble used for making the figurines. This examination helped the field-work search for marble sources, making it more focused on specific types of marble. It allowed an initial grouping of the figurines and the selection for sampling of representative ones from each marble type.

Following this initial examination and measurement, 89 figurine fragments were selected for sampling, representing as many marble types and varieties as possible, as well as figurine types and varieties, following the initial typological classification of the figurines. With the permission of the Ministry of Culture, sampling took place in the storerooms of the Archaeological Museum of Naxos. The samples were in the form of small chips weighing around 100 mg, obtained from old breaks so that no damage was caused to the typological information or to the appearance of the objects (Fig. 5.42). In the case of very small or delicate objects, instead of a chip a small number of marble grains was taken from a suitable place on the object.

The techniques used for the measurement and analysis of the samples are the same as for the geological samples, namely EPR spectroscopy, stable isotope analysis (IRMS) and MGS measurement, as well as microscopic examination for the crystalline structure and other marble features.

A special methodology was developed and used (Tambakopoulos 2007) for the analysis of undersized samples using EPR spectroscopy and for their comparison with the existing database.

Results and discussion

Examination of all figurines

Table 5.1 lists the results of the optical examination of practically all the figurines excavated from the Special Deposit South at Kavos and from Dhaskalio, altogether 564 in number. The colour and veins, transparency and maximum grain size, together with their special find number, excavation trench, the part preserved, and type and variety according to the final typological classification, as well as the weathering degree (see volume II, chapter 11) are given in this table for all figurines. It should be noted that the estimates of transparency are uncertain for a number of figurines where the weathering and surface deposition were severe, prohibiting the transmittance of light.

Table 5.1. *Results of the* in situ *optical examination for all the figurines. Variety: D=Dhaskalio sub-variety; K=Kea sub-variety; A=Akrotiri sub-variety. Part: L= left; R= right. Transparency: L=low; M=medium; H=high. WD=Weathering Degree as described in Chapter 3 (see also Volume II, chapter 11). Location: S=Special Deposit South; N=Special Deposit North; D=Dhaskalio; E=East of Kavos; M=Middle Area; A=Area A; P=Area P.*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
16	A	Spedos	Pelvis and upper legs	White	L to M	1.0	5
58	S	Spedos	Neck	White	H	1.2	5
59	S	Dokathismata	Feet	White	H	1.9	4
60	S	Spedos	Leg frag.	Uncertain (white to greyish)	L	0.8	5
64	S	Dokathismata	Legs and feet	White or whitish	L	0.5	5
71	S	Spedos	L foot	White	H	1.0	4
72	S	Dokathismata	L shoulder	White	H	1.5	4
78	S	Spedos	Torso	White	L	1.2	5
79	S	Spedos	Head	White	H	1.5	4
80	S	Spedos	L ?lower leg	White	M to H	1.1	4
81	S	Apeiranthos (D)	Shoulders	White or whitish	M	0.2	4
100	S	Spedos	Leg frag.	White	M	1.5	4
101	S	Spedos	Lower arm to upper legs	White	L	1.5	5
112	S	Spedos	Head	White	H	1.2	4
115	S	Spedos	L upper leg	White	M to H	1.0	5
117	S	Dokathismata	Head	White	M	1.5	5
118	S	Indeterminate	Leg frag.	White or whitish	M	1.8	5
123	S	Spedos	Upper legs	White or whitish	L	1.3	5
127	S	Spedos	R lower leg	White	H	1.1	4
129	S	Spedos	Torso and pelvis	White	M	1.0	5
135	S	Spedos	L lower leg	White or whitish	L to M	1.5	5
136	S	Spedos	L pelvis and upper leg	White or whitish	L to M	1.0	5
147	S	Spedos	Torso	White	M to H	1.8	5
156	S	Chalandriani (K)	Waist and pelvis	White	H	1.0	3
165	S	Apeiranthos (D)	Body	White	L	0.5	5
174	S	Spedos	L upper leg	Greyish	L	0.5	5
188	S	Apeiranthos (D)	Body	White	M to H	3.4	4
193	S	Spedos	Waist and upper legs	White or whitish (schist vein)	H	1.0	5
194	S	Spedos	Lower legs	White	H	1.0	4
195	S	Dokathismata	Torso	White	M	1.2	3

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
198	S	Dokathismata	Torso and upper waist	White	M	1.5	5
200	S	Other	Head and neck	White	M to H	0.5	4
210	S	Spedos	Lower leg frag.	White	H	0.9	4
211	S	Spedos	?Lower leg	White	M to H	1.5	5
257	S	Dokathismata	Upper legs	White	M to H	1.0	3
264	S	Spedos	L upper leg frag.	White (white vein)	M to H	1.5	4
269	S	Spedos	Upper legs	White or whitish	M	1.0	5
280	S	Dokathismata	Lower legs and heel	White	H	1.1	3
282	S	Spedos	R lower leg	White	H	0.8	3
283	S	Spedos	L knee	White	L	1.5	4
294	S	Dokathismata	?Knees	White	M to H	1.5	4
295	S	Spedos	Head	White and grey bands	L	1.0	5
297	S	Spedos	L foot	White or whitish	L	1.1	5
299	S	Chalandriani	Head	White or whitish	L	1.0	5
310	S	Spedos	Legs frag.	White	L to M	1.1	5
311	S	Chalandriani	Feet	White	H	0.2	3
331	S	Dokathismata	R foot	White	H	1.0	3
335	S	Dokathismata	Lower arm and torso	White	M to H	1.0	5
341	S	Spedos	L upper leg	White	L	1.0	4
344	S	Spedos	Lower legs	White	H	1.5	5
348	S	Spedos	Upper legs	White	L to M	1.0	5
351	S	Dokathismata	Head	White (milky)	L	0.2	1
352	S	Spedos	Torso	White	M	1.0	5
353	S	Spedos	Torso	White	M to H	1.2	4
354	S	Spedos	Upper legs	White (grey vein)	H	1.6	4
357	A	Spedos	Arms and pelvis	White	M to H	1.0	5
358	S	Dokathismata	L foot	White	H	0.8	1
371	S	Spedos	Torso	Greyish	M to H	5.0	4
379	S	Spedos	Lower L leg	White	H	0.5	5
385	S	Spedos	Upper and lower legs	Uncertain (white to greyish)	M	1.0	5
410	S	Spedos	Torso frag.	White or whitish	L	1.0	5
427	S	Spedos	R upper leg	White	M	1.2	5
437	S	Spedos	L foot	White	H	1.1	4
442	S	Dokathismata	Knees	White or whitish	L	1.0	4
446	S	Dokathismata	Torso	Uncertain (white to greyish)	L	1.0	4
523	S	Spedos	L foot	White or whitish	M	1.1	5
541	S	Indeterminate	Lower leg	White	M to H	1.0	4
543	S	Spedos	Pelvis and upper legs	White	M to H	1.1	5
550	S	Spedos	Breast frag.	Greyish	L	1.3	5
578	S	Spedos	R foot	White or whitish	M	1.0	4
581	S	Spedos	R knee?	Uncertain (white to greyish)	L	1.8	5
607	S	Spedos	Lower L leg	White	H	1.0	4
614	S	Spedos	Lower legs	White (red vein)	M	1.0	3
615	S	Keros	L thigh	White	M	0.8	3
621	S	Spedos	Lower legs	White	M	1.8	4

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
625	S	Spedos	R arm and waist	White or whitish	M	1.5	5
631	S	Spedos	Sheared torso	White or whitish	L	0.9	5
637	S	Apeiranthos (D)	Complete	White	H	0.3	4
638	S	Chalandriani	L shoulder	White	M	1.0	5
644	S	Spedos	L thigh	White or whitish	L to M	1.4	5
650	S	Spedos	R lower leg	White	H	1.0	3
710	S	Apeiranthos (D)	Body	White	H	1.3	5
722	S	Dokathismata	Torso and arms	White	H	0.5	4
729	S	Dokathismata	Torso and arms	White	M	0.001	4
736	S	Other	Torso?	White (milky)	M to H	0.3	5
737	S	Spedos	L foot	Uncertain (white to greyish)	L to M	1.0	5
739	S	Spedos	L foot	White	H	1.1	5
756	S	Chalandriani	L shoulder	White (milky)	M to H	1.0	3
758	S	Spedos	Pelvis and arms	White	M to H	1.9	5
770	S	Indeterminate	Neck	White	H	1.0	4
778	S	Keros	Head	White	L	1.4	5
801	S	Spedos	L foot	Whitish	M	1.2	4
804	S	Spedos	R foot	White	H	1.0	3
814	S	Dokathismata	Head	White	L to M	1.0	4
816	S	Spedos	L? Leg	Whitish	No	1.8	5
817	S	Spedos	L calf	White	H	1.5	3
820	S	Dokathismata	Head	Greyish	L	0.6	4
827	S	Spedos	L upper leg	White or whitish	L to M	1.0	5
832	S	Dokathismata (A)	Torso	White or whitish	M	1.0	5
849	S	Dokathismata	Torso	White	H	1.0	2
850	S	Spedos	R lower leg	White	H	1.2	1
870	S	Spedos	Torso frag.	White or whitish	L	1.0	5
872	S	Spedos	L upper leg	Greyish (white veins)	L	0.4	5
874	S	Spedos	Head	White	M	0.8	4
878	S	Spedos	R ?upper leg	White	M to H	1.0	4
900	S	Spedos	Waist	Whitish	L	1.0	5
925	S	Spedos	Lower L leg	White (greyish veins?)	L	1.0	5
936	S	Dokathismata	Torso	White	M to H	1.2	5
939	S	Spedos	Arms and ?waist	White	L	1.5	5
958	S	Spedos	R elbow	White	L	1.0	5
961	S	Spedos	Lower R arm	White	M to H	1.0	5
964	S	Spedos	L pelvis and upper leg	White	M	1.1	5
966	S	Spedos	Large head	White	L	1.0	5
972	S	Dokathismata	Head	White or whitish	H	1.0	3
998	S	Uncertain	Body	White	H	1.0	3
1052	S	Spedos	R foot	White	H	1.0	4
1056	S	Spedos	R upper leg	White	H	1.1	5
1060	S	Spedos	R foot	White or whitish	L to M	1.2	5
1061	S	Spedos	Upper legs	White	H	1.2	5
1063	S	Spedos	Waist	White	H	1.2	5

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
1064	S	Spedos	L leg frag.	White	M to H	1.8	5
1105	S	Dokathismata (A)	Neck and shoulders	White	L	0.5	5
1151	S	Spedos	Pelvis and upper legs	White	L to M	1.5	5
1153	S	Spedos (Kavos)	R arm and waist	White	H	1.5	5
1155	S	Chalandriani (K)	Torso and pelvis	White	H	1.5	3
1252	S	Spedos	Lower legs	White	M to H	1.2	5
1302	S	Keros	Feet	White or whitish	M	0.8	2
1303	S	Spedos	Leg frag.	Greyish	No	1.0	5
1304	S	Spedos or Kapsala	R foot	White	M	1.0	2
1306	S	Indeterminate	Leg? frag.	Uncertain (white to greyish)	No	3.0	4
1312	S	Spedos	R foot	Greyish	No	1.0	5
1403	S	Spedos	?Upper leg frag.	White or whitish	L to M	1.1	4
1409	S	Spedos	Torso	White or whitish	L to M	1.5	5
1413	S	Dokathismata	Head	White	M	1.0	4
1434	S	Spedos	Upper legs	White or whitish	M	1.8	5
1439	S	Spedos	Waist and top of pelvis	White	H	0.8	4
1446	S	Keros	Torso	White (red limestone layer)	L	0.5	4
1459	S	Spedos	lower leg	White	H	1.0	2
1461	S	Dokathismata	Torso and arms	White	L to M	0.8	5
1463	S	Spedos	Waist	White	M to H	1.0	5
1466	S	Dokathismata	Pelvis and legs	White	H	1.0	5
1472	S	Indeterminate	Uncertain frag.	White	L	1.5	5
1475	S	Chalandriani	head	Grey	L	1.1	5
1477	S	Spedos	R lower leg and foot	White or whitish	M	0.8	5
1478	S	Spedos	Head	White or whitish	L	0.5	5
1480	S	Spedos	Pelvis	White or whitish	M	1.0	5
1484	S	Spedos	L pelvis area	White	M	1.1	5
1485	S	Spedos	Sheared back	White	M to H	1.5	5
1486	S	Spedos	Neck and torso	White	M to H	1.4	5
1489	S	Spedos	Foot	White	M to H	1.0	5
1494	S	Indeterminate	Spall (back)	White	M to H	0.5	4
1497	S	Spedos	Torso and waist	White	M	1.5	5
1499	S	Spedos	L shoulder	White	H	2.2	5
1506	S	Spedos	Head	Greyish	L	1.5	5
1521	S	Spedos	Upper leg frag.	White	M to H	1.0	4
1538	S	Dokathismata	Torso	White or whitish	L	1.0	3
1539	S	Spedos	L foot	White	H	1.3	4
1540	S	Spedos	Head and neck	Greyish	No	1.1	5
1541	S	Apeiranthos (D)	Head	White	M	1.0	5
1556	S	Dokathismata	R shoulder	White	M	1.9	3
1561	S	Spedos	Torso	White or whitish	L	1.0	5
1562	S	Spedos	Head	Greyish (white veins?)	L	1.4	4
1585	S	Spedos	L foot	White	M to H	1.5	5
1586	S	Spedos	L leg frag.	Uncertain (whitish to greyish)	L	1.1	4
1592	S	Spedos	Large torso	White or whitish	L	1.0	5

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
1701	S	Spedos	Waist and upper legs	White or whitish	L	2.0	3
1702	S	Spedos	Upper and lower legs	White	L	0.2	5
1703	S	Indeterminate	Breast frag.	White	M	0.8	4
1716	S	Spedos	Torso	White or whitish	L	1.0	5
1724	S	Spedos	Lower leg frag.	White or whitish	L	1.0	5
1726	S	Dokathismata	L Foot	White	M	1.0	1
1732	S	Spedos	R thigh	White or whitish	M	1.1	5
1733	S	Spedos	Leg frag.	White or whitish	L	1.6	4
1739	S	Spedos	Sheared upper legs (front)	White	M to H	1.0	5
1740	S	Spedos	R knee	White	M	1.5	4
1741	S	Spedos	L knee	White	M	1.1	4
1746	S	Indeterminate	Neck	White	M	1.5	4
1802	P	Apeiranthos	Head	White	H	0.5	4
1895	S	Spedos	L upper leg and knee	White	H	1.2	3
1898	S	Chalandriani	Head frag.	White	H	1.0	3
1902	S	Apeiranthos	Shoulder area	Greyish	No	0.2	4
1903	S	Chalandriani	Head	White or whitish	M	1.0	4
1908	S	Spedos	Leg frag.	Uncertain (whitish to greyish)	L	1.0	5
1917	S	Dokathismata	Neck	White (white vein)	M	1.0	4
1918	S	Chalandriani	Neck	White	M	1.1	4
1927	S	Dokathismata	Head	White	M	1.0	2
1928	S	Spedos	Head	White or whitish	L to M	1.0	4
1929	S	Spedos	Head	White or whitish (white veins)	M	1.0	4
1936	S	Spedos	L upper leg	White	H	2.0	3
1955	S	Spedos	?Lower L arm	White or whitish	M	1.0	5
1957	S	Spedos	Torso back (spall)	White	H	1.0	4
1958	S	Spedos	Head frag.	White	H	1.3	5
1970	S	Spedos	Head	White	M	1.0	5
1971	S	Spedos	L shoulder	White	L to M	1.0	5
1973	S	Keros	Thighs/legs	White (red limestone layer)	L	0.2	3
1983	S	Spedos	Neck	Greyish	L	1.0	2
1987	S	Spedos	Torso	White	L	1.0	5
1988	S	Unfinished	Unfinished FAF	White	H	0.5	3
1989	S	Spedos (Kavos)	Torso	White	M to H	1.5	5
1990	S	Spedos	R lower leg	White	H	1.3	4
1991	S	Spedos	Upper legs	White	H	1.5	4
1992	S	Spedos	Waist	White	H	1.0	5
1993	S	Spedos	?L shoulder	White	M	1.2	5
1994	S	Spedos	Head	White or whitish	L	1.5	5
1995	S	Spedos	R lower leg	White	L to M	1.2	4
1996	S	Spedos	Pelvis and upper legs	Uncertain (white to greyish)	L	1.1	5
1999	S	Spedos	R leg	White	L to M	1.8	5
2005	S	Spedos	Neck	White	H	1.9	5
2006	S	Spedos	Lower legs	White	H	2.0	5
2009	S	Apeiranthos (D)	Head	Greyish	L to M	1.0	4

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
2010	S	Spedos	Torso	White	H	1.0	5
2014	S	Indeterminate	Neck	White	M	1.2	5
2018	S	Spedos	Lower legs	White	H	1.1	5
2019	S	Spedos	Pelvis and thighs	Whitish	L	1.0	5
2020	S	Spedos	Waist and pelvis	Greyish (grey striations)	L	1.3	5
2022	S	Keros	R knee of small FAF	White (greyish vein)	M to H	1.0	3
2023	S	Spedos	Waist	White or whitish	L	0.9	5
2032	S	Chalandriani	Torso frag.	White (milky)	M to H	1.2	3
2035	S	Spedos	Head	White (greyish vein)	H	1.0	4
2043	S	Spedos	Lower R leg and foot	White	H	1.2	5
2044	S	Spedos	Lower legs	Uncertain (whitish to greyish)	L	1.2	5
2045	S	Chalandriani	Lower legs and feet	Whitish	H	1.2	3
2048	S	Spedos	Head	White	L	1.9	5
2101	S	Spedos	Head	White or whitish	L	1.0	5
2105	S	Spedos	R lower leg	White	L	1.0	4
2106	S	Dokathismata	R pelvis and upper leg	White (white vein)	H	1.0	4
2110	S	Spedos	Frag. of ?lower leg (spall)	White	M to H	1.0	4
2115	S	Dokathismata (A)	Arms and waist	Grey	L	1.5	3
2118	S	Spedos	Neck?	White	L	1.0	3
2123	S	Dokathismata	Arms	White	L	2.2	5
2140	S	Indeterminate	Neck?	White (milky)	L to M	0.2	3
2141	S	Spedos	Pelvis and upper legs	White	H	1.2	4
2145	S	Spedos	R lower leg	White	L	1.0	5
2147	S	Spedos	L foot	White	H	1.1	1
2150	S	Spedos	Lower (or upper) legs	Whitish	H	1.1	3
2152	S	Spedos	Lower legs	White or whitish (white vein)	M	1.0	3
2153	S	Keros	Torso	White	H	0.2	2
2166	S	Other	Torso	Uncertain (whitish to greyish)	No	0.8	5
2178	S	Chalandriani	Head	White (milky)	M to H	2.0	2
2189	S	Spedos	Leg frag.	White	M	1.1	5
2194	S	Special	Head	Greyish	L to M	3.2	1
2199	S	Spedos	?R leg (lower)	Whitish	L to M	1.0	2
2207	S	Spedos	Waist	White	L to M	1.0	4
2253	S	Dokathismata	Neck	White or whitish (grey vein)	L	1.1	3
2261	S	Spedos	Torso	White or whitish	L to M	0.5	5
2272	S	Spedos	Upper legs and knees	Uncertain (whitish to greyish)	M to H	1.0	5
2275	S	Apeiranthos (D)	Body	White	H	1.5	3
2279	S	Apeiranthos (D)	Complete	White or whitish	L	0.4	4
2281	S	Dokathismata	Legs	Uncertain (whitish to greyish)	L	1.2	2
2298	S	Spedos	Lower legs and feet	White	L	0.8	3
2303	S	Keros	Feet	Greyish	L	0.5	5
2313	S	Spedos	Lower R leg	White or whitish	M to H	1.0	5
2314	S	Spedos	Lower legs	White	H	1.2	3
2319	S	Spedos	Lower legs	White or whitish	L	0.8	4
2330	S	Spedos	Leg (calf)	White or whitish	M	1.0	5

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
2335	S	Spedos	Thighs and calves	Uncertain (whitish to greyish)	L	0.5	5
2338	S	Indeterminate	L thigh	White or whitish	L	1.2	4
2341	S	Spedos	Possible upper leg Frag.	White or whitish	M	1.0	4
2342	S	Spedos	L foot frag.	Uncertain (whitish to greyish)	L	1.1	5
2343	S	Apeiranthos (D)	Body	White	L	0.5	4
2350	S	Dokathismata	Head frag.	Uncertain (whitish to greyish)	L	1.0	4
2361	S	Spedos	Leg frag.	White	M	1.0	5
2377	S	Spedos	R thigh	White (white vein)	M to H	0.9	3
2378	S	Spedos	Arms and waist	White or whitish	L	1.2	5
2380	S	Dokathismata	Pelvis	White (milky)	M to H	0.5	5
2381	S	Chalandriani	Head	White	L to M	1.5	4
2383	S	Spedos	L foot	White	H	1.0	4
2393	S	Spedos	Neck and partial head	White or whitish	L	1.1	4
2394	S	Chalandriani	Head	Greyish	L to M	1.0	2
2396	S	Spedos	Thighs	White or whitish	M	2.0	4
2400	S	Dokathismata	Neck	Greyish	M	0.9	2
2403	S	Spedos	Leg frag.	White or whitish	L	1.0	5
2411	S	Dokathismata	Lower legs and feet	White or whitish	M	1.2	2
2413	S	Keros	Arms. waist and pelvis	White	L	0.5	3
2418	S	Spedos	L leg	White	H	1.6	4
2419	S	Spedos	Waist and pelvis	Uncertain (whitish to greyish)	L	1.1	5
2421	S	Dokathismata	Lower legs	White	H	1.5	3
2422	S	Spedos	Lower arms and pelvis	White or whitish	L	1.0	5
2427	S	Chalandriani	Neck and shoulders	Greyish	M to H	0.8	3
2437	S	Other	Head	Whitish	M to H	1.2	3
2446	S	Uncertain	Body	White	H	0.5	4
2450	S	Apeiranthos	Body	Uncertain (whitish to greyish)	L	0.5	5
2501	S	Dokathismata	L shoulder	White	M to H	2.0	3
2504	S	Spedos	L foot frag.	White	H	1.9	3
2535	S	Apeiranthos (D)	Head	White	L	0.5	3
2610	S	Spedos	Head	White	L	1.1	5
2618	S	Chalandriani	Torso	Greyish	L	1.0	4
2620	S	Uncertain	Torso frag.	White	L	0.5	3
2625	S	Dokathismata	Pelvis. waist and L elbow	White	M	1.0	3
2629	S	Apeiranthos (D)	Head	White or whitish	L to M	1.0	3
2645	S	Spedos	R foot	White	H	0.8	4
2651	S	Spedos	Spall of leg	White	M	1.0	4
2652	S	Spedos	Neck	White	H	1.6	5
2654	S	Spedos	Head	Greyish	No	0.8	5
2655	S	Spedos	Upper legs	White	H	1.0	5
2709	S	Spedos	Feet	White	M to H	1.5	5
2710	S	Spedos	Crown of head	White	H	0.2	3
2711	S	Dokathismata (A)	Double figurine	White	M	2.0	5
2718	S	Spedos	Crown of head	White	M	1.3	5
2719	S	Dokathismata	Torso and waist	White	M to H	1.3	5

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
2750	S	Spedos	Arms and waist (spall)	White	M	2.0	5
2761	S	Indeterminate	?Neck	Uncertain (whitish to greyish)	L	0.5	3
2762	S	Dokathismata	Head	White	L	1.0	4
2764	S	Spedos	Head frag.	Uncertain (whitish to greyish)	No	1.0	5
2774	S	Spedos	L leg frag.	White	M	1.0	2
2780	S	Spedos	Neck and head	Greyish	L	1.5	2
2791	S	Spedos	Lower leg	White (greyish layer)	H	1.5	5
2797	S	Spedos	Calves	White or whitish	L	1.1	5
2804	S	Spedos	Torso	White	H	0.9	5
2811	S	Unfinished	Unfinished body	White	H	0.6	3
2814	S	Spedos	Pelvis and thighs	White	H	1.0	5
2815	S	Spedos	Upper leg	White	M to H	2.8	5
2816	S	Spedos	Large lower leg	White	L	1.6	5
2819	S	Dokathismata	Head	Whitish (grey band)	L	0.8	3
2827	S	Indeterminate	Neck	Greyish	L	1.2	2
2842	S	Spedos	R Foot	White	H	1.0	3
2846	S	Chalandriani	Torso Frag.	White or whitish	M	1.0	4
2848	S	Dokathismata	Torso	White	M	1.2	4
2849	S	Spedos	Waist, pelvis and upper legs	White or whitish	L	0.9	4
3014	S	Dokathismata	Head	White	M to H	0.5	1
3018	S	Spedos	Upper and lower legs	Whitish	H	1.4	5
3069	S	Indeterminate	?Neck	Greyish	L	1.0	5
3103	S	Spedos	Head and neck	White	H	1.0	4
3106	S	Apeiranthos (D)	Head	White	H	1.0	3
3111	S	Dokathismata	Head	White	H	1.3	2
3117	S	Spedos	Waist and pelvis	White	M to H	1.2	5
3129	S	Spedos	Leg frag.	White	M	0.5	2
3132	S	Spedos	Torso frag.	Greyish	M	1.0	5
3133	S	Spedos	Crown (only)	Whitish	L	1.0	3
3134	S	Dokathismata	Torso to upper legs	White or whitish	L	0.6	2
3138	S	Spedos	R leg frag.	White or whitish	L	1.0	3
4602	S	Chalandriani	Neck	White (milky)	L	1.0	2
4603	N	Spedos	R thigh	White	H	2.0	3
4605	S	Special	Waist and pelvis	White	M	1.5	5
4606	S	Spedos	Waist	White or whitish	H	1.1	5
4608	S	Apeiranthos (D)	Head	White or whitish	M	0.5	4
4613	S	Spedos	Waist?	White or whitish	No	1.8	5
4614	S	Indeterminate	Torso	White	M	0.5	3
4616	S	Spedos	Lower L leg	White	H	1.8	4
4619	S	Dokathismata	Pelvis and thighs	White	M	1.0	5
4627	S	Apeiranthos	Upper body	Greyish (red vein)	L	0.5	4
4628	A	Spedos	R arm and breast	White	L	1.0	5
4700	M	Spedos	Frag. at knee area	White	H	1.0	5
5385	D	Uncertain	Parallel-sided frag.	White or whitish	No	0.2	2
5746	D	Apeiranthos (D)	Complete	White	H	0.5	1

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
5751	D	Apeiranthos (D)	Complete	White	H	1.0	3
5814	D	Apeiranthos (D)	Complete	White	H	0.5	2
6014	S	Apeiranthos (D)	Body	White	M	0.5	4
6015	S	Keros	Legs and feet	White	L	0.5	3
6024	S	Other	Head frag.	White	M	3.0	4
6051	S	Apeiranthos	Lower part of figurine	White	M	1.0	4
6133	S	Dokathismata	Lower legs	White	M	1.0	3
6158	S	Dokathismata	Neck of folded arm figurine	White (milky)	M	0.5	2
6200	S	Spedos	Lower (or upper) L leg frag.	White	H	1.8	4
6203	S	Spedos	R foot	White	M	1.0	4
6205	S	Spedos	Head	White and grey bands	No	1.0	5
6206	S	Spedos	lower L leg	White	L	1.0	4
6208.2	S	Indeterminate	Lower part of head	White	L	1.4	4
6212	S	Spedos	L foot	White	L	0.5	4
6215	S	Spedos	L foot	White	M	1.0	4
6216	S	Spedos	Leg	White	L	1.0	4
6217	S	Spedos	R ankle	White or whitish	M	1.0	4
6222	S	Spedos	Head and neck	White	L	1.0	5
6231	S	Spedos	Lower L leg	White	M	1.0	3
6237	S	Spedos	Torso	Uncertain (whitish to greyish)	No	1.0	5
6247	S	Spedos	Torso and waist	White	L	1.0	4
6250	S	Spedos	L lower leg and heel	White	H	1.0	3
6251	S	Dokathismata	Lower legs and heel	Greyish	L	1.0	3
6252	S	Indeterminate	Legs	White	L	1.0	3
6253	S	Spedos	Lower leg and heels	White or whitish	L	1.0	5
6254	S	Dokathismata	Feet and lower legs	Greyish	L	1.0	3
6255	S	Spedos	Torso	White or whitish	No	1.1	5
6258	S	Spedos	L shoulder	White	L to M	1.0	4
6264	S	Spedos	Neck and head frag.	White	L	1.2	5
6272	S	Spedos	Head	Uncertain (whitish to greyish)	No	1.0	5
6274	S	Spedos	Waist and upper legs	White	No	1.0	5
6275	S	Spedos	Head	White or whitish	L	1.0	4
6284	S	Keros	Feet	White	M	1.0	4
6287	S	Spedos	Broken head	White	M	1.0	5
6288	S	Spedos	Head and neck	White	M	1.0	5
6291	S	Spedos	L foot	White	H	1.1	3
6292	S	Spedos	R leg (upper or lower)	White	L	1.1	4
6302	S	Spedos	Legs	White	H	1.0	4
6304	S	Spedos	Torso and part of waist	White	No	1.0	5
6305	S	Unfinished	Unfinished	White or whitish	L	1.1	4
6307	S	Special	R half torso (double fig.)	White	M	0.5	3
6322	S	Spedos	Head	White	No	1.0	4
6330	S	Apeiranthos (D)	Head	White or whitish	No	1.0	5
6337	S	Uncertain	Body frag.	Whitish	M	0.5	3
6339	S	Spedos	Waist	White	No	1.0	5

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
6341	S	Spedos	L thigh	White or whitish	No	1.0	5
6343	S	Dokathismata	Pelvis and upper legs	White	L	1.0	4
6403	S	Spedos	Waist, pelvis and thighs	White	H	1.0	4
6404	S	Spedos	Feet	White	M	1.0	4
6410	S	Spedos	Pelvis and upper leg	White or whitish	No	2.0	5
6414	S	Chalandriani	Lower legs and feet	White	L to M	1.0	4
6420	S	Dokathismata	Upper legs	White	M	1.0	4
6425	S	Spedos	R foot	White	H	1.5	3
6429	S	Spedos	Neck	White or whitish	No	1.1	5
6433	S	Chalandriani	Head	Greyish	L	0.5	3
6441	S	Spedos	Torso and neck	White	L	1.5	5
6442	S	Dokathismata	Torso	White	H	1.0	4
6456	S	Dokathismata	Head	White	H	1.0	3
6457	S	Chalandriani	Neck	White	L	0.5	4
6458	S	Dokathismata	Legs	White or whitish	No	1.0	5
6476	S	Spedos	Head	White (grey bands)	M	1.0	3
6478	S	Spedos	Pelvis and thighs	White	L	1.0	3
6480	S	Spedos	Lower R leg	White	H	1.5	3
6481	S	Spedos	R knee of thigh	White	H	1.0	4
6483	S	Spedos	Legs (upper or lower)	White or whitish	No	1.2	5
6484	S	Spedos	R foot	White or whitish	L	1.2	5
6600	S	Spedos	L torso	Uncertain (whitish to greyish)	L	1.0	5
6605	S	Apeiranthos (D)	Body	White or whitish	L	0.5	4
6607	S	Spedos	Lower leg	White or whitish	M	1.0	4
6608	S	Spedos	Torso and waist frag.	Uncertain (whitish to greyish)	No	1.5	5
6610	S	Spedos	Pelvis and thighs	Uncertain (white to greyish)	No	1.0	5
6614	S	Chalandriani	Torso	White (schist vein)	H	1.0	2
6619	S	Spedos	Waist and pelvis	White	No	2.0	4
6624	S	Dokathismata	Torso and part of neck	White or whitish	M	1.0	5
6816	S	Chalandriani	Small head	Whitish (schist vein)	M	2.0	5
6820	S	Other	Head	Uncertain (whitish to greyish)	No	1.0	3
6822	S	Spedos	Head	White	H	1.0	3
6824	S	Apeiranthos (D)	Body	White or whitish	No	1.1	3
6826	S	Chalandriani	L torso	White	L	1.0	5
6833	S	Dokathismata	Head	Uncertain (whitish to greyish)	No	1.5	5
6841	S	Indeterminate	Breast frag.	Uncertain (whitish to greyish)	No	1.0	5
6846	S	Dokathismata	Neck and lower head	White	M	0.5	2
6851	S	Apeiranthos (D)	Head	White	H	0.5	2
6855	S	Apeiranthos (D)	Body frag.	White	M	1.0	4
6856	S	Spedos	Torso and part of waist	White or whitish	No	1.0	5
6873	S	Apeiranthos	Body	Uncertain (whitish to greyish)	No	1.0	3
6874	S	Dokathismata	Torso and waist	White	L	1.5	5
7000	S	Spedos (Kavos)	Torso and waist	White	L	1.5	5
7001	S	Spedos	Upper legs	White	No	1.8	5
7005	S	Apeiranthos	Head	White	M	0.5	3

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
7007	S	Spedos	Upper leg	White	L	1.5	5
7100	S	Chalandriani	Neck and head	Whitish	L	1.1	4
7151	S	Other	Frag. of throne	White	M to H	1.2	3
7152	S	Apeiranthos (D)	Complete	Greyish (red vein)	L	0.6	4
7153	S	Spedos	Head	White	M	1.0	4
7154	S	Spedos	Head and part of neck	White	M	1.0	5
7201	S	Spedos	Upper legs and knees	White	L	1.1	5
7207	S	Dokathismata	Torso	White or whitish	L	1.0	5
7224	S	Spedos	Leg frag.	White	No	1.0	4
7243	S	Spedos	Lower L leg	White or whitish	No	1.0	3
7266	S	Dokathismata	Legs and feet	White	H	1.0	3
7400	S	Spedos	Damaged lower legs	White or whitish	L	1.8	5
7409	S	Keros	Head and neck	White	L	1.0	5
7410	S	Keros	Head	White (red limestone layer)	M	1.0	5
7420	S	Spedos	Waist of figure	White	L	1.2	5
7422	S	Spedos	Feet	White	H	1.0	5
7447	S	Spedos	Torso and waist	White	H	1.0	5
7510	S	Spedos	Torso and waist	White or whitish	No	1.5	5
10413	D	Apeiranthos (D)	Body	White/very light greyish	H	0.8	3
10769	D	Apeiranthos	Complete	Whitish	H	0.4	1
10793	D	Apeiranthos (D)	Complete	Whitish	H	0.4	1
11430	D	Apeiranthos (D)	Head	White	H	0.2	1
11795	D	Apeiranthos (D)	Complete	White (white vein)	H	0.6	1
12428	D	Apeiranthos (D)	Body	Whitish	H	0.3	2
20102	S	Spedos	Head frag.	White	No	1.0	5
20103	S	Keros	Feet	Uncertain (whitish to greyish)	No	1.0	4
20105	S	Spedos	Lower leg frag.	Uncertain (whitish to greyish)	L	1.1	4
20107	S	Dokathismata	Head	Whitish	L	0.6	2
20110	S	Chalandriani	Legs	White	L	1.0	2
20111	S	Spedos	Head	Grey	No	1.2	5
20113	S	Dokathismata	Upper legs	White	L	1.0	2
20114	S	Spedos	Knees	White	No	1.2	5
20116	S	Spedos	Upper legs	White or whitish	No	1.0	5
20120	S	Spedos	R foot	Uncertain (whitish to greyish)	M	1.1	5
20121	S	Unfinished	Body	Whitish	M	0.6	4
20127	S	Dokathismata	Neck	White or whitish	No	1.2	5
20132	S	Dokathismata	Flat torso	White	L	1.2	4
20145	S	Spedos	Feet	Whitish	No	1.2	5
20147	S	Dokathismata	Lower legs	Whitish	L	1.1	2
20149	S	Spedos	Neck (or waist)	White	M to H	1.2	4
20151	S	Apeiranthos (D)	Head	White	No	0.5	4
20156	S	Spedos	R upper leg	White or whitish	No	1.1	5
20161	S	Dokathismata	Feet	White	L	2.0	4
20164	S	Spedos	Head and neck	White	No	2.0	5
20167	S	Spedos	Upper legs	White	No	1.0	4

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
20168	S	Spedos	Lower legs	White or whitish	No	1.2	4
20175	S	Keros	Waist and upper legs	White	L to M	1.1	2
20178	S	Spedos	R foot	White or whitish	No	1.4	4
20202	S	Keros	Feet	White or whitish	L	2.0	4
20207	S	Spedos	Pelvis	White	L to M	1.5	2
20233	S	Apeiranthos (D)	Body	White	H	2.1	4
20237	S	Spedos	Spall of upper leg	White or whitish	No	1.2	5
20332	S	Chalandriani	Head	White	No	1.0	5
20412	S	Indeterminate	Neck frag.	White or whitish	No	0.9	5
20417	S	Spedos	Head frag.	White or whitish	L	1.0	5
20418	S	Chalandriani	Torso	White	No	1.1	4
20423	S	Spedos	Frag. of R leg	White	H	1.4	5
20424	S	Spedos	Upper leg	White	No	1.0	5
20425	S	Spedos	Upper leg frag.	White	No	1.2	5
20429	S	Chalandriani	Breast	White or whitish	No	0.9	5
20432	S	Spedos	Head and neck	Uncertain (whitish to greyish)	M	0.2	4
20502	S	Spedos	L upper (or lower) leg	White	M	1.3	3
20507	S	Spedos	Upper leg	White	No	1.0	5
20508	S	Uncertain	Uncertain frag.	White or whitish	H	2.9	5
20510	S	Apeiranthos (D)	Body	Whitish	M to H	0.4	4
20515	S	Spedos	R knee	White	L	1.1	5
20518	S	Chalandriani	Torso	Greyish	L	1.2	5
20519	S	Spedos	Waist	Greyish	L	1.0	4
20522	S	Dokathismata (A)	Torso	White	L	1.1	5
20525	S	Dokathismata	Waist and pelvis	Whitish	M	1.5	5
20528	S	Dokathismata	Head frag.	White or whitish	L to M	1.0	5
20530	S	Spedos	Waist frag.	White (quartz? vein)	L	1.0	5
20542	S	Spedos	Torso	White	L	1.7	5
20544	S	Spedos	Upper legs	Whitish	No	1.1	5
20547	S	Spedos	Upper legs	White	M	1.5	5
20548	S	Spedos	Torso to knees	White or whitish	L	1.5	4
20552	S	Spedos	Lower legs	White	L	1.8	5
20553	S	Spedos	Waist and upper legs	Uncertain (whitish to greyish)	L	1.6	5
20604	S	Unfinished	Unfinished body	White	L to M	1.2	5
20607	S	Dokathismata	Arms and pelvis	White or whitish	L	0.5	3
20706	S	Spedos	Lower legs and heels	White	L	0.8	3
20708	S	Spedos	Torso to knees	White or whitish	No	1.0	5
20711	S	Apeiranthos (D)	Plump figurine	White	L	1.0	5
20712	S	Apeiranthos	Complete	Whitish (mica vein)	L	1.0	5
20718	S	Chalandriani	Feet	Greyish	L	1.0	4
20720	S	Spedos	?Lower legs	White or whitish	No	1.0	5
20724	S	Chalandriani	Legs and thighs	Greyish	L to M	1.0	4
20725	S	Spedos	Lower legs	Greyish	L	1.2	4

Table 5.1. *(Continued.)*

SF no.	Location	Variety	Part	Colour, veins	Transp.	MGS (mm)	WD
20727	S	Spedos	Upper legs	White or whitish	M to H	1.1	4
20730	S	Spedos	Upper legs	White (white vein)	L	2.0	5
20731	S	Spedos	Upper legs	White	M	2.0	4
20732	S	Chalandriani	Knees	Greyish	L	1.5	5
20739	S	Dokathismata	Lower legs	White	H	1.1	3
20743	S	Apeiranthos (D)	Body	White	L	0.5	4
20748	S	Apeiranthos (D)	Plump body	White or whitish	M	1.5	2
25006	S	Spedos	Torso	Whitish	No	1.0	5
25017	S	Spedos	Head	White	No	1.5	5
25018	S	Spedos	R breast	Uncertain (whitish to greyish)	No	1.2	5
25019	S	Spedos	R shoulder	White	No	0.7	4
25020	S	Chalandriani	Head	Greyish	No	0.5	4
25021	S	Keros	Torso	White	M	0.5	4
25025	S	Spedos	Torso	White or whitish	No	1.0	5
25026	S	Spedos or Kapsala	R foot	White	H	1.4	2
25029	S	Spedos	Head	White or whitish	No	1.0	5
25032	S	Spedos	Lower legs	White	H	1.2	2
25033	S	Unfinished	Head to shoulders	White	L	1.0	4
25034	S	Spedos	Torso and upper legs	Greyish	No	1.5	3
25035	S	Chalandriani	Feet	White	L to M	1.2	2
25037	S	Apeiranthos	Flat head	Greyish	M	0.4	3
25038	S	Dokathismata (A)	Torso	White	L	1.2	4
25055	S	Dokathismata	Torso and upper legs	White	H	1.6	2
25061	S	Spedos	L foot	White	H	1.5	3
25066	S	Dokathismata	Feet	White	H	1.2	3
25076	S	Dokathismata	R elbow and shoulder	Greyish (white vein)	No	1.1	5
25077	S	Spedos	Upper or lower legs	Whitish	No	1.5	5
25091	S	Spedos	Legs	White or whitish	L	0.5	4
25114	S	Spedos	Head	White	L	1.1	3
25123	S	Dokathismata	Waist and upper legs	White (white vein)	M	1.5	4
25124	S	Spedos	Neck	White or whitish	L to M	1.0	3
25126	S	Spedos	Upper legs	White or whitish	No	1.0	5
25127	S	Spedos	Neck	White	L	1.3	4
25507	S	Spedos	Waist (or neck)	White	H	1.5	5
25514	S	Dokathismata	L shoulder	White	M	1.5	5
30026	E	Spedos	Waist and arms	White	M to H	1.5	3
30027	N	Spedos	R lower (or L upper) leg	White	H	1.1	1
30028	P	Spedos	Torso and upper legs	White (red vein)	L to M	1.8	5
30030.2	S	Spedos	L upper leg	White	No	2.0	5
30416	S	Dokathismata	Torso	White or whitish	H	1.1	3
30420	S	Dokathismata	Legs and feet	White	H	1.2	3

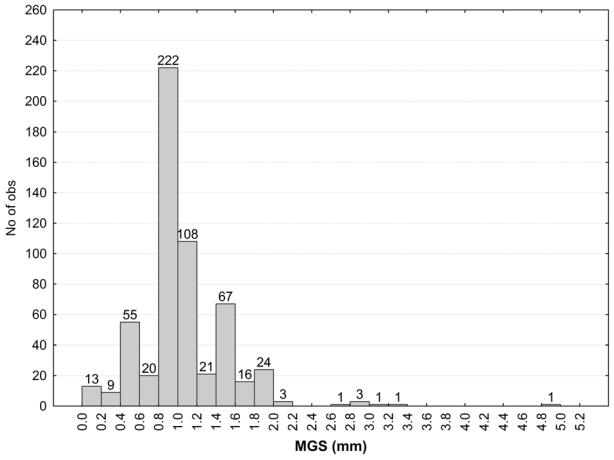

Figure 5.43. *Histogram showing the distribution of the MGS measured for all the figurines (n=564).*

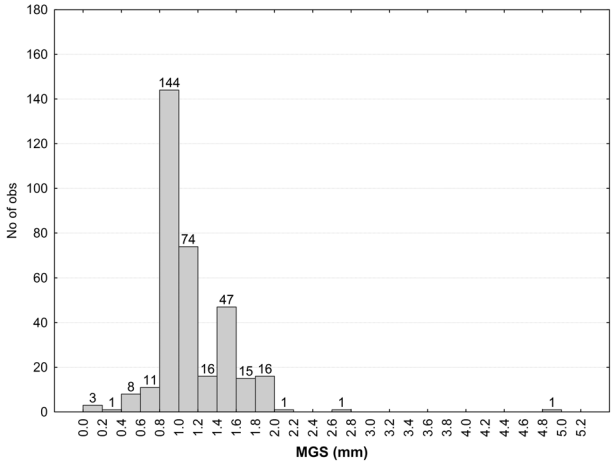

Figure 5.44. *MGS distribution of Spedos variety, including the Kavos sub-variety.*

Figure 5.43 presents the distribution of MGS for all the 564 figurines in histogram form. Most figurines are made of marble with MGS from 0.2 to 2.0 mm, while the most probable value (the value at which the highest number of figurines concentrate) is around 1.0 mm. Only 10 figurines out of the 564 are made of marble with MGS over 2.0 mm, of which six have a MGS around 3.0 mm and one of 5.0 mm. This is a very interesting result in view of the abundance and extent of coarse marble (MGS >2.0 mm) outcrops all over the Cyclades (Fig. 5.32). This persistent use of fine marble may reflect two factors relating to the prehistoric craftsmen who manufactured the figurines:

1. Either they carefully selected a finer marble, most probably for easier carving and polishing, or

2. They lived in areas where only fine marble deposits exist.

If we examine the MGS distribution of the marble of each figurine variety separately (Figs. 5.44–5.46), we observe the following:

The Spedos variety (Fig. 5.44) follows the general overall distribution with the feature that its MGS are particularly concentrated in the range 0.8–2.0 mm and that the number of figurines made of very fine marble (MGS <0.8 mm) represents a very small percentage (3.8 per cent) of the total Spedos variety. A few figurines are made in ultra-fine-grained marble and just two figurines are made of clearly coarser marble, one with MGS of 2.8 mm and one with 5.0 mm.

The Kavos sub-variety of the Spedos variety is represented by three figurines all having MGS of 1.5 mm.

The two figurines of Spedos or Kapsala variety have MGS of 1.0 and 1.4 mm (Table 5.1). They fall within the bulk of the Spedos distribution without any significant deviation and hence are included in the general Spedos histogram.

The Dokathismata variety figurines (Fig. 5.45A) seem to have marble mostly also in the MGS range 0.8–2.0 mm, like the Spedos variety, but the percentage made with very fine marble (MGS <0.8 mm) is about 19 per cent, much higher than that of the Spedos variety. Furthermore, of those made with very fine marble, some are made of ultra-fine marble with MGS <0.5 mm. In addition, there are no samples at all with MGS above 2.2 mm.

Figurines of the Akrotiri sub-variety of the Dokathismata variety are concentrated in a narrow MGS range of 1.0–0.5 mm (Fig. 5.45B), with one figurine having 0.5 mm and one 2.0 mm. Compared with the rest of Dokathismata variety, the higher and lower values are missing, which shows a larger MGS distribution range. This should, however, be treated with caution, because of the low number of figurines (6 fragments) in this sub-variety.

The fragmentary and indeterminate figurines seem to be made of marble with a MGS mostly in the range 0.8–1.8 mm. However a large fraction (30 per cent) is made of finer marble (Fig. 5.45C). There is also one figurine made with a coarser marble.

The Chalandriani variety (Fig. 5.45D) shows a rather strong concentration in its MGS values in the range 0.8–1.5 mm, but with an unusually high frequency peak around 1.0 mm, where about 65 per cent of the samples accumulate, indicating a systematic use of a single marble source. The very fine (MGS <0.8 mm) and ultra-fine (MGS <0.5 mm) marble types are also present, together representing a fraction of about 12 per cent of the total of this variety. One figurine with a MGS of 2.0 mm is also present.

The Keros variety (Fig. 5.45E) in general shows the same overall distribution as the typical Chaland-

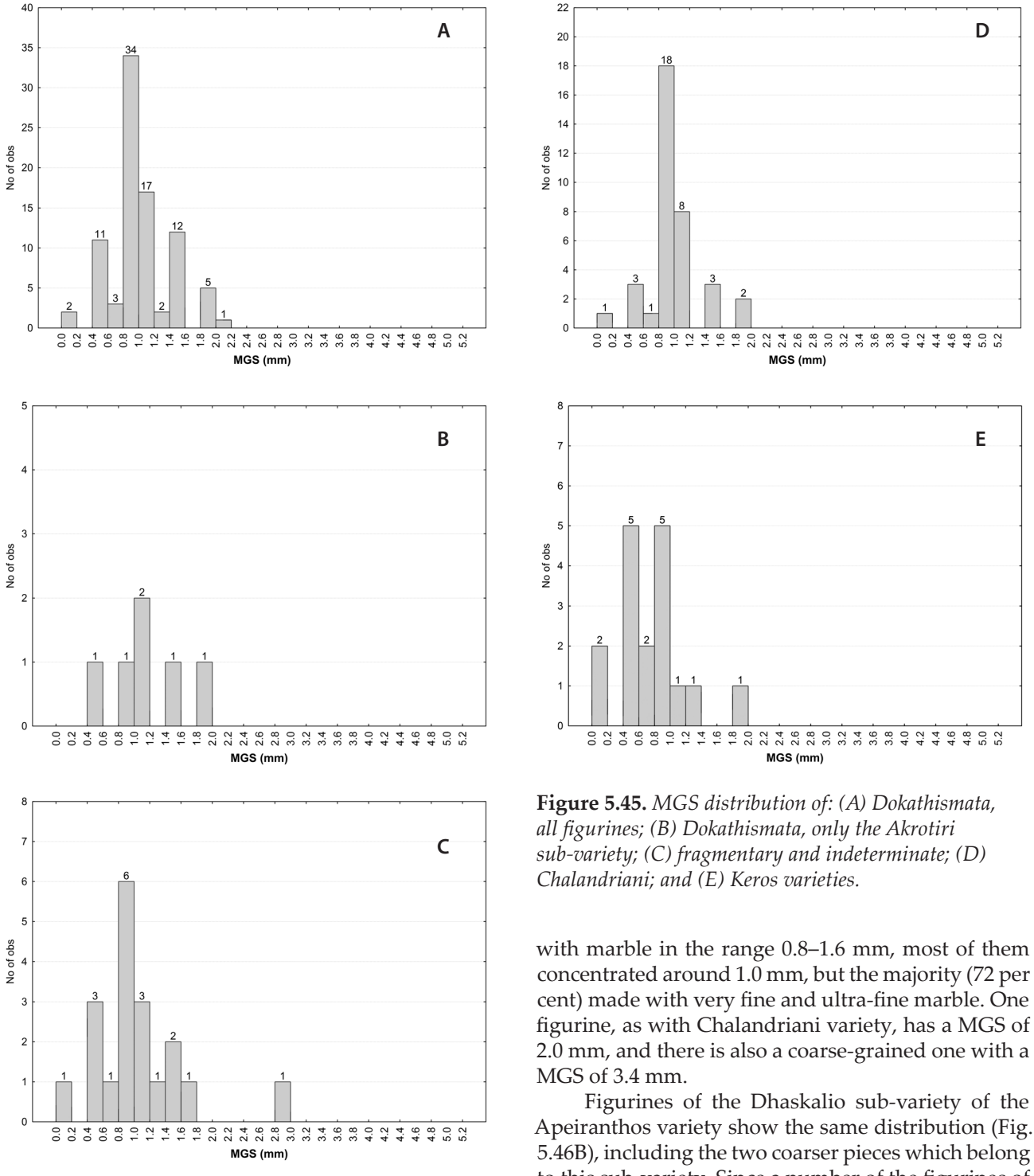

Figure 5.45. *MGS distribution of: (A) Dokathismata, all figurines; (B) Dokathismata, only the Akrotiri sub-variety; (C) fragmentary and indeterminate; (D) Chalandriani; and (E) Keros varieties.*

riani variety, but with the difference that half of the figurines (50 per cent) are made with the very-fine and ultra-fine grade marble.

The schematic Apeiranthos variety (Fig. 5.46A) shows a distribution to a certain extent resembling that of the Chalandriani variety, having a kind of bimodal distribution with a number of figurines made with marble in the range 0.8–1.6 mm, most of them concentrated around 1.0 mm, but the majority (72 per cent) made with very fine and ultra-fine marble. One figurine, as with Chalandriani variety, has a MGS of 2.0 mm, and there is also a coarse-grained one with a MGS of 3.4 mm.

Figurines of the Dhaskalio sub-variety of the Apeiranthos variety show the same distribution (Fig. 5.46B), including the two coarser pieces which belong to this sub-variety. Since a number of the figurines of this sub-variety was found at Dhaskalio, from which they took their name, we tested the distribution of the MGS of the figurines found at Dhaskalio separately (Fig. 5.46C) to see if they showed a different pattern concerning the marble sources used for their manufacture. Indeed, as seen from this histogram, the Dhaskalio sub-variety figurines found at Dhaskalio

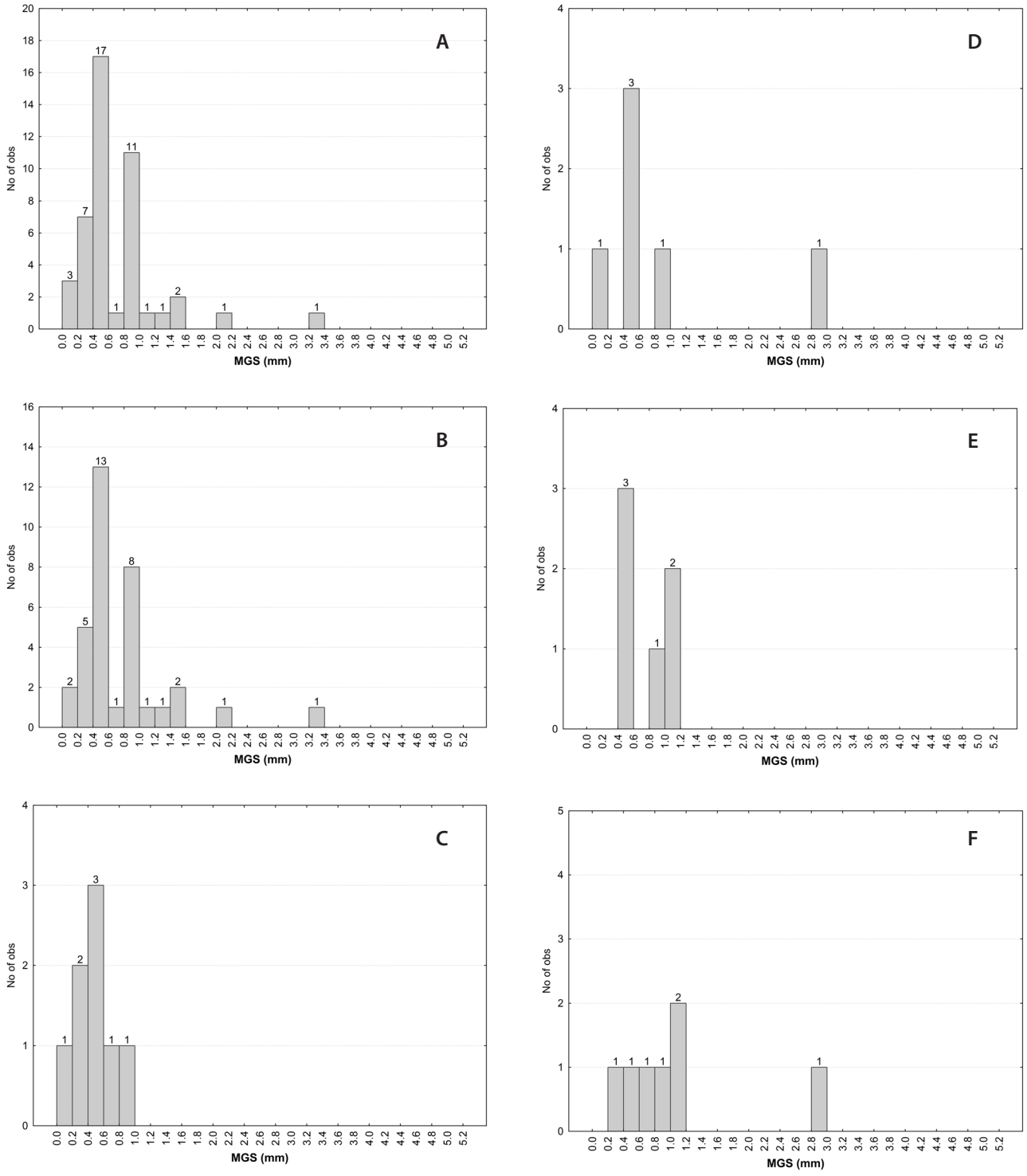

Figure 5.46. *MGS of figurines of: (A) Apeiranthos variety, all figurines; (B) Apeiranthos, only Dhaskalio sub-variety; (C) Apeiranthos, Dhaskalio sub-variety, only those found at Dhaskalio; (D) schematic figurines of uncertain variety; (E) unfinished folded-arm figurines; and (F) figurines of other type.*

are made exclusively of very fine and ultra-fine marble, pointing probably to a single source.

Schematic figurines of uncertain variety show the same distribution as those of the Apeiranthos variety,

with most made of very fine and ultra-fine marble (Fig. 5.46D). One figurine has a MGS around 1.0 mm and one is coarser, with a MGS of 2.8 mm.

The unfinished folded-arm figurines, only six in number, are divided into two groups. One group (three figurines) is made with marble of MGS of 0.5–0.6 mm and the other (also three figurines) of 1.0–1.2 mm (Fig. 46E).

The figurines of other type, although small in number, also show a wide range of MGS values from ultra-fine to fine and with one coarse example (Fig. 5.46F).

Finally, three figurines of the Special type, **2194**, **4605** and **6307** (Table 5.1), have MGS of 3.2 mm, 1.5 mm and 0.5 mm, respectively.

On the whole, the analysis by MGS according to variety shows the use of ultra-fine (MGS <0.5 mm), very fine (MGS 0.5–0.8 mm), fine (MGS 0.8–1.6 mm), medium-fine (MGS 1.6–2.0 mm) and very rarely coarse (MGS 2.8–5.0 mm) marble for all varieties. However, the fraction of figurines in each of these marble groups varies considerably between the different varieties and types. For example, the Spedos variety is made predominantly of marble of MGS >0.8 mm, while the Dhaskalio sub-variety is mostly <0.8 mm, and those found on Dhaskalio are made exclusively of marble <0.8 mm. In general, the schematic figurines of all varieties are made of finer marble, with a few exceptions.

The above results may indicate marble preferences or different habitation locations for the craftsmen making the different varieties of figurine. The Dhaskalio sub-variety figurines found at Dhaskalio seem to be made exclusively of one type of marble. All the remaining varieties have examples made of slightly different types of marble (different locations). All these differentiations work to show a general overall preference for the use of fine marble (MGS <2.0 mm) for figurines of all varieties.

The transparency, as seen from Table 5.1, displays all variations from opaque to high transparency in all varieties. Most probably this results from differential weathering and deposition on the surface, which in many objects masks the original transparency of the marble. However, the Dhaskalio sub-variety, and particularly those found at Dhaskalio, are all made of marble with a high transparency. This, in conjunction with the ultra-fine grain sizes of the marble, indicates a special provenance and production for this group of figurines.

The colour of the marble of the figurines is another parameter which we tried to record. The weathering and surface deposition was again a factor inhibiting the judgement of colour, but in most cases an estimate of marble colour was possible. From Table 5.1 and

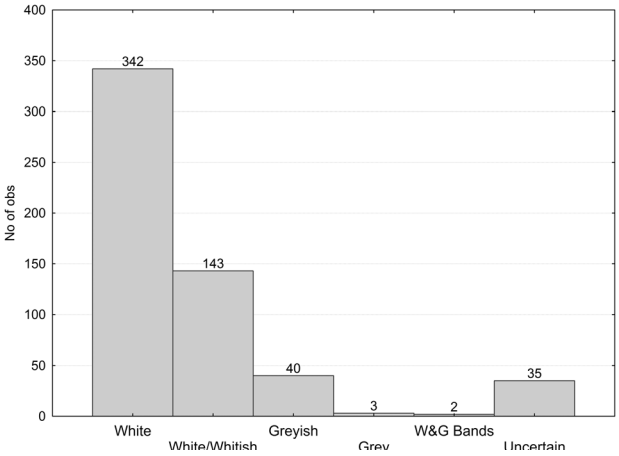

Figure 5.47. *Histogram showing the distribution of marble colours observed in all figurines (W&G Bands=white and grey bands; Uncertain=opaque or undetermined).*

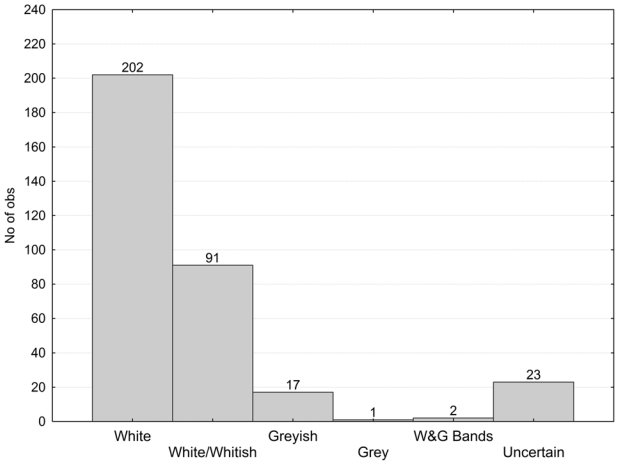

Figure 5.48. *Histogram showing the distribution of marble colours observed in figurines of Spedos variety (W&G Bands=white and grey bands; Uncertain=opaque or undetermined).*

Figure 5.47 it can be shown that most of the figurines are made of marble of white or whitish colour (slightly off-white that can have a yellowish, greyish or brownish background) and a few are light grey. Only three figurines out of 564 are made of grey marble and two of banded marble with white and grey bands. This is a clear indication that white marble was preferred for the manufacture of the figurines. This, in conjunction with the selection of a fine-grained marble, proves that the production of these objects was in the main undertaken by experienced craftworkers who sought marble with specific properties at specific places, perhaps within the general area in which they lived.

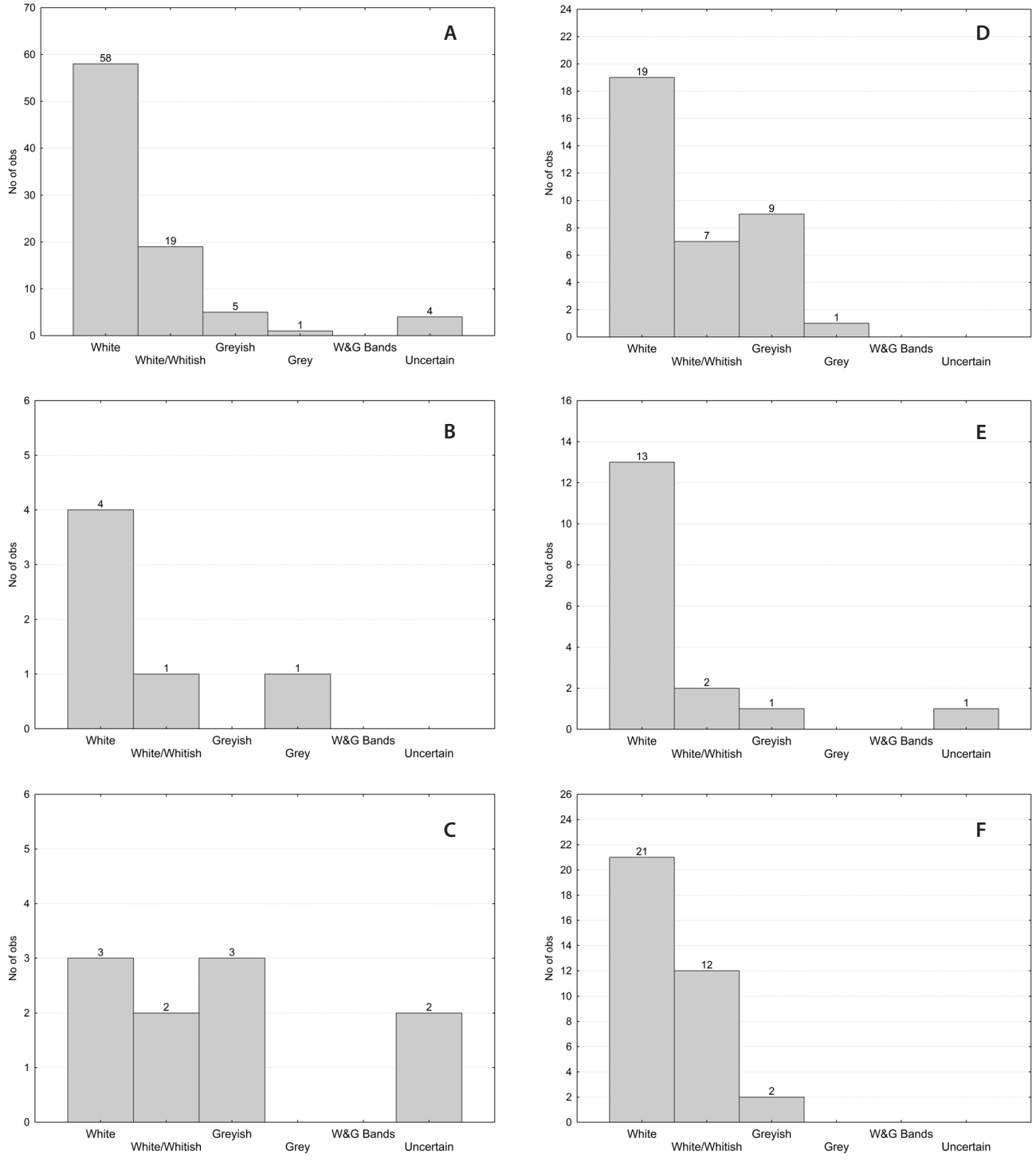

Figure 5.49. *Distribution of marble colours for figurines of (A) Dokathismata variety, all figurines; (B) Akrotiri sub-variety of Dokathismata variety; (C) Apeiranthos variety, not including the Dhaskalio sub-variety; (D) Chalandriani variety; (E) Keros variety; (F) Dhaskalio sub-variety of Apeiranthos variety. (W&G Bands=white and grey bands; Uncertain=opaque or undetermined.)*

There are no major deviations in marble colour between the different figurine types and varieties, although some preferences can be seen. The Spedos and Dokathismata varieties follow the general trend (Figs. 5.48 & 5.49A). On the other hand, the Chalandriani and Apeiranthos (non-Dhaskalio) varieties show a

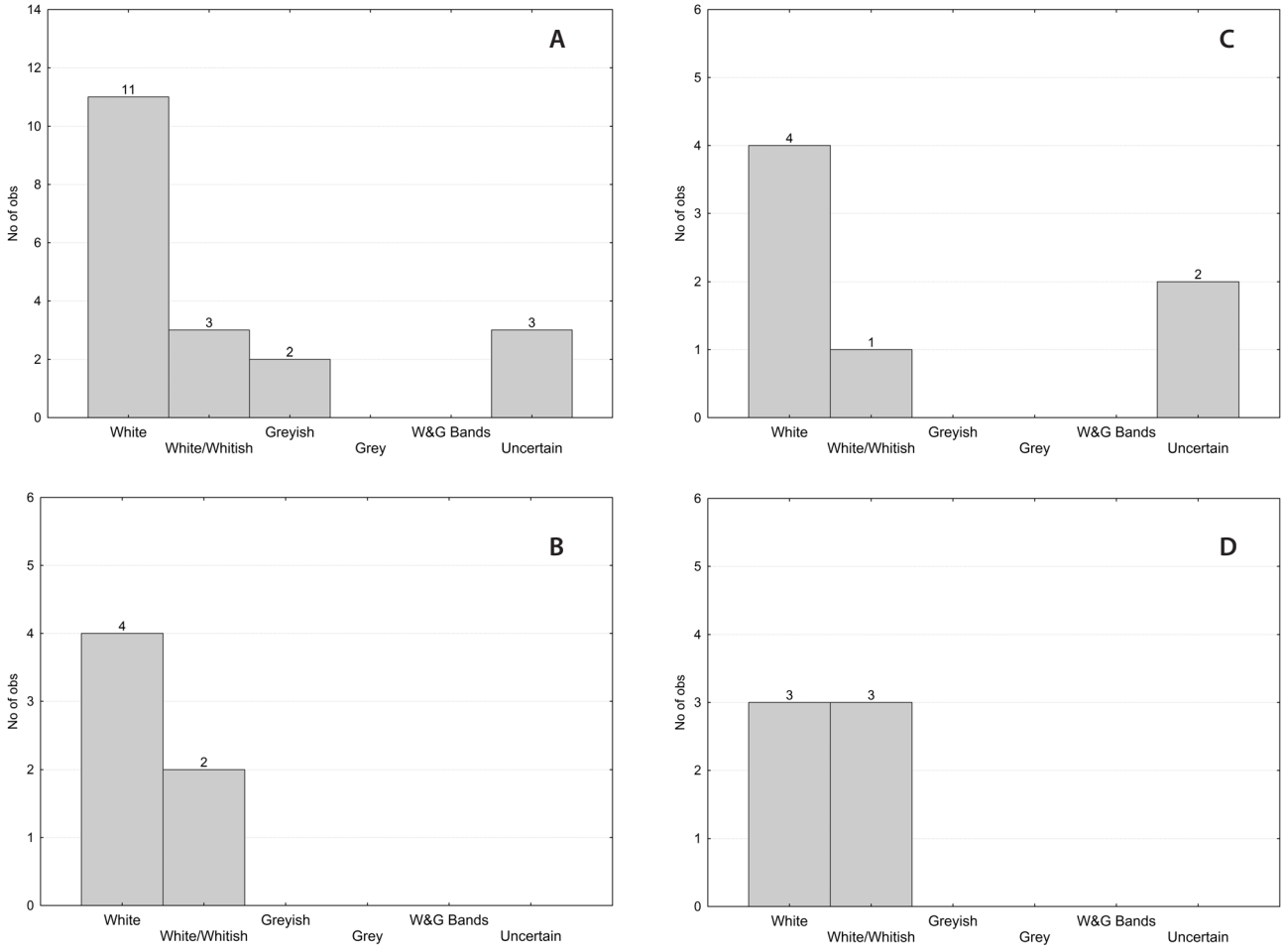

Figure 5.50. *Distribution of marble colours for figurines of (A) fragmentary and indeterminate variety; (B) unfinished variety; (C) other type; (D) uncertain (schematic) variety. (W&G Bands=white and grey bands; Uncertain=opaque or undetermined.)*

relatively greater number of greyish marble, while the Akrotiri sub-variety, unfinished and uncertain varieties, as well as the other type, are exclusively made of white or whitish marble (Figs. 5.49 and 5.50).

Analysis of sampled figurines

Following initial examination and measurement of all the figurines, we proceed to the presentation of the results for the figurines that had been sampled and fully analysed. The analyses are shown in Table 5.2. The values of the spectroscopic parameters measured with EPR, as well as the isotopic signatures measured with IRMS, are presented, together with the MGS and colour. The approximate percentage of dolomite contained in the calcitic marbles is measured from the high field side peaks of the EPR spectra shown in Figure 5.51, which represents a slight modification of the procedure suggested in the literature (Attanasio *et al.* 2006; Cordischi *et al.* 1988; Mandi 1993). For a number of figurines the amount of sample material received was extremely small, of the order of a few milligrams, due to the delicate nature of the object. In these cases EPR spectroscopic analysis could not be performed and so the EPR parameters, including the dolomite percentage, could not be determined (denoted by 'n.m.' in Table 5.2). For the other small samples, apart from these minute ones, a special methodology developed in the Laboratory of Archaeometry (Tambakopoulos 2007) permitted their measurement by EPR spectroscopy.

A general inspection of the analytical results in Table 5.2 shows that the marble of the figurines analysed is in most cases pure calcitic, occasionally containing a small percentage of dolomite. The varieties whose marble contains more than 10 per cent dolomite are the Dhaskalio sub-variety (2 out of 8), the Chalandriani variety (3 out of 9), one Keros variety figurine out

Table 5.2. *Results of analysis for the Keros figurines. %Dol.=percentage of dolomite contained in the marble (Tr=trace; – =under detection limit or zero); n.m.=not measured with EPR due to very small sample; A=Akrotiri sub-variety; D=Dhaskalio sub-variety.*

SF no.	Variety	Colour, veins	%Dol.	MGS (mm)	Mn^{2+} (r.u.)	Width (G)	Fe^{3+} (r.u.)	$\delta^{13}C‰$ (vsPDB)	$\delta^{18}O‰$ (vsPDB)
4602	Chalandriani	White (milky)	–	1.0	1,234.0	3.54	4.8	2.21	–8.50
4603	Spedos	White	Tr	2.0	1,490.9	1.50	6.7	2.05	–11.60
4614	Indeterminate	White	–	0.5	84.5	2.20	2.3	3.45	–3.17
4616	Spedos	White	–	1.8	870.8	2.10	10.6	1.90	–10.64
6015	Keros	White	n.m.	0.5	n.m.	n.m.	n.m.	2.54	–7.35
6024	Other	White	–	3.0	287.8	4.05	7.4	2.32	–3.66
6133	Dokathismata	White	–	1.0	395.5	2.27	7.1	2.29	–3.79
6222	Spedos	White	–	1.0	477.6	1.60	10.0	0.20	–7.70
6231	Spedos	White	9%	1.0	538.0	2.28	2.5	1.93	–6.90
6250	Spedos	White	–	1.0	1,159.8	1.66	9.2	2.09	–9.08
6274	Spedos	White	Tr	1.0	702.0	1.52	1.5	2.29	–4.49
6288	Spedos	White	Tr	1.0	630.5	1.41	11.1	2.19	–8.67
6307	Special	White	4	0.5	1.273.9	2.56	4.4	2.25	–5.44
6337	Uncertain	Whitish	–	0.5	1.033.6	1.72	21.8	–1.97	–3.05
6403	Spedos	White	–	1.0	9.0	1.75	2.1	1.23	–2.76
6420	Dokathismata	White	–	1.0	166.0	2.24	5.8	1.89	–4.37
6425	Spedos	White	Tr	1.5	525.3	1.54	12.6	2.13	–9.67
6456	Dokathismata	White	–	1.0	188.9	1.53	5.2	2.16	–4.32
6476	Spedos	White (grey bands)	–	1.0	313.1	1.94	5.3	1.49	–4.08
6478	Spedos	White	–	1.0	666.4	2.28	2.4	1.90	–9.01
6480	Spedos	White	–	1.5	536.4	1.57	5.0	2.14	–9.54
6481	Spedos	White	–	1.0	446.1	1.45	10.6	2.18	–7.27
6614	Chalandriani	White (schist vein)	2%	1.0	1,341.7	4.91	11.6	1.69	–4.24
6619	Spedos	White	–	2.0	491.9	1.99	5.1	1.98	–7.20
6624	Dokathismata	White or whitish	–	1.0	221.1	1.38	9.6	1.78	–4.07
6816	Chalandriani	Whitish (schist vein)	11%	2.0	504.9	1.75	14.9	3.74	–2.86
6846	Dokathismata	White	–	0.5	144.6	1.71	12.3	0.64	–5.72
6855	Apeiranthos (D)	White	–	1.0	196.4	2.09	4.8	1.84	–4.95
6874	Dokathismata	White	–	1.5	763.2	1.93	8.9	2.04	–8.80
7005	Apeiranthos	White	Tr	0.5	1,620.3	1.83	6.6	1.97	–14.87
7266	Dokathismata	White	Tr	1.0	825.7	1.50	8.7	2.16	–7.28
10413	Apeiranthos (D)	White or very light greyish	–	0.8	1,224.2	1.55	85.2	–1.82	–10.49
11430	Apeiranthos (D)	White	12%	0.2	657.4	2.00	5.5	2.26	–5.50
12428	Apeiranthos (D)	Whitish	14%	0.3	235.8	2.35	7.0	2.50	–6.69
20102	Spedos	White	–	1.0	264.6	2.85	1.8	2.58	–4.87
20107	Dokathismata	Whitish	17%	0.6	157.9	2.04	5.1	1.70	–2.18
20110	Chalandriani	White	6%	1.0	1,192.5	2.95	35.9	3.62	–2.63
20113	Dokathismata	White	–	1.0	985.3	4.99	3.0	2.08	–8.45
20121	Unfinished	Whitish	26%	0.6	1,351.5	3.58	7.1	3.12	–4.02
20132	Dokathismata	White	–	1.2	339.4	1.62	6.5	–1.81	–7.80
20147	Dokathismata	Whitish	Tr	1.1	379.9	1.61	11.2	1.07	–6.74
20167	Spedos	White	–	1.0	316.9	1.77	4.4	1.23	–5.21
20175	Keros	White	17%	1.1	144.0	2.31	4.5	2.00	–2.30
20207	Spedos	White	–	1.5	201.3	1.19	15.1	–2.20	–7.31

Table 5.2. *(Continued.)*

SF no.	Variety	Colour, veins	%Dol.	MGS (mm)	Mn^{2+} (r.u.)	Width (G)	Fe^{3+} (r.u.)	$\delta^{13}C‰$ (vsPDB)	$\delta^{18}O‰$ (vsPDB)
20233	Apeiranthos (D)	White	–	2.1	118.1	1.91	11.3	2.90	–7.21
20418	Chalandriani	White	17%	1.1	240.6	1.41	18.4	0.86	–3.13
20423	Spedos	White	Tr	1.4	348.5	1.64	11.2	–0.07	–7.73
20425	Spedos	White	–	1.2	503.9	1.53	9.1	1.13	–5.56
20507	Spedos	White	–	1.0	643.4	2.78	4.6	2.31	–8.14
20510	Apeiranthos (D)	Whitish	Tr	0.4	1,761.9	3.03	5.7	2.58	–5.22
20515	Spedos	White	n.m.	1.1	n.m.	n.m.	n.m.	2.41	–8.15
20518	Chalandriani	Greyish	–	1.2	128.6	2.57	5.0	–0.18	–2.21
20522	Dokathismata (A)	White	–	1.1	525.2	1.56	9.8	0.79	–6.03
20525	Dokathismata	Whitish	–	1.5	889.5	2.10	10.2	0.63	–5.72
20530	Spedos	White (quartz? vein)	–	1.0	333.5	2.84	5.8	2.20	–6.40
20542	Spedos	White	Tr	1.7	502.8	1.69	1.9	1.99	–7.45
20547	Spedos	White	Tr	1.5	542.3	1.70	2.6	1.86	–7.67
20548	Spedos	White or whitish	n.m.	1.5	n.m.	n.m.	n.m.	3.05	–5.93
20604	Unfinished	White	–	1.2	262.0	2.50	5.8	1.90	–4.07
20607	Dokathismata	White or whitish	9%	0.5	1,165.9	3.08	21.9	3.72	–2.52
20711	Apeiranthos	White	–	1.0	226.2	1.70	8.5	1.67	–5.00
20712	Apeiranthos	Whitish (mica vein)	–	1.0	1,968.7	4.55	6.8	2.72	–3.70
20724	Chalandriani	Greyish	–	1.0	200.1	2.08	7.0	1.38	–1.90
20730	Spedos	White (white vein)	Tr	2.0	1,365.1	1.88	6.0	2.03	–9.83
20731	Spedos	White	Tr	2.0	682.9	1.70	12.4	1.90	–8.60
20743	Apeiranthos (D)	White	9%	0.5	841.9	1.94	3.9	2.20	–6.09
25006	Spedos	Whitish	–	1.0	328.8	1.36	11.5	1.75	–6.59
25017	Spedos	White	–	1.5	316.6	1.61	5.0	2.08	–5.03
25019	Spedos	White	Tr	0.7	444.1	2.05	4.0	1.76	–4.62
25020	Chalandriani	Greyish	13%	0.5	274.5	2.36	6.9	–0.07	–2.38
25021	Keros	White	–	0.5	2,010.3	2.93	3.9	2.36	–12.01
25026	Spedos or Kapsala	White	Tr	1.4	704.3	1.63	9.6	1.98	–8.52
25032	Spedos	White	–	1.2	447.3	1.75	10.2	1.60	–7.99
25033	Unfinished	White	Tr	1.0	451.8	2.79	8.0	1.58	–6.71
25034	Spedos	Greyish	Tr	1.5	281.5	1.64	3.9	1.60	–4.45
25035	Chalandriani	White	n.m.	1.2	n.m.	n.m.	n.m.	2.93	–9.94
25038	Dokathismata (A)	White	Tr	1.2	382.2	1.60	5.2	2.08	–5.22
25055	Dokathismata	White	–	1.6	162.7	1.36	6.6	2.17	–4.24
25061	Spedos	White	–	1.5	1,086.0	1.74	9.9	1.93	–8.33
25066	Dokathismata	White		1.2	–	–	–	2.06	–12.08
25077	Spedos	Whitish	Tr	1.5	589.3	1.71	1.5	0.96	–9.61
25123	Dokathismata	White (white vein)	–	1.5	160.6	2.21	7.1	1.87	–4.74
25124	Spedos	White or whitish	–	1.0	718.8	2.11	10.9	1.77	–10.15
25127	Spedos	White	–	1.3	404.7	2.32	3.9	2.17	–5.27
30026	Spedos	White	–	1.5	211.2	1.63	6.0	2.09	–4.63
30027	Spedos	White	6%	1.1	311.4	1.47	20.3	–0.38	–5.40
30028	Spedos	White (red vein)	–	1.8	1,870.5	1.78	18.7	1.87	–9.14
30416	Dokathismata	White or whitish	–	1.1	467.2	1.64	7.5	1.94	–6.79
30420	Dokathismata	White	2%	1.2	2,781.5	1.78	11.3	2.33	–5.34

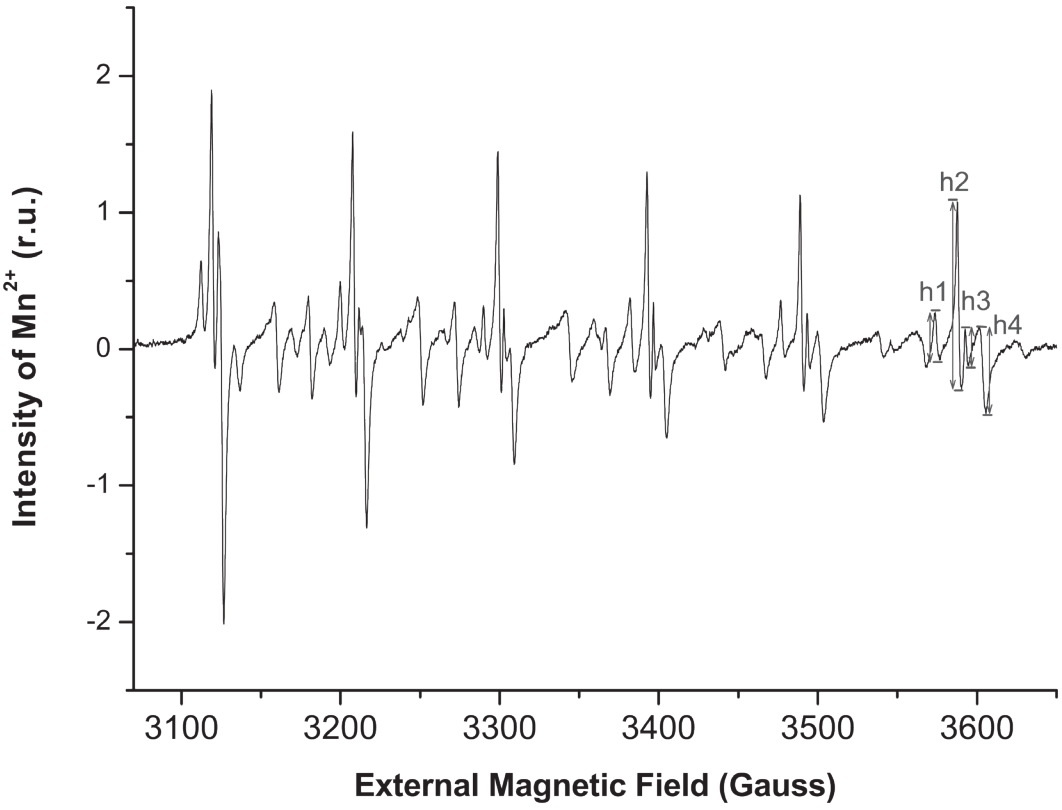

Figure 5.51. *Characteristic EPR spectrum of calcitic marble containing dolomite. The peaks h1 and h4 originate from Mn^{2+} ions in dolomite, while h2 and h3 Mn^{2+} ions in calcite. The content of dolomite in the marble is calculated from the heights of these four peaks according to the procedure: % D=(h1+h3)/(h1+h2+h3+h4)×100.*

of 3 analysed, and one Dokathismata variety figurine out of 20. The case of **20121** is somewhat extreme: an unfinished folded-arm figure, containing the highest amount of dolomite detected, 26 per cent. It is interesting to note that the Spedos variety figurines all show zero or very low dolomite content. This result, based on 38 figurines analysed and hence statistically sound, perhaps points to a common provenance for many of them, confined to a rather narrow geographic region.

Next, we present the first step of the statistical treatment of all the figurines against the Cycladic marble databases. In the first database, the logarithm of the intensity of Mn^{2+} is used as measured with EPR *versus* the logarithm of the MGS (Fig. 5.52). In the second database, the two stable isotope signatures are presented (Fig. 5.53). The databases and the Cycladic marble groups are as described in the earlier sections of this chapter. The different varieties of figurines are denoted with different symbols in the plots. The first observations from the plots is that the distribution of the values of the figurines in the overall distribution of parameters of the Cycladic marbles is similar to that observed for the figurines of the so-called 'Keros Hoard' in the Museum of Cycladic Art and J. Paul Getty Museum (Maniatis *et al.* 2005), which do not come from official excavations, but their authenticity seems now almost certain.

Figure 5.52 shows that most of the Cambridge Keros project figurines, like those from the so-called 'Keros Hoard', concentrate in the central part of the diagram corresponding to a MGS of around 1 mm and Mn^{2+} intensity between 480 and 1300 r.u. This region lies outside the fields of southeast Naxos (NX-1) and Keros fine grain (KE-1) and outside the Naxos high-metamorphic zones (NX-H1 and NX-H2) where the archaic and later quarries of Melanes and Apollonas exist. In the publication of the 'Keros Hoard' (Maniatis *et al.* 2005; 2009a), due to the lack of systematic geological sampling in the area from central-east to northeast Naxos, we had predicted that the marble for these figurines most probably came from the northeast part of Naxos. It is now apparent that this area in the database is covered fully by the marble from around central-east Naxos. However, the field of the Ios marbles also covers this central part of the diagram. The Paros parameter fields, especially Paros Lychnites (PA-L), seem also to cover a number of these samples in the centre of the diagram. But, as we will

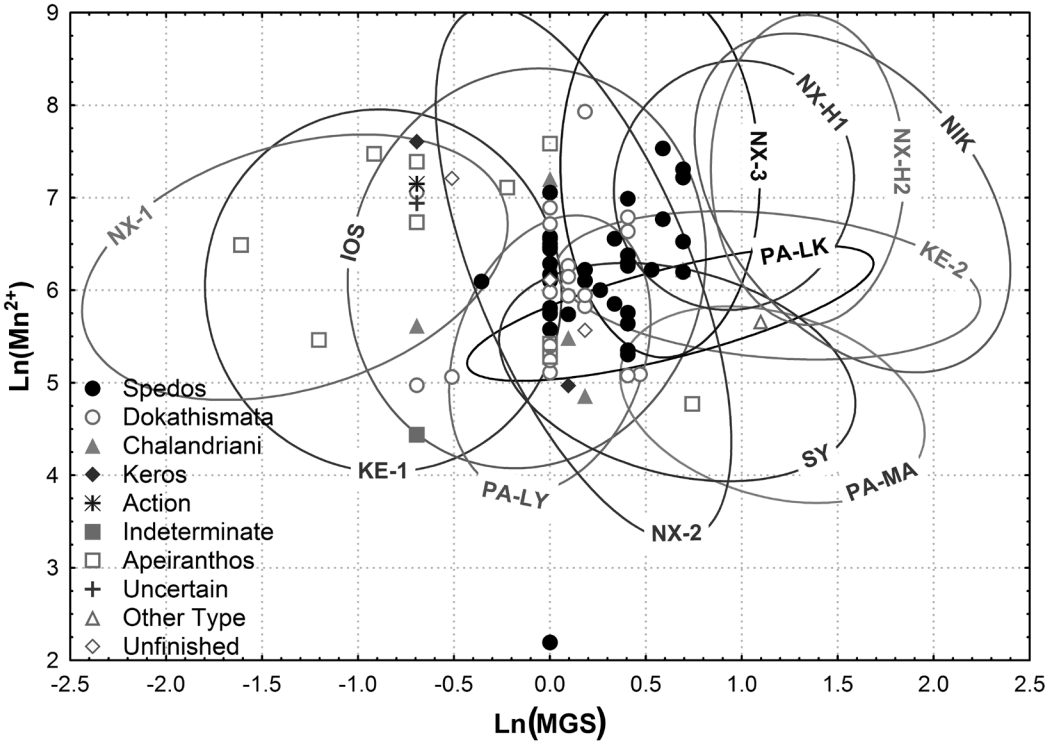

Figure 5.52. *Bivariate diagram of Ln(Mn^{2+})* versus *Ln(MGS) for the Keros figurines against the various marble groups of the Cycladic Islands: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

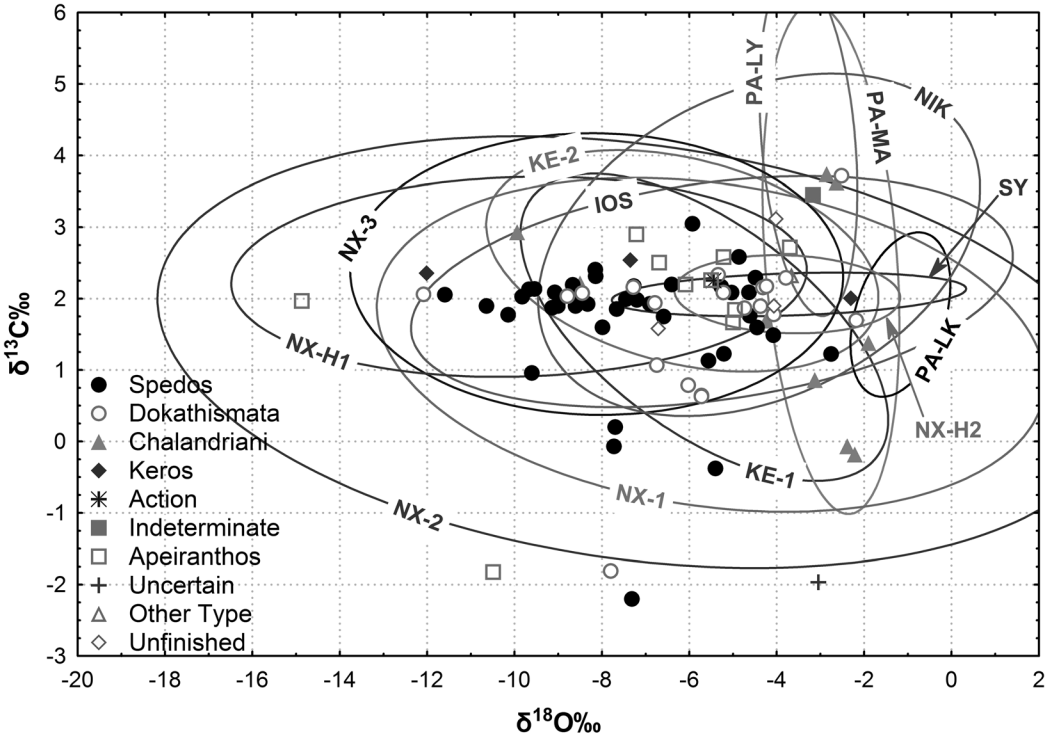

Figure 5.53. *Diagram of $\delta^{13}C‰$* versus *$\delta^{18}O‰$ parameters for the Keros figurines against the various marble groups of Cycladic Islands: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

see later, the Parian marble has other features that differentiate it from the marble of this group of figurines. It is observed from this diagram (Fig. 5.52) that, apart from one borderline case, none of the analysed Spedos variety figurines are made of southeast Naxos marble, despite the fact that the site of Spedos itself, which gave its name to these figurines, is situated in southeast Naxos. The other varieties seem to be distributed widely over the diagram, with the Apeiranthos variety (which includes the Dhaskalio sub-variety) showing a tendency towards the southeast Naxos field. It should be noted here that the fine-grained marble from Keros (KE-1) is, as discussed earlier, either of very poor quality mixed with argillaceous material or embedded as small globules within very hard aeolian sediments that are impossible to remove. Therefore, despite the appearance of the field of this fine-grained Kerian marble in the diagram, we should consider it highly improbable as a source for fine-grained figurines.

The second diagram shows the distribution of figurines in the isotopic signature database (Fig. 5.53) and appears more complicated, as the overlap between the different Cycladic marble groups is more extensive than in the Ln(Mn^{2+}) *versus* Ln(MGS) diagram. Nevertheless, some very interesting features pertaining to the provenance of the figurines can be observed. The spread of the isotopic values for most of the figurines follows a bimodal distribution with an extended horizontal stretch along the $\delta^{18}O$ axis within a narrow range of $\delta^{13}C$, and a vertical spread along the $\delta^{13}C$ within a narrow range of $\delta^{18}O$ (–2 to –8‰). This is apparently a characteristic feature of the Naxian marbles, as discussed earlier (Fig. 5.14), and it is due to the conditions of formation and metamorphosis. It is particularly seen in the samples from the areas of central-east (NX-2) and southeast (NX-1) Naxos (Fig. 5.13). The distribution of the Parian fields is totally different, as is that of Keros and Nikouria (Fig. 5.39). Similarly, the Ios marbles clearly do not show the bimodal behaviour (Fig. 5.26) characteristic of Naxos. But an overlap with the Naxos marbles occurs in the range of $\delta^{18}O$ values between –4 and –10‰ and $\delta^{13}C$ values of about 2‰, where the Ios marble samples are mainly distributed. The isotopic values of a large number of figurines fall within this overlap area, creating provenance uncertainties. A number of figurines with lower $\delta^{13}C$ values (<0‰) and $\delta^{18}O$ values (<–3‰) fall clearly in the Naxian fields of NX-1 and NX-2, four of them only in the NX-2 field close to the borderline. These samples follow the vertical spread of the Naxian marbles of NX-1 and NX-2, particularly pronounced in the NX-2 field. The same extreme low $\delta^{13}C$ values were observed also in a few samples from southeast Naxos analysed in the past (Herz & Doumas 1991). As no other islands exhibit this extreme behaviour, we have no doubt that these four figurines (one each of the Spedos, Dokathismata and Apeiranthos varieties, and one of uncertain variety) are made of Naxian marble, either from the southeast or, more likely, the central-east region. Similar values were observed in an upper torso of a post-canonical figurine from the so-called 'Keros Hoard' in the Museum of Cycladic Art (Maniatis *et al.* 2005) and in two vase samples from the Naxos Museum (Herz & Doumas 1991).

This first step of analysis and the distribution of the values of the figurines against the two databases therefore points to Naxian marble sources for the vast majority of the analysed figurines. A difficulty in this otherwise relatively clear picture is imposed by the Ios field, whose parameters overlap with the southeast and central-east Naxian fields where many figurines concentrate. According to geological studies (van der Maar & Jansen 1983), the Ios marbles are geologically the same as the southeast and central-east marbles of Naxos to such an extent that they can be considered part of the same massif, seen in both islands and under the sea between them. It is thus of no surprise that the physico-chemical and isotopic parameters of the marble of Ios and of southeast and central-east Naxos are very similar.

It appears that a similar trend is followed by all varieties, although the statistics for some varieties, due to the small number of figurines, are not so good. Very tentatively, one may say that the Chalandriani variety shows a slightly different distribution of values in the isotope signature diagram (Fig. 5.53), but whether this has any implication for provenance remains to be seen in the following steps of the statistical analysis.

The second step of the analysis involves a detailed treatment of each individual sample. This starts with the position of its parameters in the two databases. The exclusion principle, whereby marble group fields that are not possible for a particular sample in the one or the other database are excluded, allows us progressively to narrow down the number of provenance choices. When this procedure is complete, one ends up with either a single or more than one possible provenance area for each sample. For those figurines with more than one possible provenance areas, a third step of analysis follows.

The third step of the analysis involves a selection of the most suitable combination of parameters that best discriminates between the final provenance areas in question and the use of discriminant statistical analysis in order to resolve the provenance of the figurines and pinpoint it to a single area, or to narrow it down to two. An example of this procedure is given in Figure 5.54. It concerns a number of figurines (black

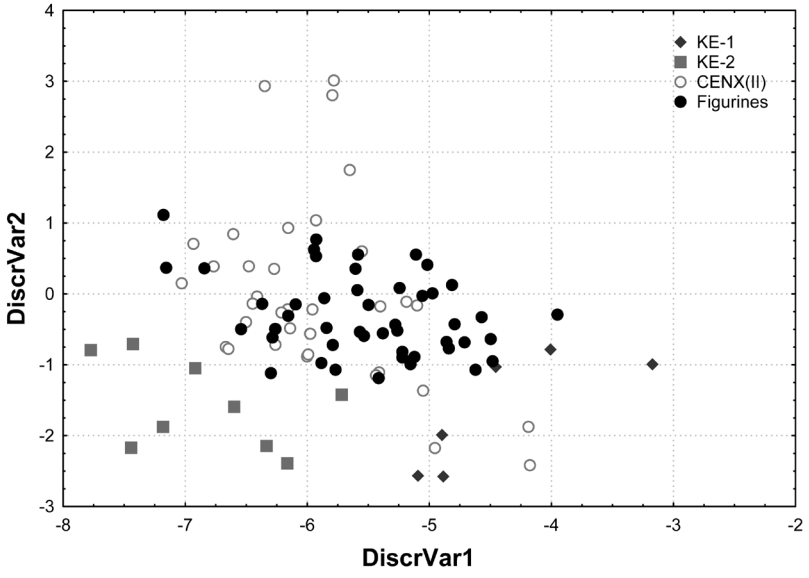

Figure 5.54. *Discriminant analysis between the marble groups of Keros-1, Keros-2, central-east Naxos and the figurines which fell in the overlap of these three groups in the first two steps of analysis. The axes represented by discriminant variables 1 and 2 are of percentages of all parameters measured (Mn^{2+}, Fe^{3+}, Width, MGS, $\delta^{13}C$ and $\delta^{18}O$) so that a maximum discrimination between the sources is produced.*

dots) that, from the first and second steps, had some probability of being from central-east Naxos or from Keros-1 or Keros-2. The discriminant analysis using all the measured parameters shows that practically all of these figurines fall away from the KE-1 and KE-2 field points, but lie within the distribution of the central-east Naxos field points, a fact that excludes Keros as the marble source for this set of figurines and defines their origin as central-east Naxos.

For the final provenance assignment, the qualitative features of the marble of the figurines, such as transparency, colour, etc., are taken into account, as much as the weathering degree permits these parameters to be obtained.

Discussion of the figurine provenance results

Table 5.3 lists the final provenance assignment of all the figurines. As can be seen from the first inspection of these provenance results for the 89 figurines analysed, 25 samples were pinpointed to a single source, 54 to two sources and only 5 to three sources. Also, two samples were of an unknown provenance for which Naxos could be a possibility, and only for three samples did the provenance remain totally unknown. These can be considered to be quite successful results, given the great degree of geological and physico-chemical similarity between the various groups of Cycladic marbles.

A histogram presenting the provenance results by island, without differentiating between the different sources on each island, is given in Figure 5.55. As can be seen from this diagram, 22 figurines come securely from Naxos and 53 from either Naxos or Ios, together covering 84 per cent of the figurines analysed. Naxos is also a possible source for several of the remaining figurines with double or triple provenance assignment. This emphasizes the major role of Naxos for the figurines found on Keros. The distribution of the provenance of the figurines between the different marble sources in each island is given in the more detailed histogram of Figure 5.56. It appears that most of the figurines that come from Naxos actually come from the central-east or southeast part of the island where many of the prehistoric settlements are found (Fig. 5.6). This is also true for the figurines for which Ios is a second option.

The Ios problem

As discussed earlier, the marble of Ios has the same geology as that of Naxos, being probably part of the same massif (van der Maar & Jansen 1983) as south-east (NX-1) and central-east (NX-2) Naxos, where the marble exhibits the lowest degrees of metamorphosis (I and II). As the physico-chemical parameters overlap, the discrimination between these two Naxian marble groups and Ios becomes difficult, as can be seen in the histogram, Figure 5.56. It is in fact from this critical region (central and southeast Naxos or Ios) that most of the figurines found in Keros seem to come. However, there are several indications that restrict or diminish the probability of Ios as a source of marble for the Keros figurines. These are the following:

1. The general distribution of the figurine isotopic signatures (Fig. 5.53) shows a bimodal dispersion pattern with a remarkable similarity to the bimodal dispersion occurring only in the Naxian marbles (Fig. 5.14), and especially those of southeast and central-east Naxos.

Table 5.3. *Final provenance assignment of the analysed Keros figurines.*

SF no.	Location	Variety	Colour, veins	Provenance	Comments
4602	S	Chalandriani	White (milky)	NX-2, IOS?	Less likely to be from Ios due to absence of 'chalky' and opaque marble quality on Ios
4603	N	Spedos	White	NX-3	
4614	S	Indeterminate	White	IOS?	Or non-sampled area in NX-1
4616	S	Spedos	White	NX-3	
6015	S	Keros	White	NX-1, IOS?	Less likely to be from Ios due to absence of white and opaque marble quality on Ios
6024	S	Other Type	White	PA-M	Keros was also given by the analyses, but was excluded based on width and a peak with g=2.0079 that does not appear on Keros
6133	S	Dokathismata	White	NX-2, IOS	
6222	S	Spedos	White	NX-2	
6231	S	Spedos	White	NX-2, IOS	
6250	S	Spedos	White	NX-2, IOS	
6274	S	Spedos	White	NX-2, IOS	
6288	S	Spedos	White	NX-2, IOS	
6307	S	Action	White	NX-1, IOS?	
6337	S	Uncertain	Whitish	Unknown Origin or NX-2	Due to extreme isotope position it could be from NX-2
6403	S	Spedos	White	PA? NX-2? IOS?	Only based on IRMS and MGS, as Mn^{2+} is very low, most probably due to weathering
6420	S	Dokathismata	White	NX-2, IOS	
6425	S	Spedos	White	NX-2, IOS	
6456	S	Dokathismata	White	NX-2, IOS	
6476	S	Spedos	White (grey bands)	NX-2, IOS	
6478	S	Spedos	White	NX-2, IOS	
6480	S	Spedos	White	NX-2, IOS	
6481	S	Spedos	White	NX-2, IOS	
6614	S	Chalandriani	white (schist vein)	NX-2, IOS?	Most likely to be from NX-2 due to identical spectrum with **20113**
6619	S	Spedos	White	NX-2, IOS	
6624	S	Dokathismata	White or whitish	NX-2, IOS	
6816	S	Chalandriani	Whitish (schist vein)	Unknown Origin	Most probably NX-2
6846	S	Dokathismata	White	IOS, NX-1?	Despite that NX-1 is not confirmed by the parameters, is given as a minor possibility due to marble characteristics
6855	S	Apeiranthos (D)	White	NX-2, IOS	
6874	S	Dokathismata	White	NX-2,3, IOS	
7005	S	Apeiranthos	White	Unknown Origin or NX-1,2	
7266	S	Dokathismata	White	NX-2, IOS	
10413	D	Apeiranthos (D)	White or very light greyish	NX-2	
11430	D	Apeiranthos (D)	White	NX-1	

Table 5.3. *(Continued.)*

SF no.	Location	Variety	Colour, veins	Provenance	Comments
12428	D	Apeiranthos (D)	Whitish	NX-1	
20102	S	Spedos	White	NX-2, IOS	
20107	S	Dokathismata	Whitish	IOS?	
20110	S	Chalandriani	White	Unknown Origin	Most probably NX-2
20113	S	Dokathismata	White	NX-2, IOS	
20121	S	Unfinished	Whitish	NX-1,2, IOS	
20132	S	Dokathismata	White	NX-2	
20147	S	Dokathismata	Whitish	NX-2, IOS	
20167	S	Spedos	White	NX-2, IOS	
20175	S	Keros	White	NX-2, IOS	Due to low transparency Paros, given by the analyses, has been excluded
20207	S	Spedos	White	NX-2	
20233	S	Apeiranthos (D)	White	NX-2	
20418	S	Chalandriani	White	NX-2	
20423	S	Spedos	White	NX-2	
20425	S	Spedos	White	NX-2, IOS	
20507	S	Spedos	White	NX-2, IOS	
20510	S	Apeiranthos (D)	Whitish	NX-1	
20515	S	Spedos	White	NX-2,3, IOS	
20518	S	Chalandriani	Greyish	NX-2	
20522	S	Dokathismata (A)	White	NX-2, IOS?	
20525	S	Dokathismata	Whitish	NX-2	
20530	S	Spedos	White (quartz? Vein)	NX-2, IOS	
20542	S	Spedos	White	NX-2	Joins with 20547, identical spectrum on sextet but different on low fields.
20547	S	Spedos	White	NX-2	Joins with 20542, identical spectrum on sextet but different on low fields.
20548	S	Spedos	White or whitish	NX-2,3, IOS	
20604	S	Unfinished	White	NX-2, IOS	
20607	S	Dokathismata	White or whitish	Unknown Origin	Most probably NX-1
20711	S	Apeiranthos	White	NX-2, IOS	
20712	S	Apeiranthos	Whitish (mica vein)	NX-2, IOS	
20724	S	Chalandriani	Greyish	PA-LK, NX-2	
20730	S	Spedos	White (white vein)	NX-3, IOS	
20731	S	Spedos	White	NX-3, IOS	
20743	S	Apeiranthos (D)	White	NX-1	
25006	S	Spedos	Whitish	NX-2, IOS	
25017	S	Spedos	White	NX-2, IOS, SY?	Less likely to be from Syros due to low transparency and absence of dolomite and foliation
25019	S	Spedos	White	NX-2, IOS, NX-1?	
25020	S	Chalandriani	Greyish	NX-1	
25021	S	Keros	White	NX-1	
25026	S	Spedos or Kapsala	White	NX-2,3, IOS	

Table 5.3. *(Continued.)*

SF no.	Location	Variety	Colour, veins	Provenance	Comments
25032	S	Spedos	White	NX-2, IOS	
25033	S	Unfinished	White	NX-2, IOS	
25034	S	Spedos	Greyish	NX-2, IOS	
25035	S	Chalandriani	White	NX-2	
25038	S	Dokathismata (A)	White	NX-2, IOS, SY?	Less likely to be from Syros due to low transparency and absence of dolomite and foliation
25055	S	Dokathismata	White	NX-2, IOS, SY?	Less likely to be from Syros due to absence of dolomite and foliation
25061	S	Spedos	White	NX-2,3, IOS	
25066	S	Dokathismata	White	NX-2,3	
25077	S	Spedos	Whitish	NX-2, IOS?	
25123	S	Dokathismata	White (white vein)	NX-2, IOS	
25124	S	Spedos	White or whitish	NX-2, IOS	
25127	S	Spedos	White	NX-2, IOS	
30026	W	Spedos	White	NX-2, IOS, SY?	Less likely to be from Syros due to absence of dolomite and foliation
30027	N	Spedos	White	NX-2	
30028	S	Spedos	white (red vein)	NX-3, IOS	
30416	S	Dokathismata	White or whitish	NX-2, IOS	
30420	S	Dokathismata	White	NX-2, IOS	

2. The good-quality fine, white and transparent marble on Ios is heavily dolomitic compared with the almost pure calcitic marbles used for the Keros figurines. Veins with calcitic marble of similar quality to the figurines and that of central-east Naxos are very rare on Ios and restricted to one location (on the hill south of and above Aghia Theodoti) where they have been exposed recently by road-construction works.
3. There are only two figurines for which Ios was singled out as the most probable provenance (Fig. 5.56), and for one of them this is still questionable. If the Ios marble was a strong candidate for more than 53 figurines, as at first appears from the analysis, one would expect more than two samples to be singled out as coming from Ios with a high probability after the detailed and multi-step analysis, an outcome that does arise for Naxos where 22 samples are determined as exclusively Naxian.
4. Likewise, from 111 early bronze age samples (mainly vessels) from the Special Deposit North on Keros analysed in the past (Herz & Doumas 1991) using stable isotope analysis alone, only 8 were found to give Ios as the most probable origin, although this may also be an artefact of the limitations of using only one technique.
5. The number of early bronze age marble figurines found on Ios is small compared to the large number widely found on Naxos.
6. All the figurines (six of marble and one of shell), exhibited or stored in the Ios Archaeological Museum were examined by Y. Maniatis with the permission of the then Director, Marisa Marthari. They come mainly from Skarkos and a couple from old collections or donations. The figurines from Skarkos are mainly schematic and are made of a strongly banded or layered marble with alternating blue-grey and white layers closely spaced. This type of marble is abundant on Ios and has not been observed in the Keros figurines at all. Two folded-arm figurines, one from a private collection, the other from an old archaeological collection, were found to be made of good-quality white, well-crystallized and homogenous marble (the MGS being 0.7 and 1.0 mm) resembling that of Paros, central-east Naxos, or perhaps northeast Ios. Furthermore, a bowl from Skarkos was made of grey marble, most probably local, as was a grinding mortar of good-quality homogenous white marble. Apart from

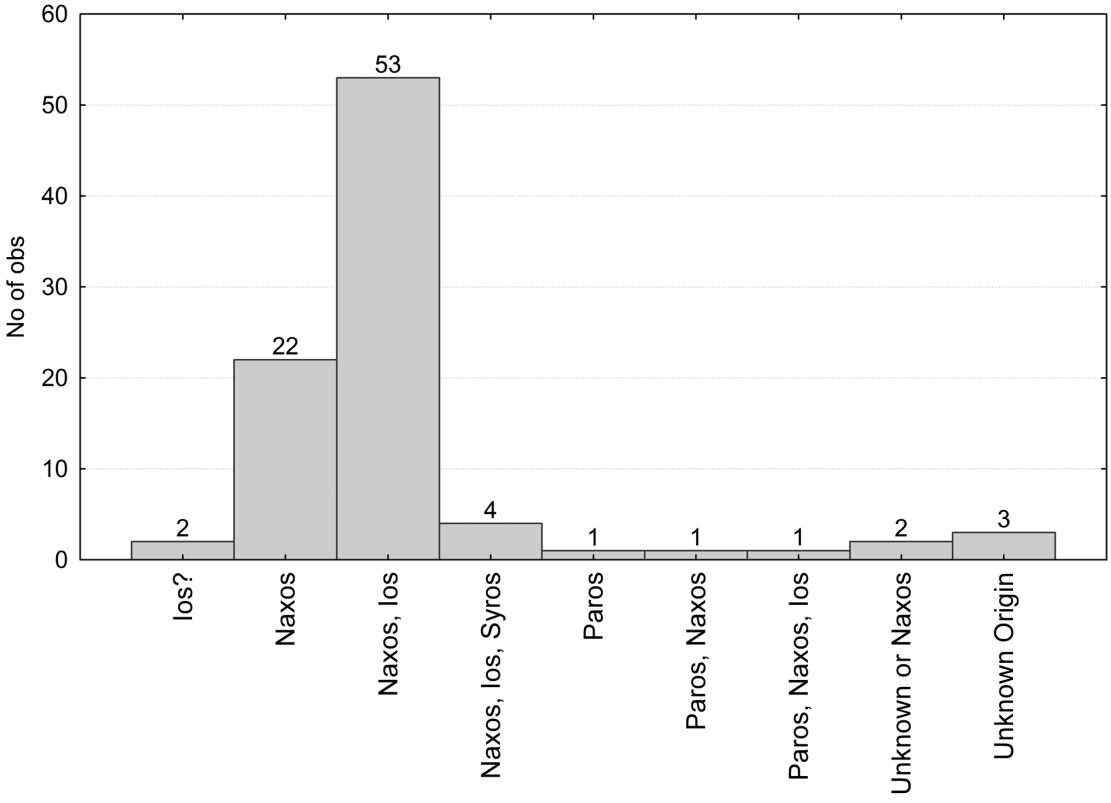

Figure 5.55. *General provenance histogram for all figurines by island.*

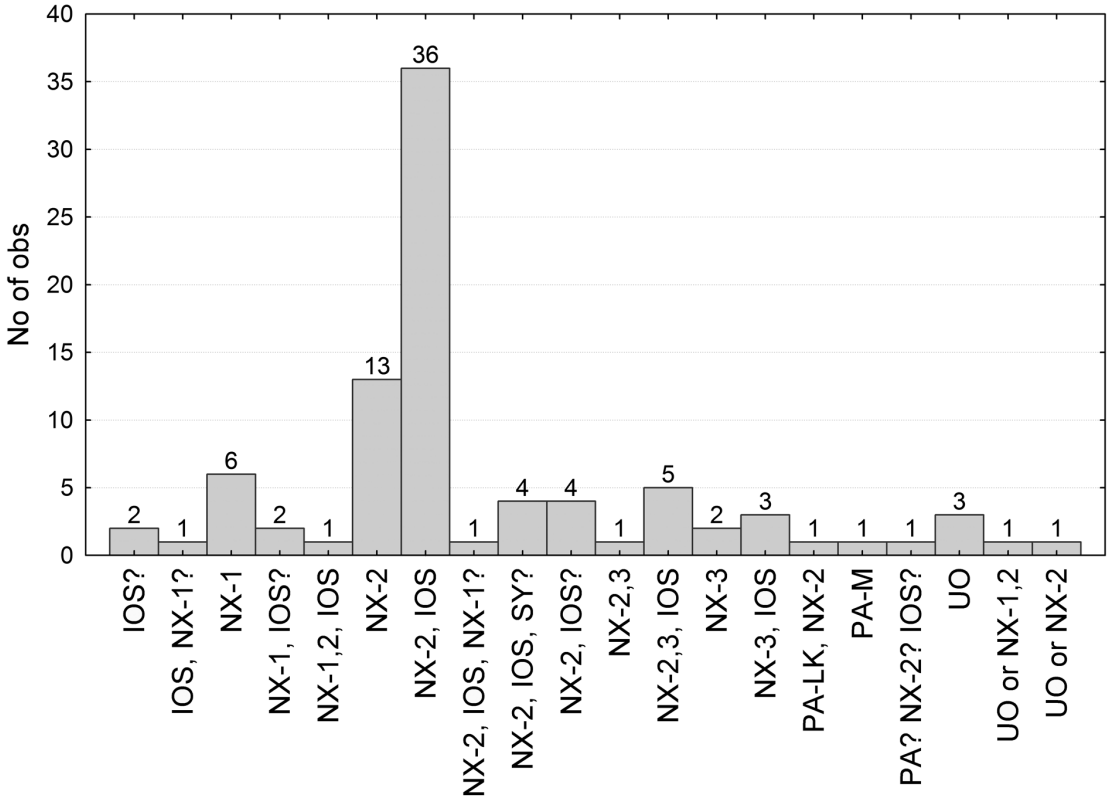

Figure 5.56. *Provenance histogram for all figurines by marble group.*

this, a marble basin from Skarkos was sampled and analysed and its provenance determined as definitely Parian.

All the above provide indirect but accumulating evidence that the restricted veins of white calcitic marble on Ios of similar quality to the figurines and to the marble of central-east Naxos were not exploited in prehistoric times for making figurines. Based on that, apart from some debatable cases discussed in detail below, it seems highly unlikely that any significant number of figurines found on Keros were made of marble from Ios.

Thus, excluding Ios as a possibility for the Naxos-Ios double provenance assignments, unless otherwise stated, we will focus on Naxos for the provenance of the vast majority of the Keros figurines.

The importance of Naxos

Setting aside the possibility that a number of figurines came from Ios, Naxos is undoubtedly the major source for the figurines found in the Special Deposit South and on Dhaskalio, and most likely also for those from the Special Deposit North, if we judge from the few finds from the Special Deposit North analysed in this work, along with the finds from the so-called 'Keros Hoard' (Maniatis *et al.* 2005). Naxos is a very large island and its extensive marble deposits exhibit various degrees of metamorphosis, as discussed in earlier sections. This allows a differentiation in the marble properties and helps in distinguishing between different areas. It appears from Figure 5.56 (and excluding Ios as a source in the cases where it appears together with Naxos) that 53 figurines come from central-east Naxos (NX-2), defined as the area between Moutsouna-Apeiranthos-Danakos-Kasteli-Ligaridia (Fig. 5.6). Also, eight figurines come from southeast Naxos (NX-1), the area defined by the line separating the metamorphic degrees I and II and the sea (Fig. 5.6), and two figurines come either from NX-1 or NX-2, southeast or central-east Naxos. Furthermore, five figurines come from NX-3, a zone with degree of metamorphosis III (Fig. 5.6) around and southwest of Apeiranthos, and six figurines either from NX-2 or NX-3. This makes a total of 84 per cent of the analysed figurines coming from Naxos, and this number could actually be higher, since NX-1 and NX-2 are the alternative options for various other cases where the provenance is not so well defined. It is interesting to note that not even a single figurine has any probability of coming from the more central and northern regions of the island where marble deposits with a higher degree of metamorphosis exist and where the important quarries of Melanes and Apollonas were opened in much later years. This may be explained by the paucity of prehistoric settlements in those areas and also the circumstance that these settlements, being further inland or further north, did not have the direct contact with or and easy access to Keros available to people in the central-east and southeast settlements of Naxos.

The other islands

The other Cycladic islands are scarcely represented as marble sources for the Keros figurines. In particular:

Paros: a high probability exists for just one figurine as being from Paros, and more specifically from the Marathi valley area, with lower probabilities for another two which could, however, come from Naxos (Figs. 5.55, 5.56).

Syros: there is a relatively low probability of an origin in Syros in the case of four figurines. Each has a higher probability of coming instead from Naxos or Ios. The main reason that the possibility of a Syros provenance is of low probability is the lack of characteristic foliation of crystals on the figurine fragments. However, the weathering condition of the fragments could have made the identification of such foliation a very difficult task and thus Syros cannot be entirely excluded.

No other island is represented as a marble source for the 89 figurines analysed. In particular, the islands of Amorgos and Nikouria, Herakleia and Schinousa were not sources for the marble of any of the figurines found on Keros.

The origin of three further figurines remains undetermined. They all contain small amounts of dolomite and could be from an unexplored area of Naxos or another island. The provenance of the marble of two other figurines remains uncertain: but it might also come from Naxos.

Variety and provenance

The histograms in Figures 5.57–5.63 give the distribution of the provenance for the figurines of each variety. It should be noted that some varieties are not well represented in the analysed figurines, in some cases by just one or two samples, which makes difficult any generalizations about provenance, since at the time of sampling the archaeological and typological analysis had not been finalized.

The Spedos variety

Figurines of the Spedos variety, as Figure 5.57 shows, seem to have been made mainly of marble from the area of central-east Naxos (NX-2) which, as discussed above, is defined as lying between Moutsouna-Apeiranthos-Danakos-Kasteli-Ligaridia. The second area that appears as a source for this variety is NX-3,

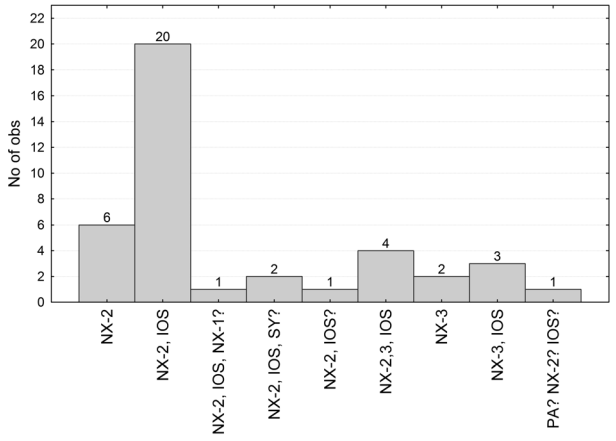

Figure 5.57. *Provenance of all Spedos variety figurines analysed.*

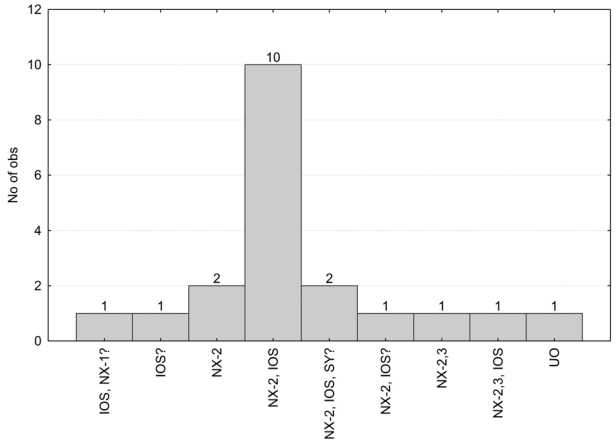

Figure 5.58. *Provenance of all Dokathismata variety figurines analysed.*

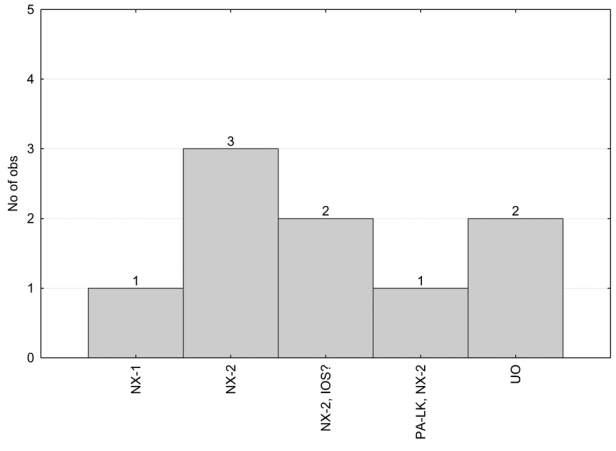

Figure 5.59. *Provenance of all Chalandriani variety figurines analysed.*

the marble zone with degree of metamorphosis III in central-east Naxos. It extends from southwest to northeast (Fig. 5.6), but the sources are most likely around and southwest of Apeiranthos (Apeiranthos-Filoti-Danakos). Taken together NX-2 and 3 define an extended area around the central-east part of the island, approximately between Moutsouna, Apeiranthos, Filoti, Danakos, Kasteli and Ligaridia, which emerges as the main production area of the figurines of the Spedos variety. It is interesting to note that. apart from one with a question mark, none of the analysed Spedos variety figurines is made of marble from southeast Naxos (NX-1), the region which includes the Spedos prehistoric site which has given this variety its name. Together with central-east Naxos, Paros may also be a remote possibility as a source for one figurine, and Syros for another. For the two figurines classified as of Spedos or Kapsala variety, one was analysed and its provenance determined as from NX-2, NX-3, or from Ios. No figurines of the Kavos sub-variety were analysed.

Ios, due to the similarity of its marble with Naxos, as stated earlier, interferes strongly with the Naxian provenance of the figurines of this variety, but a provenance in Ios is unlikely, as discussed earlier, in view of the specific marble quality and the pure calcitic nature of the figurines of the Spedos variety.

The results of the 40 figurines of the Spedos variety (including one that might be of the Spedos or Kapsala variety) analysed can tentatively be extended to the whole number of 333 Spedos variety figurines (including two of the Spedos or Kapsala variety), on the basis of the MGS and other marble features determined for all the figurines (Table 5.1). In particular, most of the figurines of Spedos variety (228 or 68 per cent) have a MGS centred at about 1.0 mm (Fig. 5.44) and another 94 (28 per cent) go up to 2.0 mm. This, in conjunction with the properties of the analysed figurines, the marble colour (Fig. 5.48) and other features, points to a provenance primarily from NX-2 and secondly from NX-3 for most (97 per cent) of the whole series of Spedos variety figurines. Thus the extended area in the central-east part of Naxos, as defined above, emerges as the major production centre of the Spedos variety. A small number, just 13 figurines out of 333, representing less than 4 per cent, is made with very fine and ultra-fine marble (MGS <0.8 mm, Fig. 5.44). Unfortunately none of these was sampled and analysed, but based on the marble characteristics and the evidence from other analysed figurines with this kind of marble, they must have come from the southeastern part of Naxos which includes the area of Spedos itself, with Panormos, Pyrgos tou Cheimarou and nearby areas.

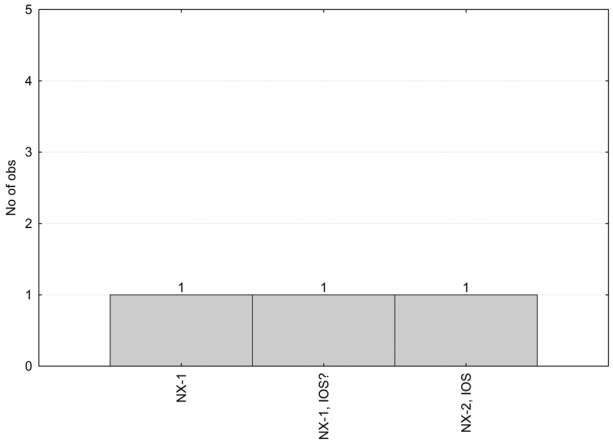

Figure 5.60. *Provenance of all Keros variety figurines analysed.*

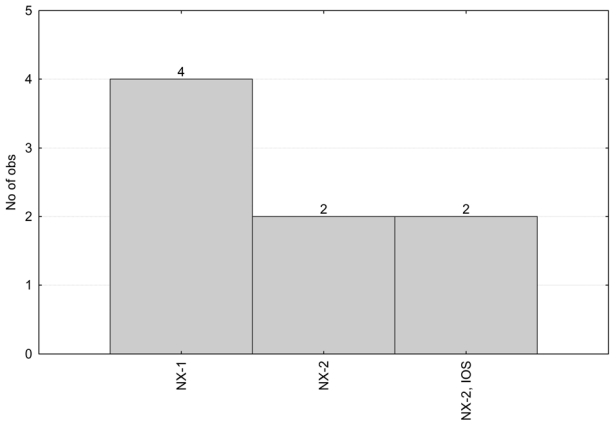

Figure 5.62. *Provenance of figurines of the Dhaskalio sub-variety of the Apeiranthos variety analysed.*

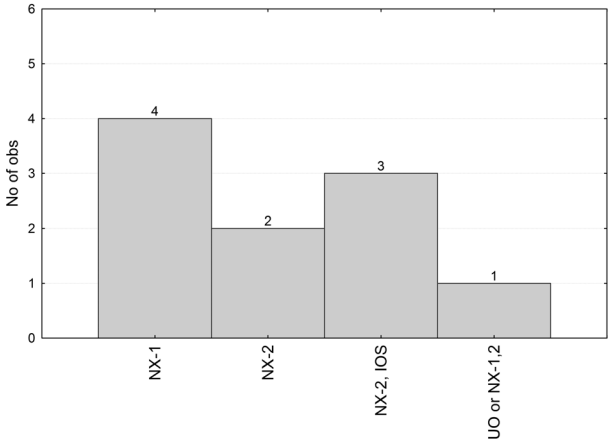

Figure 5.61. *Provenance of all Apeiranthos variety figurines analysed.*

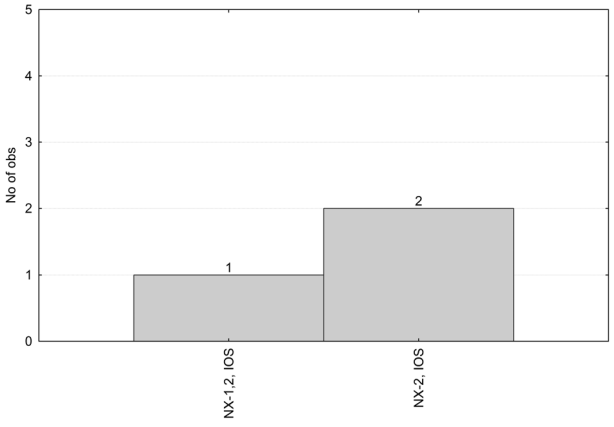

Figure 5.63. *Provenance of the unfinished folded-arm figurines analysed.*

One Spedos variety figurine (**371**) seems to have been made of marble which deviates appreciably from the rest, having a MGS of 5.0 mm. This figurine was unfortunately not analysed, but based on its coarse grain size and its greyish colour we can suggest that the provenance of its marble could either be Keros (where such coarse marble exists in the areas of Kavos, Dhaskalio and other parts of the island), or from the high-grade metamorphic marble zones of Naxos which lie in the central and northern parts of the island.

The above results are in accordance with the previous study of the so-called 'Keros Hoard' collection (Maniatis *et al.* 2005) in which a small number of the Spedos variety figurines was identified as coming from southeast Naxos (although Keros seemed then an option for a couple of them, following the databases existing at that time). Most of the finds were then assigned to an unknown Naxian location, which was predicted to lie in the northeast part of Naxos. Now, with the present extended database, this should obviously be redefined as the central-east part of Naxos.

The Dokathismata variety

The marble of the figurines of the Dokathismata variety seems mainly to originate (for at least 13 out of 20) from NX-2, while a few also have a probability of originating from NX-3 (both areas being in central-east Naxos), showing a similar pattern to that of the Spedos variety (Fig. 5.58). Ios is present again and due to the similarity of its marble has a serious overlap with the NX-2 field, creating an uncertainty for 14 of the Dokathismata variety figurines analysed. For the reasons described earlier, we consider Ios to have a low possibility as the place of origin for the marble of

these figurines. However, the Dokathismata variety yields one sample (**20107**) whose parameters do not overlap with any Naxian field and separates out in statistical analysis as having Ios as its only possible place of origin. Its isotopic parameters, however, lie at the verge of the Ios field, meaning that it could have come from a location on Naxos, or another locality not yet sampled. If we tentatively accept Ios as the place of origin for the marble of this figurine, a more detailed comparison of its parameters with the specific parameters of the different locations on Ios (Figs 5.23–5.25) reveals that its most likely place of origin could be the Aghia Theodoti area in northeast Ios (Fig. 5.22), where a prehistoric settlement evidently existed but which remains unexcavated. On the hills above and to the south of the site greyish marble with low MGS and low transparency (like this figurine) can be found. In addition, there is a second fragment (**6846**) whose origin is given as IOS or NX-1?, the question mark indicating a higher probability for an origin from IOS rather than from NX-1 (southeast Naxos). The parameters of this figurine are again borderline for Naxos and this is the reason why a provenance from Ios appears with a higher probability. However, its pure white colour in combination with its pure calcitic nature makes the Ios provenance for this figurine rather unlikely. Yet, based on the above evidence, we cannot rule out Ios as an alternative provenance for the marble of a very small number of the figurines of the Dokathismata variety.

It should be noted that, as with the Spedos variety, Syros becomes a possibility as a source for two figurines of the Dokathismata variety, but the probability is a remote one.

Finally, there is one figurine (**20607**) whose provenance remained undetermined after all steps of analysis and treatment. The isotopic signature of this figurine suggests a Paros-Marathi or Paros-Lychnites origin (Fig. 5.53), yet this origin is out of the question for this figurine in view of its ultra-fine MGS (0.5 mm), its dolomite percentage (9 per cent) and its very high Mn^{2+} intensity (1165.0 r.u.). Some location, not yet sampled, on southeast Naxos would be more probable.

For the Akrotiri sub-variety, two figurines were analysed. Their marble shows no deviation from that of the majority of the Dokathismata variety. In particular, one is found in the main group having an NX-2 or IOS provenance and most likely is from NX-2. The second gives a triple NX-2, IOS, SY? provenance, with Syros being the least likely possibility.

To extend the results of the 20 Dokathismata variety figurines analysed to the whole number of the 86 Dokathismata variety figurines found in the Special Deposit South on Keros is no trivial task, as with the Spedos variety, for there are complications here, especially with the very fine-grained ones. For example, from the three very fine-grained (MGS <0.8 mm) figurines analysed one seems to be from IOS, and one from IOS or NX-1?, but both these locations seem rather unlikely, while the third remained undetermined, although NX-1 is the most probable origin for its marble. Thus, among the 16 very fine-grained figurines in the total of 86 of the Dokathismata variety, there might be more from IOS, or more from NX-1, or even more from an unknown source, if these were fully analysed. The outcome of such analysis could clarify the origin of the very fine-grained marble characteristic of some figurines of the Dokathismata variety. If it is not NX-1, it might be located in an area on Naxos or elsewhere not existing in the databases. However, NX-2 (the central-east Naxos area) remains the most likely place of origin for marble of most (about 80 per cent) of figurines of this variety.

The Chalandriani variety

The marble of the figurines of the Chalandriani variety found in the Special Deposit South seems to originate mainly from NX-2, if we exclude the IOS possibility (Fig. 5.59), with one figurine clearly from NX-1. This picture generally resembles that of the Spedos variety and perhaps of the Dokathismata variety. One figurine has an equal probability of being either from PAROS-LAKKOI or from NX-2.

A peculiarity of this variety is that the origin of the marble for two of the eight figurines analysed, a very large fraction indeed, could not be determined (unknown origin). These figurines (**6816** and **20110**) have an almost identical isotopic signature (Fig. 5.53; the two triangles in the upper right part of the diagram) which points to the same marble source. According to this isotope field diagram, these values fall in the Paros-Marathi or Lychnites field and marginally in the NX-2 field. But neither their marble quality nor their Mn^{2+} values and dolomite percentage agree with the Parian marbles, or at least with the Paros marble areas sampled. Interestingly enough, the isotopic signatures of these two samples are almost identical with the one figurine of undetermined provenance of the Dokathismata variety (that of **20607**, Fig. 5.53). This suggests a common provenance for the marble of these three figurines, with the Paros-Marathi or Paros-Lychnites sources being excluded for all three—and especially **20607**—on the basis of the isotopes. The position of these samples in the isotopic diagram, together with the rest of the Chalandriani samples having $\delta^{13}C$ <1‰ and $\delta^{18}O$ between –2 and –4‰, verifies the bimodal behaviour

of the Naxian marbles, as does the vertical spread characteristic of NX-2 and NX-1 areas. The lack of Naxos field points at this position on the diagram most probably reflects insufficient sampling at some locations in these areas of Naxos with very extensive marble deposits. Thus, based on the isotopic results and the MGS, we can conclude that the two marbles of the two Chalandriani variety figurines most probably come from NX-2 and that of **20607** from NX-1.

It is interesting to note here that none of the Chalandriani variety figurines analysed has even the slightest probability of being of marble deriving from Chalandriani on Syros, which gives its name to this variety, or from Syros as a whole. It should further be noted that a number of marble objects coming from the archaeological excavations at Chalandriani, conducted by Marisa Marthari, was examined optically and under a microscope by Maniatis at the Ios Museum. They included one figurine of the Spedos variety and some marble vessels, and their examination showed that their marble is clearly different from the marble of Naxos, Paros, Keros and Ios, but resembles the characteristic features of the foliated marble of north Syros. For more certain provenance assignment, further analysis should be undertaken (Maniatis 2017). Therefore, while the Chalandriani marble objects found at Chalandriani, or at least a number of them, seem to have been made of local Syros marble, the Chalandriani variety figurines found on Keros are made of Naxian or other marble, but not of Syros marble.

Extending the results from the eight samples analysed to the whole number (34) of Chalandriani variety figurines from Keros and based on the MGS, colour and other features (Table 5.1), it appears that most seem to originate from the marble of NX-2, central-east Naxos, and a smaller proportion (about 12 per cent) from NX-1, southeast Naxos. The possibility of a few coming from the marble of islands other than Naxos cannot be excluded.

The Keros variety

The marble of three figurines of this variety was analysed. One seems to come from NX-1, one from NX-2 or IOS and one from NX-1 or IOS? (Fig. 5.60). Although the statistics are poor, it appears from the MGS (Fig. 5.45E) and from other marble features (Fig. 5.49E) of the 17 figurines of the Keros variety that the area of southeast Naxos is the more frequent place of origin for the marble of about 53 per cent of this particular variety. The rest are most probably of marble from central-east Naxos, with one or two having also Ios as a possibility.

The Apeiranthos variety

The marble of the figurines of Apeiranthos variety, including the Dhaskalio sub-variety, seems also to be predominantly of Naxian origin, with a large proportion (4 of the 10 analysed) clearly coming from NX-1, southeast Naxos, and two clearly from NX-2, central-east Naxos (Fig. 5.61). Of the remaining four, three are made of marble either from NX-2 or IOS and one is of marble of unknown origin, but possibly from either NX-1 or NX-2.

The Dhaskalio sub-variety of the Apeiranthos variety

Of the 10 Apeiranthos variety figurines analysed, 8 are of the Dhaskalio sub-variety. The marble for four of them clearly comes from NX-1, two from NX-2 and two from either NX-2 or IOS (Fig. 5.62). It therefore seems that the provenance of the Dhaskalio sub-variety marble is mainly centred on southeast Naxos, although a number of them were made of marble from central-east Naxos. In Figure 5.61 it can be seen that the remainder of the Apeiranthos variety were made of marble from central-east Naxos, which includes the area close to the village of Apeiranthos. A more detailed examination of the results for the Dhaskalio sub-variety figurines reveals that those of marble coming from southeast Naxos are made of an ultra-fine-grained marble with MGS <0.5 mm (Tables 5.2, 5.3). Furthermore, the marble of those found on Dhaskalio, which are better preserved, in addition to being ultra-fine grained, is of very high transparency (Fig. 5.40). These characteristics, i.e. a very fine-grained marble, well-crystallized and with a high transparency, have been found only in the area close to the Pyrgos tou Cheimarou in southeast Naxos. Thus we propose that the majority of the Dhaskalio sub-variety figurines, and especially those found on Dhaskalio itself, are of marble originating from a rather confined geographic area of Naxos around the Pyrgos tou Cheimarou.

Extending the results from the 10 analysed to the whole number of 45 Apeiranthos variety figurines, we can tentatively conclude the following:

The marble for the Apeiranthos variety (excluding the-Dhaskalio sub-variety), consisting of 10 figurines in total, seems to originate mainly (about two-thirds) from central-east Naxos and the rest (one-third) from southeast Naxos. Their marble is not of good quality, being layered and in several cases greyish and dull.

The marble for the Dhaskalio sub-variety figurines, consisting of 35 figurines in total, seems to originate also from the same two areas of Naxos, but the proportions between the two areas are reversed. The marble for the Dhaskalio sub-variety figurines comes predominantly (about 60 per cent) from southeast

Naxos and the rest from central-east Naxos. Of those made of marble coming from southeast Naxos (about 20 figurines), at least 8 are made of a very nice, well-crystallized, very fine-grained and very transparent marble, found only in the area around the Pyrgos tou Cheimarou. Most of these figurines were found on Dhaskalio.

In general, the marble of the Apeiranthos variety figurines is of Naxian origin and derives from southeast to central-east Naxos. Moreover, some of the Dhaskalio sub-variety figurines are of marble for which an origin according to existing evidence can be pinpointed close to the Pyrgos tou Cheimarou.

Schematic figurines of uncertain variety

For this small group of schematic figurines, only one of the five excavated figurines was analysed. The provenance of its marble could not be determined with precision and could be either from NX-2 or Unknown origin—an unknown location whose marble is not represented in the database. On examining the MGS distribution (Fig. 5.46D) and the other marble features (e.g. the white or whitish colour) of most of the five excavated figurines of this group, we can assume that their provenance should follow the same trend as the Apeiranthos-Dhaskalio sub-variety, i.e. the majority were of marble from southeast Naxos and a number from central-east Naxos.

Unfinished folded-arm figurines

Three of the six figurines classified as unfinished were included in the samples analysed. The provenance for the marble of two of them is established by the usual overlap NX-2, IOS and the third should be from NX-1, NX-2 or IOS (Fig. 5.63).

For the remaining three non-analysed figurines, we can conclude, on the basis of the MGS and other marble features that two of them, made of a very fine-grained marble (with MGS of 0.5–0.6 mm), white and with high transparency, most likely come from NX-1 and the third one NX-2.

The Fragmentary and Indeterminate variety

This group contains 19 figurines, but as the variety cannot be definitely determined, only one figurine was included in the samples for analysis. This is figurine **4614**. The provenance of its marble was determined as probably from IOS?, but with a high degree of uncertainty, since its parameters are closer to those of Ios than for any other field, but actually lie outside the distribution of the Ios field points. This is one of the two figurines out of the 89 analysed (the other being of the Dokathismata variety) for whose marble the determination is closer to IOS than to any other source, but with some degree of uncertainty. However, both figurines may turn out to be of marble from southeast Naxos (NX-1) if more extensive sampling and analysis is performed in that area.

Extending this result to the rest of the indeterminate variety figurines which have not been analysed might be imprudent. Judging from grain size and other marble features, they seem to be made from a variety of different marbles, from very fine to coarse grained. Based on these features, we can conclude that an IOS provenance should be excluded for at least two of them, for which a source in NX-1 and NX-H1 are more probable options. As for the rest, IOS cannot be excluded as a source, but NX-2 could be an alternative origin.

The 'Other' type

There are eight figurines of this type, of which only one was analysed (**6024**). This is of a coarse-grained marble (with MGS of 3.0 mm) and the results suggest PAROS and more specifically the area of the Marathi valley (PA-MA) as a likely place of origin for the marble. This area became famous during Archaic to Hellenistic times when open and underground marble quarries operated, producing the high-quality Lychnites Parian marble. The area also has marbles of different qualities. The marble of figurine **6024** does not have the parameters of the fine underground Lychnites marble. It obviously comes rather from some loose surface pieces. This is the only figurine among the 89 analysed that seems to come from Paros.

For the remaining figurines of the 'Other' type, based on MGS observations, we can conclude that for at least two of them, made with ultra-fine marble (Fig. 5.46F), Paros is definitely not the origin, while NX-1 is a good candidate. For the rest, Paros cannot be excluded, but NX-2 is also likely.

The Special type

Only one figurine of Special type was analysed (**6307**), for which the results gave NX-1 or IOS?. The other two figurines of Special type have different marble from the one analysed, and from each other. The coarse-grained **2194** may be made of greyish marble from northern Naxos and the medium-grained **4605** may come from central-east Naxos or, with less likelihood, from Ios.

Summary of the provenance of the marble of the figurines

The determination of the provenance of the figurines from the Special Deposit South on Keros and from Dhaskalio has been highly demanding and laborious work, given the lack of quarries, the geological similarity of the marbles and the very extensive marble

deposits in the Cyclades and especially on the huge island of Naxos. However, the outcome is satisfactory.

It has been shown that the marble of the majority of the figurines from the Special Deposit South and Dhaskalio (84 per cent), irrespective of type or variety, clearly comes from Naxos. Furthermore, Naxos is also the first or second option for the marble of the majority of the remaining pieces, whose provenance determination led to two or three different options. In addition, for most of those not recognized as coming from known and studied source areas in Naxos, an origin in Naxos, from non-sampled areas in the central-east and southeast, is still predicted. Thus, in practice the number of figurines of marble coming from Naxos is estimated close to 98 per cent.

It remains the case that Ios, which has marble similar geologically and geochemically to that of central-east and southeast Naxos, remains an alternative to Naxos as the main source island for the marble of which the figurines are made. If we were to assume that half of the figurines for which the analysis gives Ios as an alternative provenance to Naxos were actually made of marble from Ios, this would mean 27 per cent of the analysed figurines are of marble from Ios. Extending this result to the complete assemblage of figurines found on Keros would imply that about 153 figurines were made of marble from Ios, suggesting that Ios was a main figurine production centre. However, the general distribution of the figurine isotopic signatures (bimodal: characteristic only of Naxos) and EPR values, when taken into consideration along with marble quality and characteristics, and the rarity of figurine finds on Ios, makes such a result seem unlikely. The few figurines actually found on Ios, mostly at Skarkos, are in the majority of poor-quality layered grey-white local marble. In fact, only two figurines from the Special Deposit South, one of the Dokathismata variety and one of indeterminate variety, have a higher probability of being of marble from Ios than from Naxos. One cannot exclude the possibility that a few figurines from the total assemblage may be of marble from Ios. The question would remain as to whether this is an effect of the similarity of the marble in the central region in the parameter fields of central-east and southeast Naxos to that of Ios, and perhaps of the omission of some locations from the sampling in the really extensive marble deposits on Naxos.

Paros is documented as the source for the marble for only one figurine, of the Other type, which has a high probability of being of marble from the Marathi valley on Paros. A small possibility may exist for another two or three figurines, but this is uncertain. It should be noted here that scholars have in the past interpreted the fine-grained and transparent marble of some figurines found on Keros (e.g. the Harp Player, etc.) as indicative of Parian marble, but such ultra-fine-grained marble does not exist on Paros. It is clear that marble from Paros is not represented in the figurines found on Keros.

Syros appears as an alternative provenance at a third level in the analysis, together with Naxos and Ios, for four figurines where the provenance option was reduced to not less than three, of which Syros was the least likely. None of these four figurines was of the Chalandriani or Keros variety. Two were of the Spedos variety and two of the Dokathismata variety. It is unlikely that marble from Syros is represented at all in the Keros figurine assemblage.

Finally, the marble of three figurines remained unclassified, despite the detailed treatment of the results. The origin of their marble could again be from a non-sampled area of Naxos. Two of them may be from NX-2 and one from NX-1.

Keros and Dhaskalio do not seem to be the likely origins for the marble of any of the figurines found there. This may be the consequence of the poor quality of the marble found at these locations. But there may be also other reasons (social, religious or economic) that the people who visited or inhabited Keros and Dhaskalio brought the figurines from elsewhere.

No other island seems to have provided the marble for any of the figurines found on Keros or Dhaskalio.

The above discussion leads to the conclusion that Kavos and Dhaskalio, insofar as their role was a sanctuary where figurines have been found, were most probably linked primarily with Naxos or with islands whose figurines derived from Naxian workshops. The inhabitants of the early bronze age settlements of Naxos were apparently prominent among those who brought their figurines of Naxian marble to Keros for ritual deposition. Alternatively, the visitors to the sanctuary could have been from different islands, but the production of figurines was controlled principally by the Naxians.

The specific areas of Naxos from which the marble of the figurines originates are basically the area of central-east Naxos, between Moutsouna-Apeiranthos-Danakos-Kasteli-Ligaridia, and the area of southeast Naxos, between Ligaridia-Kasteli-Pyrgos tou Cheimarou-Distomo-Keli-Kalandos. In addition, a third area, perhaps less important, is situated around and southwest of Apeiranthos, most probably between Apeiranthos-Filoti-Danakos (Fig. 5.6). No figurines seem to have come from the other marble-bearing areas of Naxos, such as central-west Naxos, central-north Naxos or the northeast, where much marble was extracted in later times.

Figure 5.64. *View of Kouphonisi and Keros from Pyrgos Kanaki (southeast Naxos).*

Figure 5.65. *View of Kouphonisi and Keros from the Moutsouna-Apeiranthos road (central-east Naxos).*

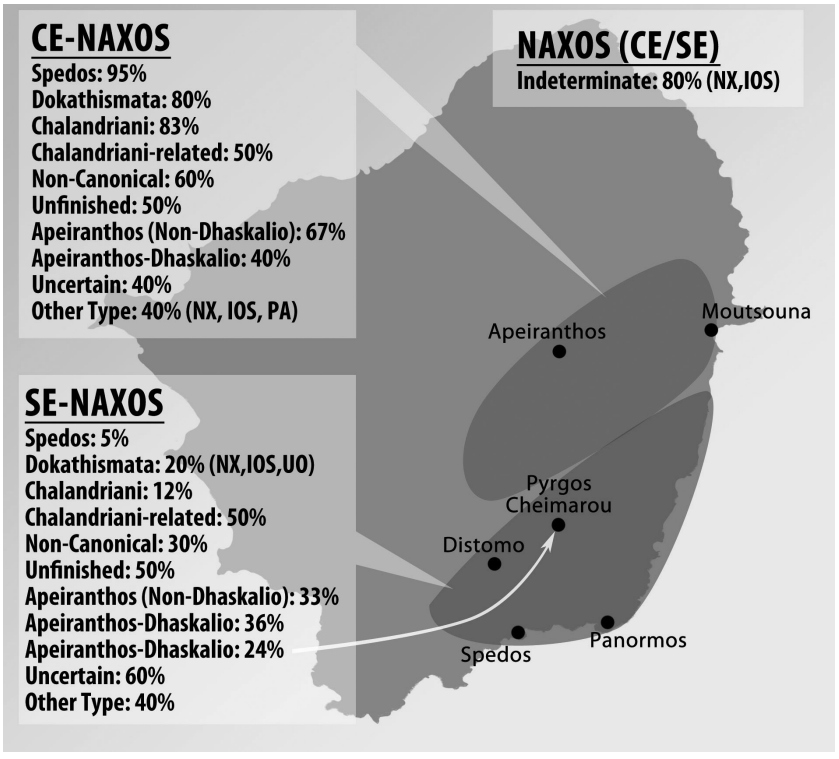

Figure 5.66. *Guide to the places of origin of the Keros figurines by type or variety with approximate percentages for each region.*

The areas of central-east and southeast Naxos are those with the most direct contacts with and access to Keros. These areas have many early bronze age settlements which are situated on hills, either close to the sea or on higher places further inland and with easy access to the sea through valleys. From all these locations which we visited during our marble surveys and sampling procedures, Keros with its impressive and bulky mountain looked imposing (Figs. 5.64, 5.65) behind the flat Kouphonisia islands. It looked close and easy to reach, with the Kouphonisia islands offering shelter and protection from the wind as well as safe access points during the journey. Thus, it is quite possible that the early bronze age inhabitants of southeast and central-east Naxos could have developed a special affinity with Keros and Dhaskalio.

For the different types and varieties of figurines, this work has shown that there are no clear-cut differences or exclusive places of origin for the marble of particular types or varieties. However, consistent preferences are indicated for some varieties. Figure 5.66 gives a summary of the most likely places of origin for the marble of the various types and varieties, as summarized below.

Figurines of Folded-arm type

The Spedos variety is made predominantly (*c.* 95 per cent) of marble from central-east Naxos, which must be the production centre for this variety. The remaining small fraction (5 per cent) is of marble from southeast Naxos. Since the Spedos variety represents 60 per cent of the figurines found in the Special Deposit South on Keros, this resolution of the origin of the marble used in their production is a significant result regarding the origin or connection of the people who visited or lived on Keros and Dhaskalio.

The Dokathismata variety and Akrotiri sub-variety were also made largely (*c.* 80 per cent) of marble from central-east Naxos in the same way as the Spedos variety. The origin of the marble for the remaining 20 per cent is less clear. Some are probably from southeast Naxos, some could be of marble from Ios and others from an unknown area on Naxos or other locations not represented in the databases. We predict that the most of them are also of marble from Naxos.

The Chalandriani variety is also predominantly (*c.* 83 per cent) made of marble from central-east Naxos, with a small percentage (12 per cent) from southeast Naxos. A small number of the remainder probably comes also from Naxos, perhaps from a non-sampled area in central-east Naxos or another location not yet represented in the databases.

The marble of the Keros variety comes equally from the same two areas of Naxos: 50 per cent of them are of marble from southeast Naxos and the other 50 per cent from central-east Naxos. This variety has a different provenance pattern to that of the Chalandriani variety.

The unfinished figurines seem to be of marbles originating equally from central-east and from south-east Naxos.

The marble of the fragmentary and indeterminate figurine fragments seems to derive from a number of locations which may include Ios (doubtful), central-east Naxos (probable for several pieces), south-east Naxos and central-west Naxos and north Naxos.

Figurines of Schematic type

The Apeiranthos (non-Dhaskalio) variety is of a Naxian marble. Many of them (67 per cent) are of marble from central-east Naxos and the rest (33 per cent) from southeast Naxos. Their marble is not of good quality, being layered and in several cases greyish and dull.

The Dhaskalio sub-variety, constituting most of the Apeiranthos variety (about 60 per cent), is of marble coming mainly from southeast Naxos, the rest from central-east Naxos. These display a different pattern to the Apeiranthos (non-Dhaskalio) variety. Of the Dhaskalio sub-variety figurines of marble from southeast Naxos, about 40 per cent seem to derive from the area around Pyrgos tou Cheimarou. Most of these figurines were found on Dhaskalio.

The marble of the figurines of uncertain variety was not well characterized, since only one figurine was analysed. But the pattern seems to follow that of the Dhaskalio sub-variety of the Apeiranthos variety, most of them coming from southeast Naxos, the rest from central-east Naxos.

Figurines of 'Other' type

The marble of the figurines of other type was also not very well characterized, since only one figurine was fully analysed. Its marble seems to be derived from Paros and specifically from the Marathi valley area. For the remainder the probable places of origin lie in southeast Naxos, central-east Naxos, Ios and Paros.

With the origin of the marble for the figurines thus estimated as Naxian in 98 per cent of the cases studied, it has become clear that the production of the figurines found on Keros in the Special Deposit South and on Dhaskalio, irrespective of specific type and variety, was a craft performed by specialist Naxian artisans who selected fine-grained white or whitish marble for figurine production. This is the case even though, in every area from which the marble for the various figurines comes, marble of inferior quality, not well crystallized and often dull, light- or dark-grey in colour or with dense grey bands and striations, is also abundantly available. In some of these areas of Naxos there is also abundant white pure dolomitic marble. But this was not selected by the early bronze age producers, perhaps because of its lower transparency.

Provenance of the Keros marble vessels

Samples and experimental techniques

A relatively small number (140) of the marble vessels found in the Special Deposit South at Kavos and on Dhaskalio was optically examined, either during the excavation period (2006–08) on Kouphonisi or during the following years in the storerooms of the Naxos Archaeological Museum, in the same manner as the figurines. Of these, 67 fragments were sampled and analysed in the laboratory.

For the optical examination, a strong cold light source was used in conjunction with a magnifying lens and a micro scale. In many instances a stereoscopic microscope was used to obtain better results. This examination permitted the determination of the MGS, the colour, transparency and other features of the marble. This information proved valuable and helped in comparing the marble used for the vessels with that of the figurines, although the estimates of transparency and colour were somewhat restricted by the heavy weathering of many of the vessels.

The overall number of vessel fragments excavated during the work of the Cambridge Keros Project is large, approximately 2300. It was thus not possible to examine all of them in the same way as for the figurines. Apart from the systematic optical examination of 140 vessel fragments, a larger number was examined briefly by eye and in a strong light in order to get a feel for the various varieties of marble used in making them.

Following this initial examination and measurement, 67 vessel fragments representative of various marble qualities were sampled and subjected to full analysis. With the permission of the Ministry of Culture, the sampling took place in the storerooms of the Archaeological Museum of Naxos. The sampling procedure was the same as for the figurines described above.

The same techniques were used as with the geological samples and the figurines for the measurement and analysis of the vessel samples, namely EPR spectroscopy, stable isotope analysis (IRMS) and MGS measurement, as well as microscopic examination for crystalline structure and other marble features.

Results and discussion

Optical examination

Here we present the statistical results for the 140 vessels examined, which allow some tentative general conclusions, bearing in mind that this number is only a fraction of the total number of vessels excavated.

Figure 5.67 shows the distribution of MGS for all 140 vessels measured. The majority spread in the MGS range from 0.2 to 2.0 mm, with values 0.4–0.6 mm and 1.6–1.8 mm lacking. Only three vessels have a larger MGS, between 2.4 mm and 3.0 mm. This overall range in the MGS is very similar to that of the figurines (Fig. 5.43), with the exception of just two figurines made from a coarser marble (MGS >3.0 mm) not seen among the examined vessels. It is therefore clear that a preference for fine-grained marble was prevalent among the marble craft workers. Probably the same people were making both vessels and figurines. A closer inspection of the MGS histogram for the vessels shows both the overall MGS range and the mode of the distribution is the same as that for the figurines. Most of the vessels (76 per cent) are located between 0.8 and 2.0 mm, with the most probable value at 1.0 mm, but there is also a second, less numerous distribution (22 per cent) of very fine and ultra-fine marble with MGS between 0.2 and 0.8 mm and with a peak around 0.4–0.6 mm. This is an indication that the same marble sources were exploited.

For MGS variations and preferences between the various types of vessels (for the definition of types, see Chapter 4 in this volume), we can get some information from the box-plot diagram of Figure 5.68. If we leave aside the types with only one or two fragments examined for which the statistics are poor, we can see that the bowls and basins cover a MGS range of 0.5–2.1 mm, apart from one or two outliers. The cups, on the other hand, cluster in the lower part of that range with MGS values of 0.5–1.0 mm, but only 3 fragments were examined. The pedestals have a MGS ranging from 0.6 to 1.5 mm. Vessel fragments which are not assigned to any category are classed as 'unknown type' (Fig. 5.68). Their MGS covers that of all categories, as is to be expected.

The colour of the marble used for the vessel fragments examined is not almost exclusively white or whitish, as it is for the figurines, for several of them are of grey or grey striated marble (Fig. 5.69). This histogram, which includes the 140 vessels examined (the colour of seven was uncertain), shows that 54 per cent are made of white or whitish marble, and even if we include those of light greyish (whitish or greyish) marble, the proportion does not exceed 67 per cent. Nevertheless, G. Gavalas, who studied the whole number of marble vessels, reports that those of white marble represent 97 per cent of the total (Chapter 4, this volume). In view of this, we can note that the general preference for white marble seems to hold for both the figurines and vessels, except that dark grey or white marble with grey striations has not been observed in the Keros figurines, but only in the

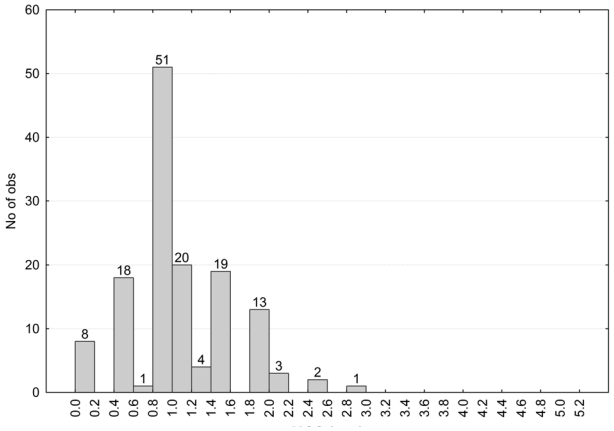

Figure 5.67. *Histogram of MGS distribution for all vessel fragments examined (n=140).*

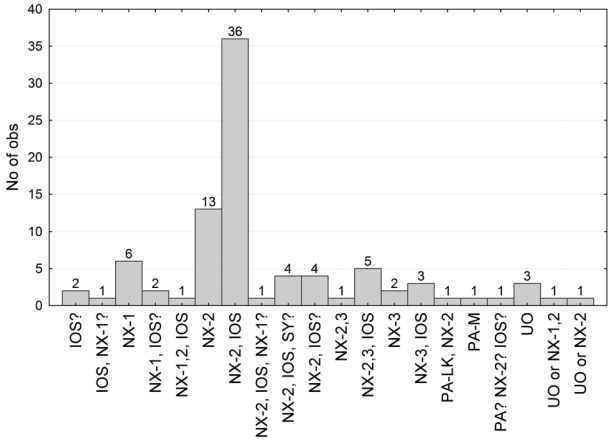

Figure 5.68. *Histogram of MGS distribution among the various types of vessels. Note that apart from the bowls, basins and cups, the rest is restricted to just 1–2 fragments examined. The unknown type includes all fragments examined whose typology had not been determined.*

vessels. This difference, however limited, may imply a deliberate choice for a number of vessels in order to produce a differing appearance.

The colour variations for the different types of vessels are summarized below.

The bowls examined, irrespective of specific design, are made mostly of white or whitish marble and to a lesser extent (about 14 per cent) of grey or grey-striated marble (Fig. 5.70). Of the total of bowl fragments the percentage of grey or grey-striated marble is approximately 2 per cent (see Chapter 4, this volume).

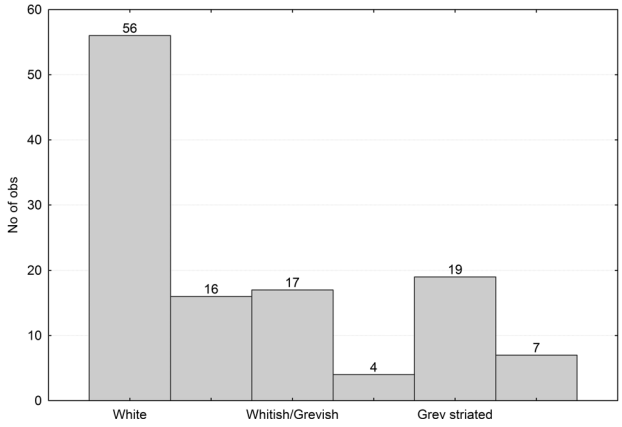

Figure 5.69. *Histogram of marble colour distribution among the 140 vessels fragments examined.*

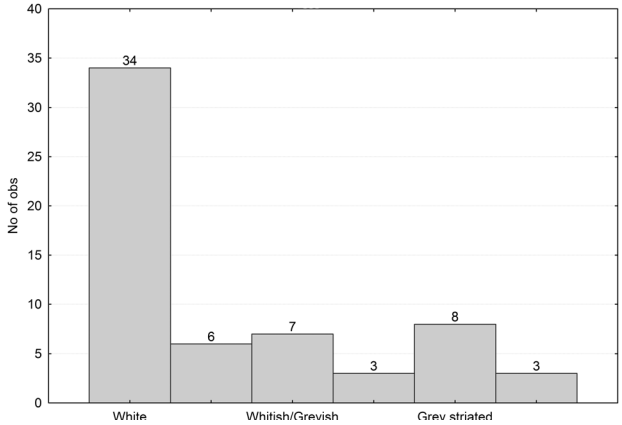

Figure 5.70. *Histogram of marble colour distribution for all the bowls examined.*

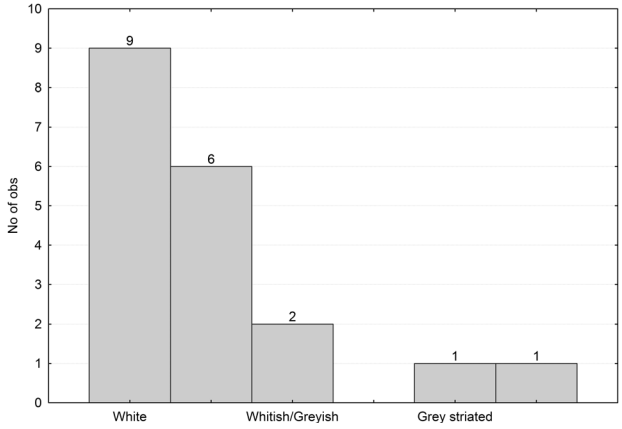

Figure 5.71. *Histogram of marble colour distribution for all the basins examined.*

The basins, although much fewer in number compared to the bowls, follow more or less the same pattern as the bowls with the white or whitish marble colours dominant (Fig. 5.71). Approximately 99 per cent of the total excavated basin fragments are made in white marble (see Chapter 4, this volume).

The cups are underrepresented in our group of examined vessels. Only four cups were examined and all of them are made in grey marble with darker and lighter thin veins (Grey striated). Two of them, from which we took samples for analysis, were classified as Keros limestone by G. Gavalas, following J. Dixon's visual examination (see Chapter 4, this volume). The optical examination of the two samples obtained showed that the material has a fine-grained and very well-crystallized fabric, with well-defined crystals and no sedimentary material in between. These features are characteristic of marble and not of limestone. It should be noted that, according to G. Gavalas (Chapter 4, this volume), the majority of the cups or saucers, 126 out of 148, were made of white marble. Unfortunately, none of those made of white marble was examined by us.

The pedestal vessels cannot be adequately evaluated since the colour of two of those examined could not be determined, due to weathering, while the third had a white colour, and the last a whitish or greyish colour.

For the remaining vessel types, of which only one or two fragments were examined in each case, the lid and palette were made of white marble, while one fragment of a possible artefact was of whitish or greyish marble and a footed cup or bowl of grey marble.

Analysis of the sampled vessels

Table 5.4 presents the results of the full analysis performed on 67 vessel fragments. The techniques and parameters are like those used for the figurines. The marble is mainly calcitic, occasionally containing various amounts of dolomite. However, the proportion of dolomite can reach quite high values (up to 67 per cent) in some vessels, especially the bowls. This behaviour differs from that of the figurines, where the proportion of dolomite was quite low, apart from one special case that reached 26 per cent.

Figures 5.72 and 5.73 present the measured values for the vessels by type against the standard field values of the different Cycladic marble groups in the two databases. As discussed above for the figurines, this presents the first step of the provenance determination procedure. The general distribution of the vessel parameters is more or less the same as for the figurines. One noticeable difference is that the distribution of the isotope signatures of the vessels (Fig.

5.73) does not exhibit the bimodal distribution which was observed for the marble of the figurines (Fig. 5.53) and which is very characteristic of the marble from central-east Naxos (NX-2) and to a lesser extent of southeast Naxos (NX-1). The bowls show the widest distribution of parameters, followed by the basins, while the cups show the narrowest.

After this initial treatment a more detailed statistical treatment of the data follows for each sample separately, following a procedure similar to that described for the figurines. This produces the final provenance assignment for the marble of each vessel fragment, analysed to the best approximation. The final assignment results are shown in Table 5.5.

The provenance results summarized for all vessels analysed from Keros are shown in the histogram Figure 5.74 grouped by island. The same picture as for the figurines emerges. Naxos, with the complicating factor of Ios, appears to be the prime candidate for the provenance of the marble of almost all analysed vessels. Naxos alone is the single place of origin for 46 per cent of the vessels analysed. Together with Ios as an alternative option, it accounts for about 90 per cent of all vessels. There is no place of origin (apart from one sample of unknown provenance) where Naxos is not the first or the second option for origin. Ios is a more probable origin for just one sample. Keros, Paros and Syros are also alternative options to Naxos for just one sample each. Syros is an option together with Naxos and Ios for two samples.

Analysing the results separately for each different marble group (location) for all analysed vessels (Fig. 5.75), the central-east Naxos (NX-2) area is again the main source area for the marble of the vessels, and southeast Naxos (NX-1) is clearly the second area. The relative proportion of vessels originating from NX-1 is higher than for the figurines. As for the figurines, some vessels come from NX-3, the area around and south of Apeiranthos, and one vessel comes from further north (NX-H1).

Table 5.4. *Results of analysis for the Keros vessels. %Dol.=percentage of dolomite contained in the marble (Tr=trace; – =under detection limit or zero).*

SF no.	Type	Colour, veins	% Dol.	MGS (mm)	Mn^{2+} (r.u.)	Width (G)	Fe^{3+} (r.u.)	$\delta^{13}C‰$	$\delta^{18}O‰$
18	Bowl	White	Tr	0.5	331.20	1.89	1.86	2.01	–6.98
120	Basin	White	–	1.5	1,604.91	2.19	11.85	1.54	–8.20
192	Bowl	Grey (dark grey striations)	–	0.5	307.30	2.22	2.89	0.41	–1.54
207	Basin	Whitish	–	2.0	698.23	1.73	10.60	2.12	–4.08
253	Basin	Whitish or greyish	–	3.0	3,389.76	1.88	15.60	2.70	–8.53
364	Basin	White	–	1.0	298.66	1.71	5.14	1.99	–6.41
877	Bowl	Whitish or greyish	–	1.0	645.12	1.86	7.90	1.73	–7.74
892	Bowl	White	–	1.0	359.12	1.80	3.28	2.11	–6.99
913	Basin	Grey (grey and white striations)	–	0.5	736.15	1.43	4.18	0.23	–6.38
918	Palette	White	–	2.0	271.87	1.45	1.83	1.94	–4.90
1203	Bowl	White	10%	1.0	36.02	1.45	1.91	1.96	–5.45
1402	Rolled-rim bowl	Uncertain	Tr	0.5	1,584.68	1.71	4.40	1.95	–11.91
1410	Bowl	White and grey bands	–	1.0	521.28	2.07	4.06	1.62	–4.70
1518	Marble fragment, perhaps of an artefact	Whitish or greyish	Tr	0.5	1,237.22	1.62	6.09	1.69	–9.61
1560	Bowl	White	–	1.0	1,264.85	1.78	17.82	1.64	–4.36
1712	Rolled-rim bowl	White (white vein)	11%	1.0	1,029.55	1.62	8.99	3.81	–2.67
1734	Rolled-rim bowl	White	–	1.0	775.75	1.92	1.66	1.67	–5.49
1744	Basin	White	–	1.0	462.15	1.57	12.93	1.15	–7.79
1750	Rolled-rim bowl	White	–	1.0	411.84	1.53	6.59	1.25	–7.83
2012	Bowl	White	–	2.5	178.56	3.38	4.23	3.76	–7.61
2116	Bowl	White	13%	1.0	737.03	1.97	12.68	3.75	–2.71
2132	Bowl	Dark grey	–	0.5	334.20	2.24	4.20	0.86	–1.58
2162	Basin	White	Tr	1.0	595.25	1.80	5.92	1.87	–5.23
2181	Bowl	White	–	1.0	485.59	1.54	4.69	2.08	–4.27

Table 5.4. *(Continued.)*

SF no.	Type	Colour, veins	% Dol.	MGS (mm)	Mn^{2+} (r.u.)	Width (G)	Fe^{3+} (r.u.)	$\delta^{13}C‰$	$\delta^{18}O‰$
2602	Bowl	White	13%	2.0	1,692.60	1.88	7.62	3.94	–1.32
2752	Basin	Whitish	10%	1.2	2,153.96	5.46	5.42	4.34	–4.36
2808	Bowl	White	24%	1.0	711.12	1.72	11.81	3.76	0.83
3101	Bowl	White	3%	2.0	401.95	1.64	5.22	3.78	–2.73
3136	Bowl	Whitish or greyish	–	2.0	90.14	2.13	17.57	2.52	–3.46
5633	Plain bowl	White and grey bands	–	1.0	70.19	2.49	6.74	2.89	–4.81
10617	Bowl	White	Tr	1.2	463.75	1.54	29.70	1.08	–4.63
10713	Basin	Greyish	Tr	2.1	201.60	1.64	13.79	1.21	–4.38
12317	Bowl	White and grey bands	Tr	2.0	194.69	1.73	18.27	1.29	–4.43
20155	Cup	Grey (dark grey striations)	Tr	0.5	318.75	2.84	3.99	2.76	–1.67
20158	Bowl	White	17%	0.6	273.56	3.62	6.28	1.87	–1.84
20171	Bowl	White	–	1.0	328.32	1.61	4.75	2.02	–6.40
20206	Bowl	White	–	1.1	440.64	1.46	5.22	1.56	–6.10
20208	Footed cup or bowl	Grey (dark grey and white striations)	3%	0.5	287.98	2.56	3.51	1.51	–1.20
20306	Bowl	White	43%	1.1	253.49	1.86	11.04	1.42	–2.91
20311	Ledge-lug cup	Grey (dark grey striations)	9%	0.5	606.84	2.62	7.08	0.96	–1.77
20409	Bowl	Whitish	59%	2.0	287.61	–	5.81	1.42	–2.87
20503	Ledge-lug bowl	White	67%	1.5	397.13	–	7.48	2.94	–5.37
20511	Bowl	White	–	1.0	427.99	1.50	3.80	0.91	–5.41
20529	Bowl	Uncertain	Tr	1.5	2,121.99	1.65	5.31	1.95	–11.05
20726	Bowl	Grey (dark grey and white striations)	Tr	1.0	195.64	2.32	2.65	3.38	–1.79
20733	Bowl	White	–	1.5	639.87	2.03	3.81	1.91	–7.83
20737	Bowl	White	56%	1.5	157.32	–	7.85	1.30	–2.65
20738	Basin	White	3%	1.5	201.02	1.56	3.98	1.63	–3.70
25004	Basin	Whitish	2%	1.1	3,197.95	1.52	16.65	2.04	–6.78
25015	Rolled-rim bowl	Whitish or greyish	Tr	1.3	763.73	1.56	9.95	2.23	–11.06
25028	Basin	Whitish (fine vein?)	Tr	1.2	317.45	1.56	5.55	2.16	–4.98
25044	Bowl	White	2%	1.3	4,697.28	1.68	11.68	2.75	–7.63
25057	Lugged bowl	White	–	1.0	642.38	1.64	16.74	2.06	–5.90
25064	Bowl	White	2%	1.2	931.01	1.49	4.70	2.16	–10.86
25070	Bowl	Whitish	2%	1.5	838.85	1.50	3.72	0.49	–5.80
25080	Bowl	Whitish or greyish (grey striations?)	15%	0.9	606.41	1.64	13.20	3.66	–2.49
25094	Bowl	Whitish	37%	1.5	151.59	1.72	13.30	2.38	–2.43
25112	Bowl	White (milky)	3%	1.2	5,596.54	1.81	75.99	2.06	–9.37
25121	Basin	White	–	1.2	137.29	1.73	9.77	1.87	–3.88
30001	Rolled-rim bowl	White and grey bands	Tr	1.5	907.20	1.60	7.51	0.99	–6.88
30003	Bowl	White	–	1.1	597.04	1.59	2.66	2.51	–5.18
30006	Basin	White	Tr	1.5	517.75	1.61	13.52	2.06	–6.52
30008	Bowl	Whitish or greyish	Tr	1.1	3,442.20	1.94	6.37	2.37	–4.70
30012	Bowl	White (greyish background)	Tr	2.0	281.23	1.77	5.45	2.18	–7.50
30415	Bowl	White (milky)	–	0.9	339.84	2.29	4.20	2.21	–5.74
30455	Bowl	White	–	1.5	34.76	1.07	1.69	2.05	–8.88
30456	Bowl	Greyish	–	1.5	368.64	1.76	5.31	2.36	–4.45

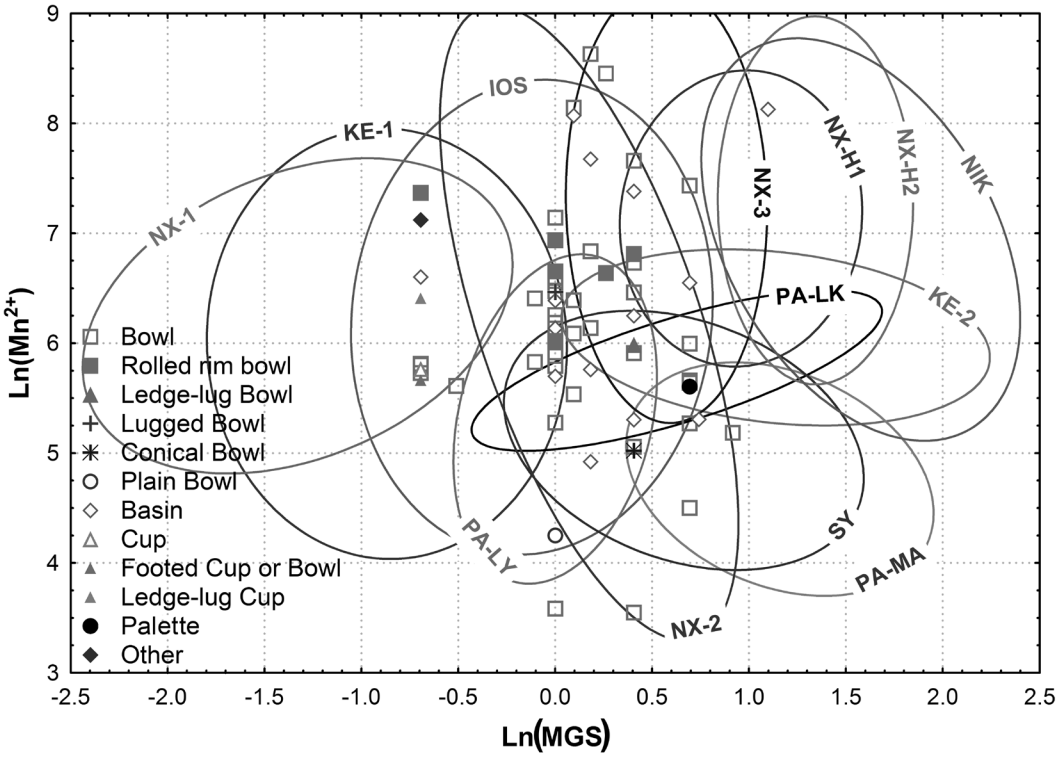

Figure 5.72. *Diagram of Ln(Mn^{2+})* versus *Ln(MGS) parameters for the Keros marble vessels against the various marble groups of the Cycladic Islands: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

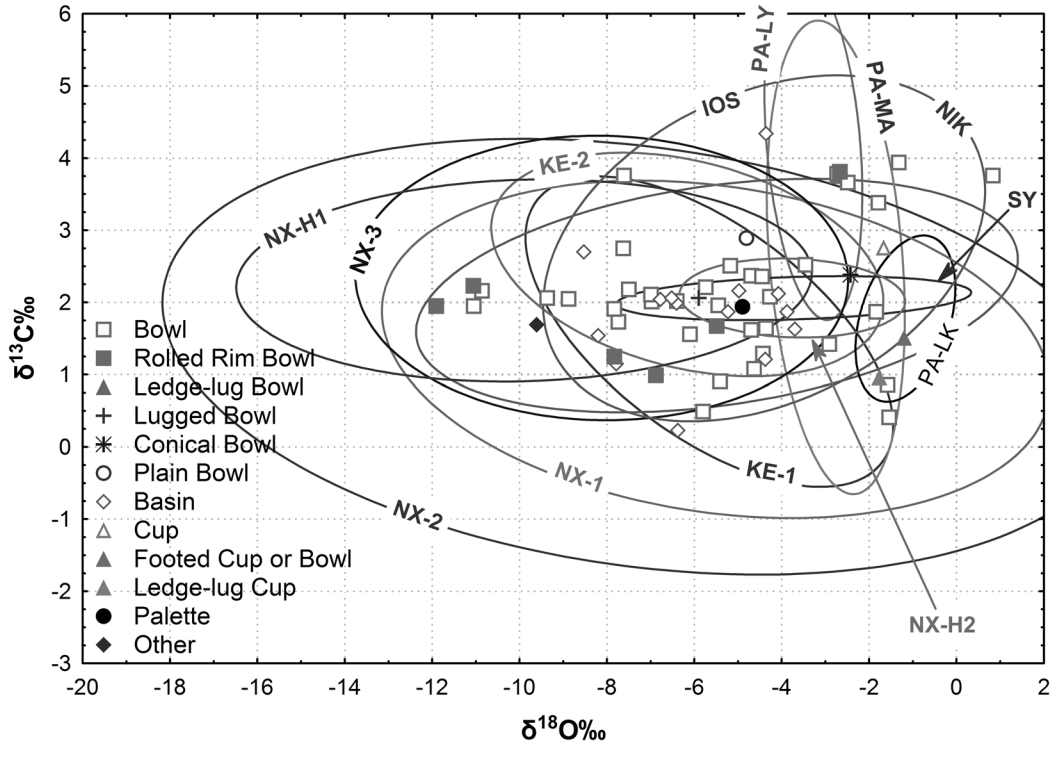

Figure 5.73. *Diagram of $\delta^{13}C‰$* versus *$\delta^{18}O‰$ parameters for the Keros marble vessels against the various marble groups of Cycladic Islands: Nikouria (NIK), Ios (IOS), Keros (KE-1 and KE-2), Naxos (NX-1, NX-2, NX-3, NX-H1 and NX-H2), Paros (PA-LY, PA-MA and PA-LK) and Syros (SY).*

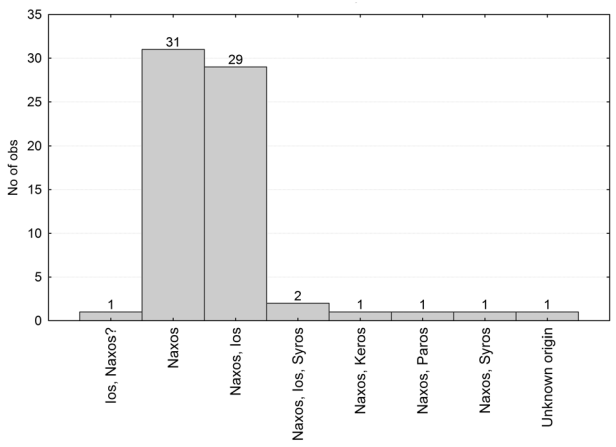

Figure 5.74. *Summarized provenance results for all vessels analysed, by island.*

For the vessel type and origin, it appears that:

The bowls (irrespective of specific shape) are made mainly of marble from central-east Naxos (NX-2 and NX-3), with a small fraction from southeast Naxos (Fig. 5.76). This is in accordance with the MGS and colours observed for all the bowls examined (Figs. 5.69, 5.70), i.e. the majority are made of white or whitish coloured marble with MGS between 0.8 and 3.0 mm, features characteristic of NX-2 & 3. A small proportion (about 13 per cent) is made of ultra-fine marble with grey striations, characteristic features for several places in southeast Naxos. There is a possibility that one bowl comes from Paros and a possibility that another comes from Syros. These possibilities, although weak, should not be excluded.

The basins exhibit more or less the same provenance pattern as the bowls (Fig. 5.77). The difference here is that the proportion of those having Ios as an alternative origin to NX-2 is much higher than for the bowls. This is probably because the parameters of the basins are confined to the central part of the database diagrams (Figs 5.72, 5.73) where the bulk of the field points of NX-2 and IOS overlap. This point should be treated with caution in regarding Ios as an alternative origin: it most probably indicates a more restricted origin to central-east

Table 5.5. *Final provenance assignment of the analysed Keros vessels.*

SF no.	Type	Colour, veins	MGS (mm)	Provenance
18	Bowl	White	0.5	NX-1
120	Basin	White	1.5	NX-2,3 or IOS
192	Bowl	Grey (dark grey striations)	0.5	NX-1
207	Basin	Whitish	2.0	NX-3 or KE-2
253	Basin	Whitish or greyish	3.0	NX-H1
364	Basin	White	1.0	NX-2 or IOS
877	Bowl	Whitish or greyish	1.0	NX-2 or IOS
892	Bowl	White	1.0	NX-2
913	Basin	Grey (grey and white striations)	0.5	NX-1
918	Palette	White	2.0	NX-2, NX-3
1203	Bowl	White	1.0	NX-2 or IOS
1402	Rolled-rim bowl	Uncertain	0.5	NX-1
1410	Bowl	White and grey bands	1.0	NX-2 or IOS
1518	Marble fragment, perhaps of an artefact	Whitish or greyish	0.5	NX-1
1560	Bowl	White	1.0	NX-2 or IOS
1712	Rolled-rim bowl	White (white vein)	1.0	NX-2
1734	Rolled-rim bowl	White	1.0	NX-2
1744	Basin	White	1.0	NX-2 or IOS
1750	Rolled-rim bowl	White	1.0	NX-2 or IOS
2012	Bowl	White	2.5	NX-2?
2116	Bowl	White	1.0	NX-2
2132	Bowl	Dark grey	0.5	NX-1
2162	Basin	White	1.0	NX-2 or IOS

Table 5.5. *(Continued.)*

SF no.	Type	Colour, veins	MGS (mm)	Provenance
2181	Bowl	White	1.0	NX-2, IOS, SY
2602	Bowl	White	2.0	Unknown origin
2752	Basin	Whitish	1.2	NX-2
2808	Bowl	White	1.0	NX-2
3101	Bowl	White	2.0	NX-2
3136	Bowl	Whitish or greyish	2.0	NX-2 or PA-M
5633	Plain Bowl	White and grey bands	1.0	IOS or NX-2?
10617	Bowl	White	1.2	NX-2 or IOS
10713	Basin	Greyish	2.1	NX-2 or IOS
12317	Bowl	White and grey bands	2.0	NX-2 or IOS
20155	Cup	Grey (dark grey striations)	0.5	NX-1 or IOS
20158	Bowl	White	0.6	NX-1
20171	Bowl	White	1.0	NX-2 or IOS
20206	Bowl	White	1.1	NX-2
20208	Footed cup or bowl base	Grey (dark grey and white striations)	0.5	NX-1 or IOS
20306	Bowl	White	1.1	NX-2 or IOS
20311	Ledge-lug cup	Grey (dark grey striations)	0.5	NX-1
20409	Bowl	Whitish	2.0	NX-2,3 or IOS
20503	Ledge-lug bowl	White	1.5	NX-2,3 or IOS
20511	Bowl	White	1.0	NX-2
20529	Bowl	Uncertain	1.5	NX-3
20726	Bowl	Grey (dark grey and white striations)	1.0	NX-2 or IOS
20733	Bowl	White	1.5	NX-2
20737	Bowl	White	1.5	NX-2
20738	Basin	White	1.5	NX-2 or IOS
25004	Basin	Whitish	1.1	NX-2 or IOS
25015	Rolled-rim bowl	Whitish or greyish	1.3	NX-2, or IOS
25028	Basin	Whitish (fine vein?)	1.2	NX-2, IOS, SY
25044	Bowl	White	1.3	NX-3
25057	Lugged bowl	White	1.0	NX-2 or IOS
25064	Bowl	White	1.2	NX-2,3
25070	Bowl	Whitish	1.5	NX-2,3
25080	Bowl	Whitish or greyish (grey striations?)	0.9	NX-2 or NX-1
25094	Bowl	Whitish	1.5	NX-2 or IOS
25112	Bowl	White (milky)	1.2	NX-2?
25121	Basin	White	1.2	NX-2 or SY
30001	Rolled-rim bowl	White and grey bands	1.5	NX-2,3 or IOS
30003	Bowl	White	1.1	NX-2
30006	Basin	White	1.5	NX-2,3 or IOS
30008	Bowl	Whitish or greyish	1.1	NX-2 or IOS
30012	Bowl	White (greyish background)	2.0	NX-2,3
30415	Bowl	White (milky)	0.9	NX-2 or IOS
30455	Bowl	White	1.5	NX-2
30456	Bowl	Greyish	1.5	NX-2,3 or IOS

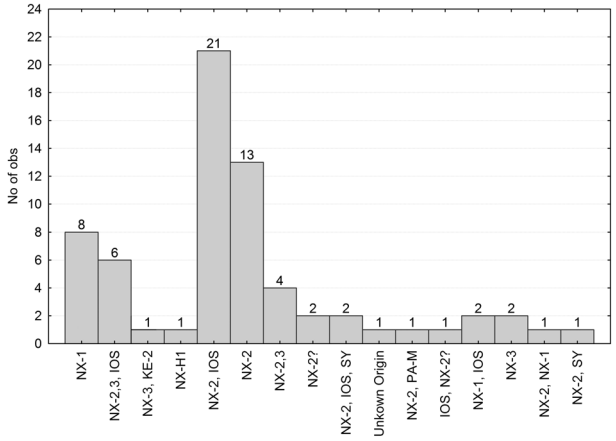

Figure 5.75. *Summarized provenance results for all vessels analysed, by different marble group (location).*

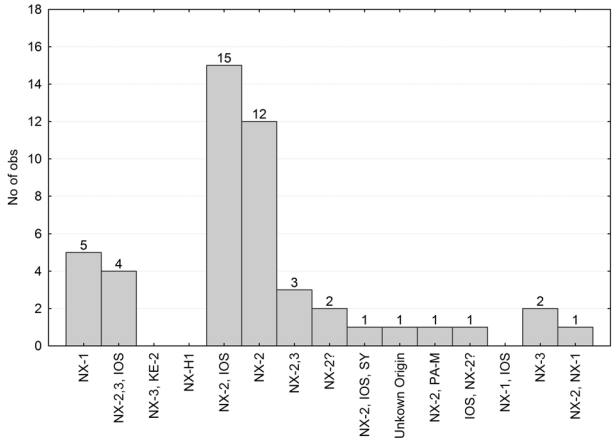

Figure 5.76. *Summarized provenance results for all bowls analysed, by different marble group (location).*

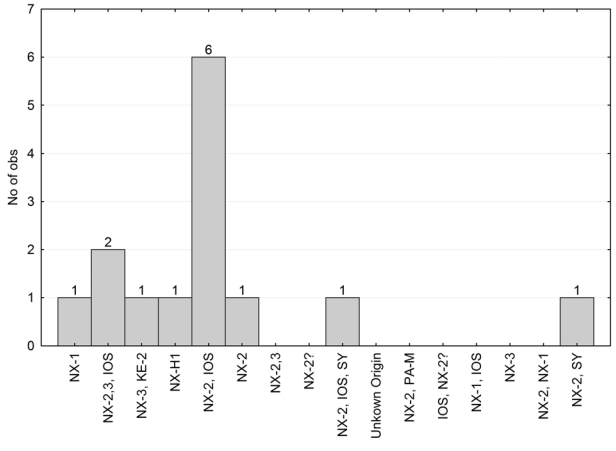

Figure 5.77. *Summarized provenance results for the basins analysed, by different marble group (location).*

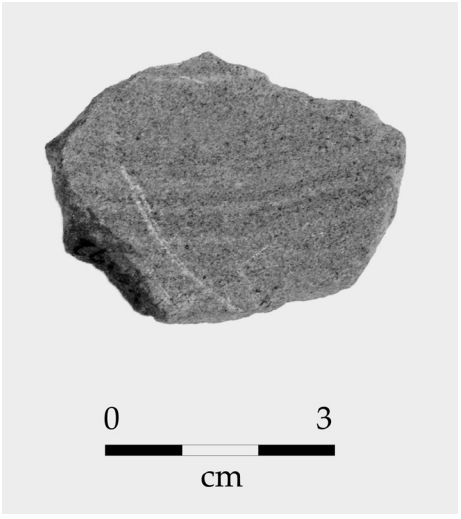

Figure 5.78. *Photo of vessel* **192** *made of dull grey marble with striations; its provenance determined as southeast Naxos.*

Naxos, an assumption which agrees very well with the MGS distribution (1.0 to 2.2 mm, apart from two outliers) and the colour range (mostly white or whitish, apart from one grey-striated) for the bulk of the basins examined. It should be noted here that a white marble basin from Skarkos on Ios was analysed at the request of Marisa Marthari and the provenance of its marble was determined as Paros. One of the basins may have been made of KE-2 marble.

The other vessel types analysed are unfortunately underrepresented in the samples. Only two cups were analysed. One is coming securely from southeast Naxos (NX-1) and the other has equal probability to originate from either southeast Naxos (NX-1) or Ios. One palette gave an NX-2 or NX-3 provenance and a marble fragment of a possible artefact (**1518**) gave an NX-1 provenance; the number is insufficient for any secure conclusions.

A further general word should be said about the possibility of provenance from Ios. As discussed earlier, the IOS marble field parameters coincide in the central part of both databases with those for NX-2 and NX-1. That Ios appears from the statistical treatment of the samples as an alternative choice of origin to Naxos is mainly due to this overlap, rather than to a real possibility of its being the actual place of origin for these samples. To demonstrate this, we can give the following example. Sample vessel **192** is a bowl made of a dull grey marble with striations (Fig. 5.78). Marble of this kind is found in abundance in southeast Naxos (Fig. 5.79), while similar marble (perhaps in lighter grey) is also found on Ios, yet the analysis gives

Figure 5.79. *Wall built with local slabs of blue/grey marble with white striations, typical of southeast Naxos, at the prehistoric site of Kastro Kanaki in southeast Naxos. Compare with vessel fragment* **192** *(Fig. 5.78),* **20726** *and many others. Also compare with the slabs used for the Dhaskalio house walls (Fig. 5.9).*

southeast Naxos (NX-1) as the only possible place of origin. On the other hand, sample **364** is a basin made of a pure white transparent marble (Fig. 5.80) with a MGS of 1.0 mm, a specific variety which is abundant in central-east Naxos, but in Ios is only rarely found—yet the statistical analysis gives NX-2 or IOS as alternative provenances. These examples indicate clearly that Ios is not necessarily the provenance for vessels made of marble with similar physical appearance seen in both Ios and Naxos, and certainly not the provenance for the vessels made of marble of characteristic Naxian quality yet with similar physico-chemical parameters to those seen in the marble of Ios.

The above evidence offers reassurance that Ios cannot be the production centre for as many vessels as might appear from the analysis, although one cannot exclude entirely the possibility that one or two objects may have come from there.

Summary for the provenance of the vessels

It should be remembered that the vessels analysed represent a small fraction of the total number excavated, hence generalizing the conclusions to the whole body of vessels may be risky. However, some tentative general conclusions are attempted below.

It appears that the marble for the vessels from the Special Deposit South, like that of the figurines, came mainly from Naxos. The areas of central-east and southeast Naxos as defined in Figure 5.66 are the two main production areas, with the central-east Naxos marble source as the main origin for bowls and basins. Some vessels (about 33 per cent of those analysed) are made of grey or grey-striated marble typical of southeast Naxos, but also found in central-east Naxos. Thus, in the same areas where the rarer white, well-crystallized and transparent marble was exclusively chosen for making figurines, the dull grey or grey-striated variety was also used by the vessel makers. This may indicate a conscious choice of different marble for a number of vessels, or the use of the closest available variety, given that the amount of marble needed for the vessels was greater than that for the figurines.

The marble of Keros does not seem to be represented in the vessels analysed, except for the case of one doubtful basin. A few vessels examined macroscopically during the excavation seem to have been made of a marble type that resembles that of the Kavos

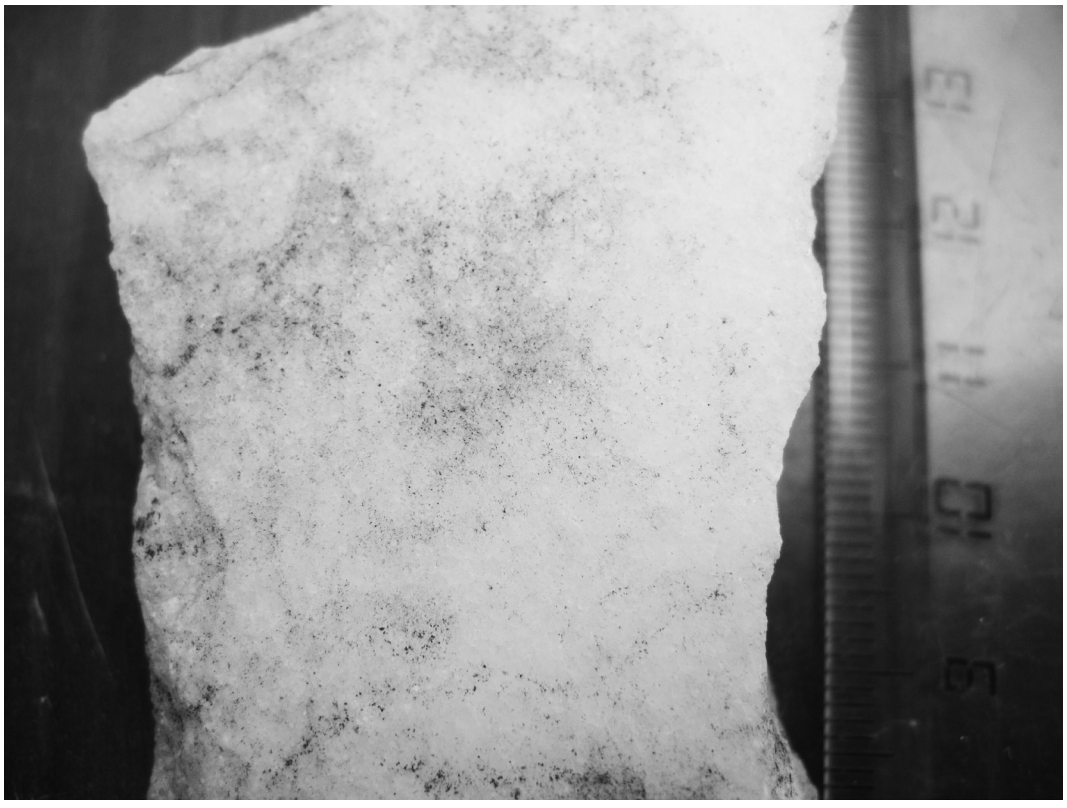

Figure 5.80. *Photo of vessel* **364** *made of a white transparent marble with MGS=1.0 mm characteristic of central-east Naxos. (Scale in mm.)*

and Dhaskalio marble deposits, but unfortunately none of these vessels was sampled. The view has been taken in Chapter 4, following Dixon's geological field-work on Keros, that these might be of Kerian origin.

Overall conclusions

It appears from this detailed and extensive provenance determination work that the figurines found in the Special Deposit South at Kavos and on Dhaskalio are made almost exclusively of marble from Naxos. The areas of central-east Naxos and southeast Naxos, with their fine view of Keros and their easy access to it, seem to contain the localities where the figurines were made, with central-east Naxos being the main production region. The marble in these areas shows a variety in colour, grain size and transparency ranging from white, transparent and fine-grained marble to dark grey marble or marble with dark grey striations and poorly crystallized. The former, which is rarer, was used for making figurines, which indicates a persistent search and selection for this variety. This marble is more readily available in central-east Naxos where the degree of marble metamorphosis is II and III, rather than in southeast Naxos where it is lower (I). This may explain the dominance of the central-east Naxos area as the principal source for the marble used in the production of figurines, unless the people in the settlements of this area were more frequent visitors to Keros than those from other regions.

Moreover, this area of central-east Naxos is the principal production area for figurines of the Spedos variety, while most of the Apeiranthos variety are made of marble from southeast Naxos. For the latter, their makers apparently sought out the better quality marble in this low-metamorphic area where dull grey marble is more abundant. For example, a large proportion of the Apeiranthos figurines of the Dhaskalio sub-variety is made of very fine white and highly transparent marble, which has been found only in the area close to the Pyrgos tou Cheimarou.

The vessels analysed (a small fraction of the total) seem also to be made of Naxian marble, coming from the same areas as that used for the figurines. The Keros or Dhaskalio marble is hardly represented in the vessels analysed, but cannot be excluded for some in the large number of examples which have not been analysed. This matter is further discussed in Chapter 4. The central-east Naxos area is again the main production centre, although the proportion of vessels made

in south Naxos seems higher than in the case of the figurines. A difference for the vessels is the use of grey or grey-striated marble for a number of them (30 per cent of the examined fragments, but less than 3 per cent of the total excavated), while only fewer than 5 in 564 figurines examined are probably made of this or similar kind of marble. The use of all kinds of marble and the clever accommodation of the veins and bands to form parallel rings indicates skilful craftsmanship.

The marble of Ios, through its great similarity (geologically perhaps belonging to the same massif) with the marble of central-east and southeast Naxos, creates some degree of uncertainty in the final provenance results. The Ios marble's physico-chemical parameters appear to overlap to a great extent with the centre of the parameter fields for central-east and southeast Naxos, thus suggesting an alternative provenance to Naxos, and especially central-east Naxos, for many figurine and vessel samples. However, there are discrepancies in the colour, MGS and in other features for those particular samples that exclude Ios as a provenance. The very small number of figurines found on Ios, mostly made from a totally different of quality marble, offers reassurance that Ios was not a production centre for the figurines found at in the Special Deposit South or on Dhaskalio.

Thus, for the marble figurines and vessels, it remains the most plausible conclusion that Dhaskalio and the Special Deposits at Kavos were visited either by Naxian populations living opposite Keros at the central-east and southeast Naxos and having a fine view of Keros, or by other islanders who had obtained the marble for their figurines and vessels, or the finished objects, from the Naxian populations of south and central-east Naxos.

Future work

Further fieldwork to extend the southeast Naxos and central-east Naxos databases would be helpful in clarifying some samples of questionable origin which we predict to be from these two regions.

Additional examination, sampling and analysis of marble objects (mainly vessels) found on Ios may help to clarify the specific types of marble source used by the early bronze age craftsmen of the island and to define their relationship with the analysed material from the excavations on Keros. It is possible that the marble objects found on Ios may be imports from other islands, as proved to be the case with the vessel (basin) from Skarkos whose analysis was discussed above.