

A NEW ARCHAEOMETRIC ANALYSIS OF MARBLE SCULPTURES AND
ARCHITECTURAL ELEMENTS FROM SELINUNTE IN THE “ANTONINO SALINAS”
MUSEUM IN PALERMO*

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ABSTRACT

Several marble sculptures of the Orientalizing, Archaic, and Classical periods from Selinunte, excavated in the nineteenth and twentieth centuries and now in the collections of the Archaeological Museum of Palermo “Antonino Salinas,” were submitted to archaeometric analyses (powder-XRD, OM on thin section, SIRA) with the purpose of determining their original provenance. This study is part of a wider project investigating the importation of marble in Greek Sicily, including chronological development, trading routes, and centers of use and production. The results show that, as was the case for the other two important *poleis* of Syracuse and Agrigento, the marble used far more frequently for architectural elements and statuary in Selinunte was coming from the large open-pit quarries of Lakkoï on the island of Paros. This origin was, in fact, determined for the fragments of an acroterion, two tiles, the fragment of a sima with lion’s-head waterspouts from the roof of Temple A; the bearded head of a statue; a left hand wearing a ring from an acrolithic/pseudoacrolithic statue; the hoof of a horse on a plinth; two statuettes featuring, respectively, an unfinished seated woman and a peplophoros; and, finally, a large votive relief. Although the use of Paros 2 marble appears predominant at Selinunte, our analysis shows how two marble lamps with human protomai from Malophoros were also of Parian origin but carved from the more prized *lychnites* of the Stephani quarries, the most prestigious marble of antiquity. Our study confirms the near monopoly of Parian marble at Selinunte but also shows the occasional use of other marble, such as the Naxian marble for the horse tail allegedly found west of Malophoros.

KEYWORDS: Selinunte. Archaeological Museum of Palermo “Antonino Salinas.” Marble sculpture. Marble roof. Archaeometric provenancing.

* Parts 1 and 2 are by Clemente Marconi; part 3 is by Lorenzo Lazzarini; part 4 is by both authors.

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1. INTRODUCTION

The original provenance of the marble from Selinunte has been a long-standing interest of scholarship since the first discovery of sculpture made of this material at our site. Considered here are the metopes of the Temple of Hera (E), combining limestone reliefs with marble inserts for the exposed parts of the female figures. Soon after the discovery of the metopes, the Duke of Serradifalco identified the marble of the inserts as “marmo greco” or “bel marmo greco” (LO FASO PIETRASANTA 1834, 17, 65), and along similar lines, in 1870, Jacob-Ignaz Hittorff referred to the same inserts as being made “en marbre blanc de Grèce,” adding a comment on the rarity and expensiveness of this imported material on Sicily (HITTORFF, ZANTH 1870, 158, 638). Only a few years later, in 1873, Otto Benndorf advanced the correct identification of Parian marble as the material for our inserts (BENNDORF 1873, 42: “An den letzern [the metopes of the Temple of Hera] . . . Gesicht, Arme, Füsse, überhaupt alle unverhüllten Partien der weiblichen Figures, aus Parischen Marmor besonders gearbeitet”), and although his study has been for many years the standard work on the metopes from Selinunte, his identification of the marble for the metopes of the Temple of Hera was ignored by part of the subsequent literature (most notably, Bernard Ashmole and Ernst Langlotz; an exception is HULOT, FOUGÈRES 1910, 296, who reiterate Benndorf’s identification of Parian as the marble for the inserts).

The interest in the source of the marble intensified in the first half of the twentieth century, sparked by Lepsius’s *Griechische Marmorstudien* (LEPSIUS 1890), the growing interest in Greek sculpture from Sicily and Magna Graecia, and the discovery of new marble sculptures and architectural elements from excavations at Selinunte. For sculpture, note Ashmole’s description of the material of the inserts of the metopes of the Temple of Hera as “a coarse-grained island marble” (ASHMOLE 1934, 27). For architecture, Ettore Gàbrici studied the marble roof now associated with Temple A (see below), in which he presents the material as large-grained and from the “Aegean islands.” (GÀBRICI 1933, 222: “Il marmo è sempre della stessa qualità, cioè di grana grossa, con numerosi cristalli, sicuramente importato dalle isole egee.” GÀBRICI 1956, 277: “frammenti . . . tutti della stessa qualità di marmo delle isole, di grana grossa a cristalli.”) Back to sculpture, particularly in the second half of the twentieth century, the provenance of the marble was a major concern for Langlotz, due, on the one hand, to his interest in the provenance of the sculptors who made the marble heads of the Temple of Hera metopes and, on the other, to his general theory that in the seventh, sixth, and fifth centuries, the origin of the sculptors of marble works in Sicily and Magna Graecia would tend to correspond to the geological provenance of the stone (see esp. LANGLOTZ 1968, 41). At the time, there was no petrological analysis available for the marble inserts of the Temple of Hera metopes, and relying on visual analysis, Langlotz limited himself to describing the material as fine-grained and excluded its identification with Pentelic. (LANGLOTZ 1968, 290: “It is a fine-grained marble which is definitely not Pentelic since this type is characterized by its lamination.”) In the same publication, which represents Langlotz’s standard treatment of sculpture from Sicily and Magna Graecia, the scholar expressed his interest also in the marble of the best-known lamp from Malophoros, which he considered to be Cycladic and perhaps Naxian (LANGLOTZ 1968, 257 no. 2).

A turning point in scholarship came in 1984, with the publication of a geochemical study by Rosario Alaimo and Salvatore Calderone concerning the provenance of the marbles from

Selinunte in the Palermo Museum, based on both chemical and isotopic analysis. This study is not without problems: the sampling process was very invasive (MARCONI 1994, 191), and some of the results are odd, such as a head and neck from the *opisthodomos* frieze said to belong to two distinct groups but later joined and proved to belong to the same sculpture (inv. 3925+14793; MARCONI 1994, 161–163). Yet there is no denying here the great value and significance of this study, which examined a remarkable number of marble sculptures and fragments, eighty-four, although, as has been demonstrated by several later studies, geochemical analyses very often need to be implemented with mineralogical-petrographic examination for the precise provenancing of an ancient marble artifact (ANTONELLI, LAZZARINI 2015). Concerning the results of this study, the chemical and isotopic analysis allowed Alaimo and Calderone to divide their samples into two groups: for the first group ($\delta^{13}\text{C}$ from +4 to +6‰; $\delta^{18}\text{O}$ from –2 to –3.50‰), the authors suggested a provenance of Ephesos or Paros; while for the second group ($\delta^{13}\text{C}$ from +2.50 to +3.50‰; $\delta^{18}\text{O}$ from 0 to –2‰), they suggested a provenance of Western Anatolia. These conclusions were based on the state of scholarship about the provenance of white marbles in the Mediterranean available at the time. Subsequent research, however, has shown that the values of Alaimo and Calderone’s Group 1 correspond with Paros 1 marble, while those of Group 2 correspond with Paros 2 marble (as first pointed out by GORGONI *et alii* 1993, 51–52 and fig. 6; then by MARCONI 1994, 191; and more recently by GORGONI, PALLANTE 2000, 503).

These considerations about the study by Alaimo and Calderone lead us to the present, more complete archaeometric analysis of the marbles from Selinunte in the Palermo Museum. Although the study carried out by Alaimo and Calderone was very extensive, some key sculptural and architectural materials were not included. Hence this new, smaller but more targeted study, which, by complementing the earlier study, contributes substantially to illuminating essential aspects of the use of marble in Selinunte from the Orientalizing to the Classical periods.

2. THE MARBLES: ART HISTORICAL DISCUSSION

Proceeding chronologically in the presentation of the material, we begin with the semicircular lamp with human protome from Malophoros, inv. 3892 (ex 270) (GÀBRICI 1927, 159, fig. 95, 162–163, pl. 23.1; BEAZLEY 1940, 24–27 no. 3, 36, figs. 2–3; LANGLOTZ 1968, 257–258 no. 2, pl. 2; TUSA 1983, 133 no. 42, pl. 45; FLOREN 1987, 422 n. 58; ROLLEY 1994, 150, fig. 133; CHIARENZA 2017, 473–482, fig. 4) [FIG. 1]. This lamp is notable for its excellent state of preservation, including the head, carved in the Daedalic style. This points to a dating of our piece within the Orientalizing period, with suggestions in the literature ranging from ca. 620–610 BCE (Beazley) to the end of the seventh century BCE (Langlotz and Rolley). Beazley, followed by Langlotz, thought that this and the other marble lamps of the same type were carved where the marble was quarried and then exported all over the Greek world. But there has been no agreement between the two scholars concerning the specific provenance of the material, for which they both relied on visual analysis. Thus, Beazley ruled out both Thasian and Naxian and considered the marble “of the nature of Parian.” Langlotz, instead, although also considering the lamp’s being made of Cycladic marble, tentatively suggested its identification as Naxian. It was on the basis of this suggestion by Langlotz that Josef Floren presented all the marble lamps with human protomai from Selinunte as being imported from Naxos. On a slightly different note, Claude

Rolley considered only this lamp as likely to be from Naxos. Lazzarini's new archaeometric analysis settles this dispute, showing how the material of our lamp is Parian *lychnites* from Stephani.

Similar conclusions concern the second lamp, circular with human protome analyzed in this study, inv. 3890 (ex 273), also from Malophoros (GÀBRICI 1927, 163, fig. 96; BEAZLEY 1940, 30 no. A, fig. 10; TUSA 1983, 132–133 no. 41, pl. 46; FLOREN 1987, 422 n. 58; ROLLEY 1994, 150; CHIARENZA 2017, 473–482) [FIG. 2]. Since Gàbrici and Beazley, the head has been compared with the head of the previous lamp and regarded stylistically later and no longer of the Daedalic style. In chronological terms, this has translated into a suggestion for a dating at the beginning of the sixth century BCE (Gàbrici) or, more loosely, to its first half (Beazley). For the identification of the marble of this lamp, considerations are similar to those for the previous lamp: Parian for Beazley but Naxian for Floren (following Langlotz's suggestion about the previous piece). A notable exception is Rolley, who hinted at the possibility that the marble of this second example would be different from that of the first. However, although the style of the two heads is different, the marble is the same, given that Lazzarini's analysis shows how this second lamp was also made of Parian *lychnites* from Stephani.

Regarding the marble lamps from Selinunte, it may be added that in their earlier study, Alaimo and Calderone analyzed a third lamp with human protome from Malophoros, inv. 17825 (TUSA 1983, 133–134 no. 44); their results suggest the identification of its marble as being Paros 1, like the two examples above.

In general, Paros 1 marble appears to have been preferably used in Archaic and Classical Greek sculpture for small works, like our two lamps. However, together with the results of the earlier analysis by Alaimo and Calderone, Lazzarini's new study shows that the coarser Paros 2 marble could also have been used in Selinunte for small sculptures, including two statuettes.

The first statuette, inv. 14802 (TUSA 1983, 182 no. 300) [FIG. 3], is a complex case. The sculpture is of a matronly figure sitting on a throne, with the arms bent at the elbow, the left forearm stretched forward, the corresponding hand probably meant to hold an attribute, and the feet resting on a tall stool. The costume includes a cloak over the head and back, a long tunic underneath reaching to the ground between the feet, and shoes. Based on the iconography, this figure is best understood as a goddess. Marble seated statuettes featuring divinities and of comparable scale to our piece were in demand in sanctuaries in Sicily and Magna Graecia in the Archaic and Classical periods. For our example, the closest parallel is the goddess from Garaguso (SESTIERI BERTARELLI 1958, 67–78, pl. 24; LANGLOTZ 1968, 274, pls. 52–53; STEININGER 1996, 128–132, 277, no. 33), generally dated to 480–460 BCE. Based on the drapery, which finds comparanda in the Small Metopes and the metopes of Temple C, our piece could be dated earlier, to about the late sixth century BCE. The sculpture is severely damaged and, more important, it is unfinished, generally executed only down to the last 1–2 mm from the final surface. As a result, most of the statuette is still rough and has conspicuous traces of the point and chisel all over, with only a few exceptions in which the surface appears smooth. The left foot is polished, not just smooth, and considerably smaller in size than the right foot. Thus far, the statuette has been discussed only once, in Tusa's catalogue, whose text seems to miss the fact that the piece is the only documented unfinished marble sculpture from Selinunte. The catalogue, however, provides

important information about the work's provenance. The statuette was given to the Palermo museum by former clandestine excavators, and it is said to have been found in a tomb west of Malophoros (presumably, the cemetery of Manicalunga) in the early 1960s. This was a time when looting of the archaeological area of Selinunte was rampaging but also a period in which forgeries were being produced in Castelvetro. It is partly on account of this situation and partly because of the lack of a clearly defined archaeological provenance that Tusa's catalogue expresses doubts about the authenticity of the sculpture. The same text, however, is ready to admit that "autorevoli colleghi" (one thinks first of Enrico Paribeni, who contributed to Tusa's work on the sculptures from Selinunte and wrote an introductory essay in the catalogue) had seen the sculpture and spoken on behalf of its authenticity, noting its unfinished status. Indeed, it is hard to imagine this statuette being a forgery or the intention of selling an unfinished sculpture on the antiquarian market. At the same time, one could easily imagine a modern intervention on the sculpture, particularly in the case of the left foot. The more likely scenario is that after its modern discovery, the statuette was subject to an attempt at finishing by forgers, which was quickly deemed difficult or unworthy and led to the consequent "donation" of the piece, hard to sell on the market, to authorities. Keeping the parallel of the statuette from Garaguso in mind, it is possible that our sculpture was a prestigious commission, left unfinished due to a flaw in the marble, possibly in correspondence with the broken right forearm. Be that as it may, our piece should be added to the small corpus of unfinished marble sculptures from Sicily and Magna Graecia that clearly points to the actual carving of marble in these two regions. In our case, what is particularly remarkable is the scale of the sculpture, which, given its reduced size, could have been imported from the Cyclades fully carved but was meant to be completed, if not fully executed, in western Sicily. Concerning the material, originally labeled in Tusa's catalogue as "white marble," a sample taken from the back was analyzed by Alaimo and Calderone, and their results point to the identification of the material as Paros 2 marble. The new analysis of the sculpture by Lazzarini confirms this identification in a definitive way.

The second statuette is inv. 3898, from the main urban sanctuary on the acropolis (GÀBRICI 1929, 91, fig. 15a–b; TUSA 1983, 131 no. 35; ØSTBY 1990, 229; MARCONI 1994, 214–215, fig. 86) [FIG. 4]. It features a peplophoros, of which only the upper torso is preserved. This statuette is one of a series of marble and limestone peplophoroi from the sanctuaries of Selinunte that, *pace* Østby, can hardly be compared with the Nike from Paros (ROLLEY 1994, 360–361; KATSONOPOULOU 2018, 107) and consequently be used as evidence for the occasional arrival of sculptors from the Cyclades to Selinunte (so ØSTBY 2000, 297). Unlike the Nike, almost all these small peplophoroi from Selinunte wear the chiton under the peplos, such as the Artemis and Athena on the metopes of the Temple of Hera, and their peplos features a long *apoptygma* marked by symmetrical folds on both sides. Likewise, the characteristic semicircular folds engraved on the upper torsos of our statuettes present a similar arrangement but a different form—they are incised, not in relief—from the semicircular folds rendered under the Nike's *apoptygma*. Not by chance, Brunilde Ridgway has regarded these small-scale peplophoroi as "probably the most convincing evidence for a local school" (RIDGWAY 1985, 705). The statuette under consideration, however, is one of two exemplars from Selinunte (the other being inv. 3897: TUSA 1983, 131 no. 34) that stand out from the rest of this series for their lack of the chiton under the *apoptygma*. Unlike those, our piece is distinctively Severe in style. Concerning the material of our piece, in his original

publication, Gàbrici speaks only of “marble,” and along similar lines, Tusa’s catalogue defines the material as “marmo bianco.” Venturing an attribution, Østby has labeled the material “marmo bianco insulare,” and correctly so, given that Lazzarini’s analysis shows that the sculpture is made of Paros 2 marble. It may be added that based on Alaimo and Calderone’s study, the marble statuettes from Malophoros, inv. 3894 (GÀBRICI 1927, 164–167, pls. 25.1–1a and 26.1; TUSA 1983, 130 no. 31; ØSTBY 1990, 225 no. 71; MARCONI 1994, 214–215, fig. 84), and inv. 3895 (GÀBRICI 1927, 164–167, pl. 26.2; TUSA 1983, 130 no. 32; ØSTBY 1990, 226 no. 72; MARCONI 1994, 214–215, fig. 85) are made of Paros 1 marble, while inv. 5779 (TUSA 1983, 130–131 no. 33; ØSTBY 1990, 227 no. 73; MARCONI 1994, 214–215, fig. 87), credited by Tusa’s catalogue with the same provenance, is made of Paros 2. At present, only one marble statuette of this series remains untested, namely, inv. 3896 (GÀBRICI 1929, 90–91, figs. 14a–b; TUSA 1983, 131 no. 36; ØSTBY 1990, 228 no. 74; MARCONI 1994, 214–215, fig. 88).

Moving to larger-scale sculpture, a notable piece is the bearded head, inv. 3893, found in the nineteenth-century excavations on the acropolis (SALINAS 1894, 204, fig. 1; HOLLOWAY 1975, 21–22, figs. 133–135; TUSA 1983, 137 no. 55; ØSTBY 1990, 222 no. 68; MARCONI 1994, 213, figs. 82–83) [FIG. 5]. The *krobylos* in which the hair is arranged, together with the beard, point to a close comparison with the Zeus of the *hieros gamos* metope from the Temple of Hera, similar in size to our piece. Also taking into account the rendering of the anatomy, especially the eyes, still visible in spite of the general weathering of the surface, the head can, in fact, be attributed to the same sculptors responsible for the carving of the metopes of the Temple of Hera. Concerning the material, after Salinas’s definition as “large-grained Greek white marble,” Tusa’s catalogue simply defines it as “marble,” while Østby defines it as “white, insular marble.” Lazzarini’s analysis now shows its identification as Paros 2 marble. Although the surface is worn, the quality of the sculpture must have been high. It is unlikely that the piece served as architectural decoration; those familiar with the last decades of scholarship on Greek sculpture will quickly realize how asymmetries of the face are hardly solid evidence for divining such function. Also, the head was clearly in the round, not meant to be inserted into a relief. Last but not least, there is simply no evidence for pedimental sculpture on the acropolis. The head more likely belonged to a votive/cult statue, and the piece confirms the use of Paros 2 marble for more prestigious commissions.

To a sculpture of comparable size belonged the left hand and wrist, inv. 5718 (TUSA 1983, 166 no. 210; ØSTBY 1990, 214 no. 55) [FIG. 6]. This is an interesting piece, since the annular wears a ring, which is very unusual. For example, finger rings are not documented on the highly adorned Acropolis korai, wearing necklaces, earrings, or bracelets often carved in one piece with the sculpture (LEE 2014, 74–105). Back to our hand, its fist is clenched, holding a tubular object that is now hard to identify. The sculpture has a dowel hole at the wrist and was thus meant to be pieced together with the rest of the figure. On the basis of this technical solution and the similarity of the marble and the dimensions, Østby has advanced the possibility of its attribution to the metopes of the Temple of Hera. Jewels do not appear to have been carved in one piece with the marble inserts of the metopes, though, which is why I did not include this sculpture in my catalogue. More likely, the hand belonged to a different acrolithic or pseudoacrolithic sculpture, unless the piecing was the result of a later repair and the entire statue was marble, which I find unlikely, however, given the treatment of the joint. Tusa’s catalogue defines the material as “white marble with small crystals,”

while Østby labels it “white insular marble.” Lazzarini’s study now confirms and refines the latter identification, namely, with Paros 2 marble. It may be noted that on the basis of the results of the analyses by Alaimo and Calderone, the hands/forearms/arms of the female figures of the metopes of the Temple of Hera are predominantly made of Paros 1 marble (Amazon’s left hand, Hera’s left hand and right arm, Artemis’s left hand and right arm, and invv. 14789, 14759+27186, 14791) but can also be made of Paros 2 marble (invv. 14797, 14790, 5746, 5762).

Among the marble sculptures from Selinunte, the horse tail, inv. 17070—according to Tusa’s catalogue, found west of Malophoros in 1965 (arguably in clandestine excavations)—is one of the largest in scale documented (TUSA 1983, 182 no. 299; FREL 1985, 64–65; ØSTBY 1990, 224 no. 70; VILLA in LYONS, BENNET, and MARCONI 2013, 163, fig. 100; GRECO 2009, 536) [FIG. 7]. The sculpture (notoriously connected with the Motya Charioteer since Frel) is currently under study by Caterina Greco, and I will keep my comments to a minimum. The sculpture consists of three pieces: the largest one corresponds to the tail’s “skirt,” with the long hairs falling below the dock delineated very carefully. To the “skirt” is attached a smaller part, which can be taken to correspond to the transition from the “skirt” to the dock. The two pieces, both of marble, are fastened together by a long cross-pin of bronze, square in section and inserted into a corresponding square but larger hole (which must have been originally filled with lead). This pin was also meant to connect the tail to the rest of the body. The piecing of the tail probably depends on the fact that this part projected beyond the back plane of the block used to carve the horse. The horse, judging from the tail’s length of 102 cm, seems to have been life-size (definitely not above life-size, as suggested by Frel). As for the iconography, considering depictions of horses in the art of Selinunte of the Archaic and Classical periods (see more recently MARCONI 2018, 382–384), including the Small Metopes and the metopes of Temple C, equestrian acroteria, arulas, imported pottery, and coinage, several possibilities are at hand, including an equine or equestrian statue or a chariot group. Concerning the material, the case of this tail is interesting. According to Tusa’s catalogue, Paola Zancani Montuoro, relying on visual analysis, considered the material to be island marble (the identification followed by Agata Villa); Tusa’s catalogue adopts the neutral definition of “white marble”; Frel presents the material as Parian marble; Østby, finally, labels the material “insular white marble.” Things become interesting with the analysis of the marble of our tail published by Rosario Alaimo and Marcello Carapezza in their 1988 study on the provenance of the marble of the Motya Charioteer. The two scholars concluded that the marble is the same, which we know now to be Paros 2. However, the new testing by Lazzarini shows the marble to be Naxian (the blue streaks should have pointed connoisseurs in the right direction, but Frel explicitly refers to them in his identification of the marble with Parian). The apparent contradiction is easily resolved, since Alaimo and Carapezza appear to have sampled the piece corresponding to the transition to the dock (the corresponding drill hole is clearly visible), while Lazzarini has analyzed the “skirt.” Our tail thus combines two different marbles, which is not without parallels for Greek sculpture (see more recently STURGEON 2006, 53, on the Acropolis korai). The most likely explanation for this combination of different marbles is a later repair; in fact, it is hard to think of the two parts corresponding to the “skirt” and the transition to the dock being originally carved out of two different blocks. Additional pinholes at the bottom of the tail further support the idea of a later repair. See below for the suggestion that

this repair may have taken place in the workshop responsible for the carving of the Motya Charioteer, to be located in Selinunte. Back to the material of the “skirt,” this is the earliest documented instance of Naxian marble in Selinunte. Naxian marble seems to have been quite rare in Sicily, but a notable instance is the kouros from Megara Hyblaea (BASILE, LAZZARINI 2012, 12, 24), one of the two mother cities of Selinunte.

There is further evidence for equine/equestrian statues from Selinunte, including marble ones. Among those published, one of the most interesting is inv. 17065, the fragment of a horse’s hoof on a plinth (TUSA 1983, 180 no. 288) [FIG. 8]. The piece, according to Tusa’s catalogue, was found in 1965 in a regular excavation to the west of Temple A (on these excavations, see more recently CHIARENZA 2011, 41 n. 1, with earlier literature). The stratigraphic context is far from clear, but the association with one of the urban sanctuaries appears safe. Tusa’s catalogue simply defines the material of this sculpture as “white marble.” Lazzarini’s analysis of the marble points now to its identification as Paros 2.

The last work analyzed in this study by Lazzarini, inv. 17069 [FIG. 9], is probably one of the most significant and unrecognized marble sculptures from Selinunte. The following is only a preliminary assessment, in preparation for a larger study of the sculpture. This is the fragment of a large votive relief found, according to Tusa’s catalogue, in 1968 at the northeast corner of the monumental altar of Temple A (still defined in the catalogue, in accordance with early-twentieth-century literature on Selinunte, as the propylea but first identified with a monumental altar by Lauter in 1976) (TUSA 1983, 176 no. 268). The piece has never been on public display, to my recollection, and has been discussed only once, in Tusa’s publication, labeled as a fragment of drapery, presented as in a good state of preservation, and described as a bas-relief featuring the lower end of a piece of drapery and a rock, on which the draped figure presumably sat. The catalogue also refers to the listel delimiting the relief at the bottom and the tenon below and suggests the function of the sculpture as either votive or honorary. This presentation is not the most accurate, starting with the conditions of the sculpture. In fact, although the surface of the extant relief is not overly worn, the slab is considerably fragmented, and only its lower right portion is preserved. Also, although the relief may now seem rather shallow, it may have been deeper. This is because the surface to the right of the rounded rock seen in higher relief on the left side is probably not the background of the relief but still part of the same landscape, carved in a slightly lower relief. Concerning the original depth of the relief, one also needs finally to take into account the figure seated on the large rock, which is largely missing. This leads us to the image on the relief. Regarding the landscape, taking both rocks together, they would have been much larger than the one on which Zeus sits on the metope of the *hieros gamos* from the Temple of Hera. As for the figure originally seated on the rock and facing left, its identification relies only on the elements of drapery. The one in the middle clearly corresponds to the area of the waist and has the shape and articulation of himatia worn by both men and women around the middle of the fifth century (the relief most likely dates to 475–450 BCE). This piece of drapery partly overlaps the three groups of folds, notable for their swallowtail pattern, adhering to the rounded rock to the left; these three groups of folds are drapery (arguably from the same cloth as the drapery above, likely a himation) pressed by the body of the seated figure, and they correspond, from left to right, to under the left knee, under the left thigh, and near the back (compare, e.g., the seated woman on the much later, early-fourth-century BCE stele Athens, NAM inv. 726: KALTSAS 2002, 163 no. 321). Finally, further drapery to the

right belongs to the area immediately above the waist. Regrettably, too little is left of this figure to establish its identity, including its gender. In consideration of the recent attribution of Temple A to Demeter (ZOPPI 2015), it would be tempting to identify our figure as Demeter seated on a rock (see BESCHI 1988, 858–860 nos. 121–157). But many other possibilities are available, and because of the fragmentary status of the relief, this suggestion remains a speculation. Regardless, with the dating of the relief to the second quarter of the fifth century BCE and its provenance from the southern urban sanctuary, its identification as a votive relief seems unescapable. The extant sculpture measures 46 cm in height and 54 cm in width. Votive reliefs were generally decorated with more than one figure, and in our case, assuming the presence of a second figure standing to the left, the original dimensions of the slab would have been significantly larger, which is also suggested by the large tenon. Still, as it is, our sculpture stands out as one of the largest and most elaborate stone votive reliefs from Archaic and Classical Sicily. As a comparison, the marble votive relief with Demeter and Kore from Catania is 42 cm high and 44 cm wide (Catania, Museo Civico 19: LYONS, BENNET, and MARCONI 2013, 168, fig. 106). Tusa’s catalogue simply presents the material of this remarkable relief as “white marble”; later on, Alaimo and Carapezza analyzed the marble in their study mentioned above, whose results point to the identification of the material as Paros 2 (ALAIMO, CARAPEZZA 1988, 30). The new analysis by Lazzarini confirms this last identification as Paros 2 marble.

Finally, I briefly discuss the fragments of the marble roof now being attributed to Temple A [FIG. 10], which, according to the analysis by Lazzarini of a few fragments in Palermo and of fragments from the IFA–NYU and UniMi excavations in the main urban sanctuary of Selinunte, appear to have been made of Paros 2 marble. Fragments of a marble roof were discovered on the acropolis in the nineteenth and twentieth centuries, and they were first systematically investigated by Ettore Gàbrici (GÀBRICI 1933, 221–225; GÀBRICI 1956, 276–281; MERTENS-HORN 1988, 93–94, 168, 180 no. 20). Gàbrici, who, as we saw, defines the marble as large-grained and from the “Aegean islands,” restores various elements of this roof, including the pan tiles and cover tiles, the lateral simas with lion’s-head waterspouts, the raking simas, and the central, floral acroteria. In searching of a building on the acropolis with which to associate this roof, Gàbrici suggests as possibilities both Temple O and Temple A, but he opts for the first on the basis of the attribution, current at the time, of limestone tiles to Temple A. More recent studies by our German colleagues working in Selinunte have significantly contributed to our understanding of this marble roof. First is a new, more detailed reconstruction of the roof, on display in the new installation of the ground floor of the Palermo Museum. This reconstruction confirms the one suggested by Gàbrici, adding ridge tiles and sphinxes as lateral acroteria. No less important is a new study of Temples A and O, which shows that the latter was never completed; the construction of Temple O was interrupted while the foundations were still being laid (MERTENS 2006, 400). This study has also led to the attribution of the marble roof to Temple A, as suggested in the new installation of the Palermo Museum. The results of the excavations in the main urban sanctuary by the IFA–NYU and UniMi mission are giving further support to this attribution, given our discovery of several fragments in the area of Temples B and R, immediately north of Temple A. Furthermore, the discovery of a large piece of the upper course of the sima has enabled Lazzarini to analyze a marble sample of this roof, leading to the identification of its material as Paros 2. The same identification now applies to several fragments of the marble

roof in Palermo, namely, two tile fragments (one of which is inv. 66428), one acroterion fragment (inv. 66439), and one fragment of the lateral sima with lions'-head waterspouts (inv. 66309). Temple A is not dated archaeologically from materials in its foundations, but its similarities in design to the Temple of Hera and temples in Agrigento strongly suggest its dating to 460–450 BCE (MERTENS 2006, 400–401; LIPPOLIS *et alii* 2007, 833). Our roof of Parian marble may thus have been introduced in Selinunte out of peer-polity interaction with Syracuse, considering that the first two examples of Parian roofs (marble sima and acroteria) on large buildings in Sicily are the Temple of Athena in Syracuse (MERTENS 2006, 268–273; LIPPOLIS *et alii* 2007, 841–842; BASILE, LAZZARINI 2012, 17, 30) and Temple C in Gela (HEIDEN 1998; MERTENS 2006, 273–276; LIPPOLIS *et alii* 2007, 813–814), both built to celebrate the victory at Himera in 480. Peer-polity interaction between Selinunte and Syracuse was already at work in the Archaic period (MARCONI 2007), and it is not difficult to posit an analogous scenario in the fifth century, especially after the end of Deinomenid rule.

3. THE MARBLES: ARCHAOMETRIC PROVENANCING

3.1. Introduction

Since 1980, I have conducted several studies on the characterization and provenancing of ancient quarry marbles and artifacts by means of petrographic and geochemical laboratory methods (LAZZARINI *et alii* 1980a and 1980b). Over the years, I have had the chance to examine several important artifacts from archaeological sites and museum objects and have occasionally published the results. In 2000, I developed the idea of gathering and publishing in a monographic study all of my archaeometric data on the Greek marble artifacts from Magna Graecia, the main purpose being to systematically investigate the importation of marble in the Greek *poleis* of South Italy. Such data were implemented ad hoc by further targeted sampling in Italian museums, followed by laboratory work, and all the results were later published in *Marmora* (LAZZARINI 2007). Given the importance of the results obtained, I extended my archaeometric research to Greek Sicily by considering the most important Greek marble statuary and architectural elements from Selinunte (GORGONI *et alii* 1993), Syracuse (BASILE, LAZZARINI 2012), Morgantina (LAZZARINI, POGGIO 2018), and Agrigento (LAMAGNA, LAZZARINI 2019).

Parallel, sometimes related investigations were conducted on other important Greek artifacts preserved in major museums, such as the Metropolitan Museum of Art (LAZZARINI, MARCONI 2014), the Barracco Museum, the National Archaeological Museum, and the Vatican Museums in Rome (CIRUCCI, LAZZARINI 2016).

The present study adds to the already remarkable and abundant information acquired on Greek marbles in Sicily from several old (ALAIMO, CALDERONE 1984; ALAIMO, CARAPEZZA 1988; GORGONI *et alii* 1993) and new (GORGONI, PALLANTE 2000) archaeometric investigations, some of which dealt with marble artifacts from Selinunte. Selinunte is, in fact, the *polis* on Sicily that has produced the largest amount of marble artifacts, thus being of fundamental importance for our understanding of the phenomena connected to marble importation in Greek Sicily.

3.2. Sampling and Experimental

Initially, the marble of all items was carefully examined macroscopically for its color, translucency, presence of stains, veins, and foliation and other overall properties such as grain size that cannot be well assessed in a small sample. These features are always quite important to take into consideration for the final assignment of provenance for marble artifacts.

The marble samples were taken by restorer Lorella Pellegrino, using a small chisel, from hidden and already broken areas of artifacts. There has been absolutely no loss of artistic or historical information and no alteration to the aesthetics and value of the items. The specific areas sampled are listed in Table 1.

Artifact, Inv. (N.I.), Tusa 1983 no.	Figure	Sample N	Sampling Area
Horse's Tail Inv. 17070, T. 299	7	PA1	Pinhole of the "skirt"
Seated Female Statuette Inv. 14802, T. 300	3	PA2	Broken area of the back in correspondence with the base
Lamp with Human Protome Inv. 3890, T. 41	2	PA3	Broken area from the partially missing side
Horse's Hoof on a Plinth Inv. 17065, T. 288	8	PA4	Broken area on the base of the plinth
Lamp with Human Protome Inv. 3892, T. 42	1	PA5	Powder from the base
Bearded Head Inv. 3893, T. 55	5	PA6	Broken area of the left part of the neck
Peplophoros Inv. 3898, T. 35	4	PA7	Broken area in correspondence with the left shoulder
Left Hand Inv. 5718, T. 210	6	PA8	Powder from the broken surface
Kalypter Roof Temple A Inv. 66428	10	PA9	Broken area opposite the protruding joining pin
Acroterion Roof Temple A Inv. 66439	10	PA10	Largest broken area
Lion's-Head Waterspout Sima Roof Temple A Inv. 66309	10	PA11	Broken area below the mane
Votive Relief Inv. 17069, T. 268	9	PA12	Bottom right edge of the back
Kalypter Roof Temple A No inv.	10	PA13	Broken area of the base

Table 1: Sampled artifacts and sampling areas.

Samples consisted of small flakes that were mechanically cleaned from dirt and patinas present on their surface under a stereomicroscope. A small portion of each cleaned flake was then powdered in an agate mortar for X-ray diffraction and stable isotopes ratio analyses. The remaining largest sample portion was embedded in a cold-setting polyester resin, polished, and used for the preparation of a standard thin section (30 μ thick), then studied in detail under a polarizing microscope. For two items (PA5 and PA8 in Table 1), it has not

been possible to find a suitable sampling place for taking even a very small flake of marble without damaging the artifacts, so only a few milligrams of powder were scraped with a sharp knife after removing the dirt and patinas from the surface.

As mentioned above, analytical methods included:

- X-ray diffraction (CuK α at 40 KV, 20 mA, with a Panalytical Empyrean X-ray diffractometer) to detect the possible presence and relative abundance of dolomite.
- Stable C and O isotope measurement by a dedicated mass spectrometer (through a Gasbench ii preparation line connected online to a ThermoFinnigan Five Plus mass spectrometer in a continuous flow mode). All $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values were measured against the PDB international standard (MCCREA 1950; CRAIG 1957). The results were later compared by means of ad hoc reference isotope diagrams (ANTONELLI, LAZZARINI 2015).
- Optical microscopy in transmitted and reflected (for opaque minerals) polarized light (Leitz dm rpx). The main petrographic features of the marbles (fabric, boundary shapes of the carbonate crystals, maximum grain size of the largest crystal of calcite expressed in mm, presence, and relative semi-quantitative evaluation of the accessory minerals) were studied according to the classical handbooks of metamorphic rocks (SPRY 1986; BARKER 1990), and specific papers (LAZZARINI *et alii* 1980a). The results were compared both with the most recent published data (GORGONI *et alii* 2002; MANIATIS, POLIKRETI 2000; ATTANASIO *et alii* 2006; ANTONELLI, LAZZARINI 2015) and with reference samples taken from ancient quarries (Lama's thin section collection, IUAV University of Venice).

More details of the methods are described elsewhere (BASILE, LAZZARINI 2012).

3.3. Results and Discussion

The results of the mineralogical and isotopic analyses are summarized in Table 2.

The oldest artifacts examined, the two lamps from Malophoros (PA3 and PA5), were found to have been carved from the *lychnites* variety of Parian marble, the most precious and famous of antiquity. This identification, already foreseen from the observation of their macroscopic marble features (both of homogeneous pure white color and fine grain, less than 2 mm), was confirmed for PA3 by the combination of the microscopic features (almost an equilibrium-mosaic fabric, high mineralogical purity) [item a in Figure 11] and isotopic ratio [FIG. 12]. For PA5—whose intact, perfect state of preservation prevented the removal of even a small flake—it was confirmed by the combination of the macroscopic features and isotopic ratio.

The horse tail “skirt” (PA1) was found to have been carved out of Naxian marble [FIGS. 11 and 13], possibly from the quarries of Apollona in the northern part of the island. The material is thus entirely different from that of the preserved Paros 2 marble piece used to connect the “skirt” to the dock, the latter most probably applied during an ancient restoration.

Interesting enough, that piece of marble has the same $\delta^{13}\text{C}$ value (about 1.80 per mil) as the Motya Charioteer's marble (ALAIMO, CARAPEZZA 1988, 32). The testing of the marble of the Motya Charioteer and the marble of the tail from Selinunte corresponding to the transition from the “skirt” to the dock was performed using the same method and in the same period of time. The results are thus perfectly comparable, and they clearly point to the

provenance of the marble as being from the same block (marble from a block from the same quarry area, including a neighboring block, would present not negligible variations, at least in the range of the first decimal fraction, which has been found in analyzing isotopically different blocks from the same quarry locus in shipwrecked marble cargoes; see, for example, BELTRAME *et alii* 2019).

We are thus confronted with three alternative scenarios:

(A) The original group, including the Motya Charioteer and the Selinunte horse, was entirely carved from Parian marble from Lakkoi and set up in Selinunte; before 409, the group was damaged for unknown reasons and was consequently repaired reusing fragments of the sculptures (as for the transition from the “skirt” to the dock) and also making use of Naxian marble, in the absence of larger fragments of Parian marble. In 409, the group was eventually transported to Motya as a war booty, leaving behind the restored tail. We must note, however, that Parian marble was largely available in Selinunte in the fifth century, including for the roof of Temple A. It would also seem strange that the statue was transported to Motya while leaving the horse’s tail behind.

(B) The equestrian group was carved from two different marbles, Paros 2 for the Motya Charioteer and Naxian marble for the Selinunte horse. The Paros 2 marble used for the charioteer was also used for connecting the tail to the body of the horse. Speaking against this attribution of the sculpture from Motya and that from Selinunte to the same hand, however, is the clear difference in carving (and proportions) between the “skirt” in Naxian marble (with the hair rendered in much higher relief) and the connecting part in Parian marble (with the hair notably shallow).

(C) The original equestrian group was entirely carved out of Naxian marble and set up in Selinunte (most likely in the Archaic period, when Naxian marble was more often used, including in the Greek West). After being damaged, the group needed to be repaired, and to that end, a piece of the marble block that was being used for carving the Motya Charioteer was used for carving the transition from the “skirt” to the dock. This would suggest that the restoration of the group of Naxian marble was made in the workshop responsible for the carving of the Motya Charioteer and that the charioteer was carved in Selinunte, where the available evidence strongly suggests the presence of Parian sculptors in the Early Classical period (MARCONI forthcoming). Ultimately, we (Lazzarini and Marconi) consider this third scenario to be the most plausible.

All the remaining fragments of statuary were found to have been sculpted in the Parian marble from the open-pit quarries of Lakkoi. Three (PA2, PA6, PA7) are characterized by a rather fine grain size of around 2 mm of MGS. Such grain size and other peculiar macroscopic characteristics common to these items (beautiful and homogeneous white color, semi-translucency) are accompanied by similar $\delta^{13}\text{C}$ isotopic ratios around 2 per mil [Table 2, fig. C], thus suggesting the use of marble blocks extracted from the same quarry. This conclusion is also supported by the close similarity of the petrographic fabrics of these artifacts [item c in Figure 11. Two items (PA4 and PA8) do not belong to this group of artifacts, and come from different loci [item d in Figure 11]. A somewhat similar conclusion may be drawn for the fragments of tiles, sima, acroterion, and votive relief associated with Temple A, although a certain variability in some of the petrographic features (grain size [item e in Figure 11], presence of light gray stains), as well as in the $\delta^{13}\text{C}$ isotopic ratio (reaching 2.3 per mil for

PA13) [FIG. 14], allow us to think that somewhat different quarry areas supplying lower-quality marble were exploited for some items.

4. CONCLUSIONS

In conclusion, the identification of *lychnites* for the two examined lamps decorated with human protomai corresponds to that previously made from isotopic analysis for another lamp from Selinunte in the Palermo Museum (inv. 17825; ALAIMO, CALDERONE 1984, 56). This means that at least three out of the four more or less fragmentary lamps with human protomai from Selinunte (TUSA 1983, 132–134 nos. 41–44) are made of the same marble. The remarkable variability of the $\delta^{13}\text{C}$ isotopic ratios of the three analyzed lamps indicates different quarrying loci in the Stephani area of Paros and, possibly, their arrival in Selinunte at different times (not a surprise, given their seemingly different chronologies). This confirms the multiple, serial production of this type of lamps made on Paros from *lychnites* and exported widely in the Greek world (see LAZZARINI, MARCONI 2014, 125).

Of the fragments of statuary examined, apart from the horse tail “skirt” of Naxian marble, most were carved from a relatively fine-grained variety of the Parian marble quarried at Lakkoi. Previous studies (GORGONI, PALLANTE 2000, 503; LAMAGNA, LAZZARINI 2019, 33) suggested the arrival in western Sicily (Selinunte and Agrigento) of a consistent supply of blocks of this variety of Parian marble in the first half of the fifth century BCE, and this appears confirmed by the present results.

The overall conclusion from the results presented in this paper is that, as pointed out in earlier studies, the quarries of Paros (especially those of Lakkoi) were almost monopolizing the marble exportation to Sicily in the Archaic and Classical periods, with a few rare exceptions of marble from Naxos and Thasos. The same situation applies to Magna Graecia and Cyrene (LAZZARINI, LUNI 2010).

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REFERENCES

- ALAIMO R., CARAPEZZA M. 1988, *Il marmo della statua di Mozia: caratteri geochimici e possibili aree di provenienza*, in N. Bonacasa and A. Buttitta (eds.), *La statua marmorea di Mozia e la scultura di stile severo in Sicilia*, Rome, 29-37.
- ALAIMO R., CALDERONE S. 1984, *Determinazione della provenienza dei marmi delle sculture di Selinunte attraverso le analisi di alcuni elementi in tracce e degli isotopi del carbonio e dell'ossigeno*, «Sicilia Archeologica», 17, 56, 53-62.
- ANTONELLI F., LAZZARINI L. 2015, *An isotopic reference database for white crystalline marbles used in antiquity*, in L. Maritan, G. Barone, M. Benvenuti (eds.) *Archaeometry*

- and Cultural Heritage: Contributions of Geosciences*, «Rendiconti Scienze Fisiche e Naturali dell'Accademia dei Lincei», 26.4, 399-413.
- ASHMOLE B. 1934, *Late Archaic and Early Classical Greek Sculpture in Sicily and South Italy*, Oxford.
- ATTANASIO D., BRILLI M., OGLE N. 2006, *The Isotopic Signature of Classical Marbles*, Rome.
- BARKER A. J. 1990, *Introduction to Metamorphic Textures and Microstructures*, Glasgow and New York.
- BASILE B., LAZZARINI L. 2012, *The archaeometric identification of the marble of the Greek statuary and architectural elements of the «Paolo Orsi» Museum in Syracuse*, «Marmora», 8, 11-32.
- BEAZLEY, J. D. 1940. *A Marble Lamp*, «Journal of Hellenic Studies» 60, 22-49.
- BELTRAME C., PERCIC T., LAZZARINI L. 2019, *The archaeometric identification of the marbles of the Roman shipwreck of Capo Granitola (TP), Isola delle Correnti and Marzamemi I (SR)*, «Journal of Archaeological Science: Report» 23, 953-967.
- BENNDORF, O. 1873. *Die Metopen von Selinunt. Mit Untersuchungen über die Geschichte, die Topographie und die Tempel von Selinunt*, Berlin.
- BESCHI L. 1988. *Demeter*, «LIMC», 4, 844-892.
- CHIARENZA N. 2011. *L'area sacra punica sull'acropoli di Selinunte. Nuove proposte*, «Sicilia Antiqua», 8, 41-53.
- CHIARENZA N. 2017. *Una lucerna in marmo e altri reperti di età arcaica da un'area sacra sull'acropoli di Selinunte*, «Römische Mitteilungen», 123, 469-493.
- CIRUCCI G., LAZZARINI L. 2016, *Indagini archeometriche su alcuni marmi greci nelle collezioni del Museo Nazionale Romano e dei Musei Vaticani*, «Marmora», 11, 33-56.
- CRAIG 1957 000
- FLOREN J. 1987, *Die griechische Plastik, I. Die geometrische und archaische Plastik*, Munich.
- FREL J. 1985, *L'auriga di Mozia. Un'opera di Pitagora di Reggio*, «La Parola del Passato», 40, 64-68.
- GÀBRICI E. 1927. *Il Santuario della Malophoros a Selinunte*, «Monumenti Antichi», 32, 1-419.
- GÀBRICI E. 1929, *Acropoli di Selinunte*, «Monumenti Antichi», 33, 61-112.
- GÀBRICI E. 1933, *Per la storia dell'architettura dorica in Sicilia*, «Monumenti Antichi», 35, 137-250.
- GÀBRICI E. 1956, *Studi archeologici selinuntini*, «Monumenti Antichi», 43, 205-408.
- GORGONI C., AMADORI M. L., LAZZARINI L., PALLANTE P. 1993, *Risultati dell'indagine micropaleontologica, minero-petrografica e geochimica preliminare sui materiali lapidei (calcari e marmi) dell'insediamento greco di Selinunte*, in *Selinunte 1*, Rome, 33-59.
- GORGONI C., LAZZARINI L., PALLANTE P., TURI B. 2002, *An updated and detailed mineropetrographic and C-O stable isotopic reference database for the main Mediterranean marbles used in antiquity*, in J. J. Herrmann, N. Herz, R. Newman (eds.), *ASMOSIA 5: Interdisciplinary Studies on Ancient Stone* (Boston 1998), London, 115–131.

- GORGONI C., PALLANTE P. 2000, *On Cycladic marbles used in the Greek and Phoenician colonies of Sicily*, in D. U. Schilardi, D. Katsonopoulou (eds.), *Paria Lithos: Parian Quarries, Marble and Workshops of Sculpture*, Athens, 497-506.
- GRECO C. 2009, *Isole nell'isola. Testimonianze e documenti archaeologici della provincia di Trapani*, in C. Ampolo (ed.), *Immagine e immagini della Sicilia e di altre isole del Mediterraneo antico: Atti delle seste giornate internazionali di studi sull'area elima e la Sicilia occidentale nel contesto mediterraneo. Erice, 12-16 ottobre 2006*, Pisa, 531-549.
- HEIDEN J. 1998. *Zum frühklassischen Athenatempel von Gela*, «Römische Mitteilungen», 105, 329-340.
- HITTORFF J. I., ZANTH K. L. W. 1870, *Architecture antique de la Sicile. Recueil des monuments de Ségeste et de Sélinonte, mesurés et dessinés par J.-I. Hittorff L. Zanth, suivi de recherches sur l'origine et le développement de l'architecture religieuse chez les Grecs*, Paris.
- HOLLOWAY R. R. 1975, *Influences and Styles in the Late Archaic and Early Classical Greek Sculpture of Sicily and Magna Graecia*, Leuven.
- HULOT J., FOUGÈRES G. 1910, *Sélinonte, la ville, l'acropole et les temples*, Paris.
- KALTSAS N. 2002, *Sculpture in the National Archaeological Museum, Athens*, Los Angeles.
- KATSONOPOULOU D. 2018, *Recent evidence of sculptures in Parian marble*, in D. Katsonopoulou (ed.), *Paros IV: Paros and Its Colonies*, Athens, 101-113.
- LANGLOTZ E. 1968, *L'arte della Magna Grecia*, 2nd ed., Rome.
- LAMAGNA G., LAZZARINI L. 2019, *La determinazione dell'origine dei marmi costituenti i principali manufatti di età greca del Museo Archeologico Regionale di Agrigento*, «Marmora», 14, 11-36.
- LAZZARINI L. 2007, *Indagini archeometriche sui marmi bianchi della statuaria e architettura della Magna Grecia*, «Marmora», 3, 21-52.
- LAZZARINI L., LUNI M. 2010, *La scultura in marmo a Cirene in età greca*, in G. Adornato (ed.), *Scolpire il marmo: importazioni, artisti itineranti, scuole artistiche nel Mediterraneo antico*, Milan, 185-222.
- LAZZARINI L., MARCONI C. 2014, *A new analysis of major Greek sculptures in the Metropolitan Museum: petrological and stylistic*, «Metropolitan Museum Journal», 49, 119-142.
- LAZZARINI L., MOSCHINI G., STIEVANO B. M. 1980a, *A contribution to the identification of Italian, Greek, and Anatolian marbles through a petrological study and the evaluation of Ca/Sr ratio*, «Archaeometry», 22, 173-182.
- LAZZARINI L., MOSCHINI G., STIEVANO B. M. 1980b, *Some examples of identification of ancient marbles through a petrological study and the examination of Ca/Sr ratio*, «Quaderni della Soprintendenza ai Beni Artistici e Storici di Venezia», 9, 35-58.
- LAZZARINI L., POGGIO A. 2018, *The "Penelope" from Persepolis and its marble: a multidisciplinary research*, «Atti della Accademia nazionale dei Lincei. Classe di scienze morali, storiche e filologiche. Rendiconti», series 9, 20, 405-423.
- LEE M. M.-Y. 2014. *The Archaic Korai from the Athenian Akropolis: A Re-examination of the Material Evidence*. Ph.D. diss. NYU.
- LEPSIUS G. R. 1890, *Griechische Marmorstudien*, Berlin.
- LIPPOLIS E., LIVADIOTTI M., ROCCO G. 2007, *Architettura greca*, Milan.

- LO FASO PIETRASANTA, D., Duca di Serradifalco 1834, *Le antichità della Sicilia esposte ed illustrate*, vol. 2, *Selinunte*, Palermo.
- LYONS C., BENNET M., MARCONI C. (eds.) 2013, *Sicily: Art and Invention between Greece and Rome*, Los Angeles.
- MANIATIS Y., POLIKRETI L. 2000, *The characterisation and discrimination of Parian marble in the Aegean region*, in D. Schilardi, D. Katsonopoulou (eds.), *Paria Lithos. Parian Quarries, Marble and Workshops of Sculpture*, Athens, 575-584.
- MARCONI C. 1994, *Selinunte: le metope dell'Heraion*, Modena.
- MARCONI C. 2007, *Temple Decoration and Cultural Identity in the Archaic Greek World: The Metopes of Selinus*, New York.
- MARCONI C. 2018. *Un acroterio equestre da Selinunte ?*, in V. Nizzo, A. Pizzo (eds.), *Antico e non antico: Scritti multidisciplinari offerti a Giuseppe Pucci*, Milan and Udine, 377-384.
- MARCONI C. forthcoming, *The case for Parian sculptors in Selinus and Western Sicily in the Early Classical period*, in D. Katsonopoulou (ed.), *Paros V: Paros through the Ages, from Prehistoric Times to the 16th Century AD*, Paros.
- McCREA J. M. 1950, *On the isotopic chemistry of carbonates and a paleotemperature scale*, «*Journal of Chemical Physics*», 18, 849-857.
- MERTENS D. 2006, *Städte und Bauten der Westgriechen*, Munich.
- MERTENS-HORN M. 1988, *Die Löwenkopf-Wasserspeier des griechischen Westens im 6. und 5. Jahrhundert v. Chr*, Mainz.
- ØSTBY E. 1990. *Selinunte*, in *Lo stile severo in Sicilia*, exh. cat., Palermo, Museo Archeologico Regionale "A. Salinas", 176-231. Palermo.
- RIDGWAY B. S. 1985, *Review of Tusa 1983*, «*American Journal of Archaeology*», 89, 704-705.
- ROLLEY C. 1994, *La sculpture grecque*, vol. 1, Paris.
- SALINAS A. 1894. *Selinunte: Relazione sommaria intorno agli scavi eseguiti dal 1887 al 1892*, «*Notizie degli Scavi*», 202-220.
- SESTIERI BERTARELLI, M. 1958. *Il tempietto e la stipe votiva di Garaguso*, «*Atti e Memorie della Società Magna Grecia*», 2, 67-78.
- SPRY A. 1986, *Metamorphic Textures*, Oxford and New York.
- STEININGER, U. 1996. *Die archaische und frühklassische Großplastik Unteritaliens und ihr Verhältnis zum Mutterland*, Münster.
- STURGEON M. C. 2006. *Archaic Athens and the Cyclades*, In O. Palagia (ed.), *Greek Sculpture: Function, Materials, and Techniques in the Archaic and Classical Periods*, New York, 32-76.
- TUSA V. 1983, *La scultura in pietra di Selinunte*, Palermo.
- ZOPPI C. 2015. *Il culto di Demetra a Selinunte*, «*Sicilia Antiqua*», 12, 25-43.

CAPTIONS

FIG. 1: Lamp with human protome: Palermo, Museo Archeologico Regionale "Antonino Salinas," inv. 3892. Source: Tusa 1983.

FIG. 2: Lamp with human protome: Palermo, Museo Archeologico Regionale "Antonino Salinas," inv. 3890. Source: Tusa 1983.

- FIG. 3: Seated female statuette: Palermo, Museo Archeologico Regionale “Antonino Salinas,” inv. 14802. Photo: Clemente Marconi.
- FIG. 4: Peplophoros statuette: Palermo, Museo Archeologico Regionale “Antonino Salinas,” inv. 3898. Photo: Clemente Marconi.
- FIG. 5: Bearded head: Palermo, Museo Archeologico Regionale “Antonino Salinas,” inv. 3893. Photo: Clemente Marconi.
- FIG. 6: Left hand: Palermo, Museo Archeologico Regionale “Antonino Salinas,” inv. 5718. Photo: Francesco Mannuccia.
- FIG. 7: Horse’s tail: Palermo, Museo Archeologico Regionale “Antonino Salinas,” inv. 17070. Photo: Clemente Marconi.
- FIG. 8: Horse’s hoof on a plinth: Palermo, Museo Archeologico Regionale “Antonino Salinas,” inv. 17065. Photo: Francesco Mannuccia.
- FIG. 9: Votive relief: Palermo, Museo Archeologico Regionale “Antonino Salinas” inv. 17069. Photo: Clemente Marconi.
- FIG. 10: Elements of roof of Temple A: Palermo, Museo Archeologico Regionale “Antonino Salinas.” Photo: Clemente Marconi.
- FIG. 11: Photomicrographs of the thin sections of selected items (all in cross-polarized light, long side = 3.8 mm): (a) PA3, *polylychne* lamp, showing a heteroblastic mosaic fabric formed by fine calcite crystals (with finer intergranular ones) with curved-to embayed boundaries; (b) PA1, horse “skirt,” mosaic fabric; (c) PA2, female seated statue, as for item a, but with larger grain size and rounded apatite crystals; (d) PA4, horse hoof, as for item b, with two small quartz crystals (center, bottom); (e) PA13, tile of Temple A, as for item c, but with even larger grain size.
- FIG. 12: Plot of $\delta^{18}O$ and $\delta^{13}C$ of the two *polylychne* lamps, in the reference isotopic diagram of the most important fine-grain marbles (MGS < 2 mm) used in antiquity (ANTONELLI, LAZZARINI 2015).
- FIG. 13: Plot of the isotopic ratios of the fragments of statuary, as for Figure 12, but for marbles with medium-to-coarse grain size (MGS > 2 mm).
- FIG. 14: As for Figure 13, but for the architectural fragments of Temple A.