

ASMOSIA XIII

*Sabine Ladstätter
Walter Prochaska
Vasiliki Anevlavi (eds.)*



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Sabine Ladstätter – Walter Prochaska – Vasiliki Anevlavi (Eds.)

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Proceedings of the 13th International Conference

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MONTSERRAT CLAVERIA

MARBLE AND PATINA ANALYSIS FOR INTERPRETING SCULPTURES FROM ANTIQUARIAN COLLECTIONS

A SET FROM THE MUSEU D'ARQUEOLOGIA DE CATALUNYA (BARCELONA) AND THE MUSEO NACIONAL DEL PRADO (MADRID)

Abstract

The article presents the results obtained through the investigation of 39 marble sculptures in classical style from antiquarian collections, whose ancient or modern chronology could not be easily determined. This group of sculptures corresponds to a representative selection of 150 sculptural works of this type studied in successive state research projects carried out between 2011 and 2022, and represents a significant group to demonstrate the important contribution of multimethod analyses of stone materials and those applied to the patinas deposited on the marble surfaces of these doubtful antiquarian sculptures to elucidate their age. The analyses by optical microscopy, cathodoluminescence (CL) and stable isotopes of carbon (C) and oxygen (O) of these works have ratified those of other sets of Roman marble sculptures carried out previously, which indicated a preference for the use of marble from Greece and Asia Minor in the 2nd and 3rd centuries AD, while the use of Luni-Carrara marble is common for the production of modern classical-style sculptures. Regarding the analysis of the patinas, our research team is finding them to be of great interest for obtaining data on the environments in which these sculptures have been preserved throughout their history.

OBJECTIVES

Most classic-style sculptures from antiquarian collections give us no information about their original archaeological context, ostensibly making the interpretation of the substantial properties of these works difficult, including their accurate dating using stratigraphic criteria and an understanding of the function(s) they performed throughout their history. Furthermore, among these pieces, as is well known, are Greek and Roman pieces and other sculptures from the modern period, including Renaissance and Baroque productions, and works from the 18th to the 20th centuries sculpted in styles and using techniques that were very close to those used to produce classical sculptures, the aim being to emulate these ancient works or to produce forgeries.

Between 2011 and 2016, the Universitat Autònoma de Barcelona's Grup d'investigació en Escultura d'Estil Clàssic (GREEC) carried out two research projects funded by the Spanish Ministry of Science, Innovation and Universities, in which we examined 150 chronologically ambiguous pieces of this type to determine if their age is ancient or modern. These projects were HAR2009-10798 »Ancient or Modern. Framing Classical Sculpture in its Corresponding Period«, and HAR2012-35861 »The Male Sculptural Portrait in Antiquarian Collections. Function, Chronology and Modes of Restoration«. Recently, we reviewed the analyses of eleven of these sculptures to verify the results of the two projects, which were obtained using optical microscopy examination only¹, whereas we had broadened the analysis by using cathodoluminescence and isotopes.

This article focuses on a representative set of these works, with the aim of publishing the results relating to this research and highlighting the contributions of the analysis of marble and patinas as

¹ Rodà et al. 2010; Rodà et al. 2015.



1 Modern male portrait from the Museu d'Arqueologia de Catalunya. MAC-19030 (photo: courtesy of the museum)

complementary techniques in the archaeological and artistic study of this type of sculpture². The set was made up of 39 pieces from well-known antiquarian collections currently housed in the Museu d'Arqueologia de Catalunya at its headquarters in Barcelona and in the Museo Nacional del Prado in Madrid, most of which are portraits (33), plus five ideal statues and a sarcophagus.

METHODOLOGY

The methodology was based on the existing bibliographic and archival documentation of these sculptures and their technical, stylistic, iconographic and epigraphic study, if an inscription was present. The stone material of the pieces was analysed using optical microscopy (OM), visual examination, spectrophotometry to quantify shades of grey, cathodoluminescence (CL) and stable carbon (C) and oxygen (O) isotopes. These analyses were carried out at the Unitat d'Estudis Arqueomètrics of the Institut Català d'Arqueologia Clàssica (ICAC), which has an extensive archive of reference samples of ancient sculptures and whose researchers we thank for their analyses of the pieces presented here³.

² Part of this study has been carried out within the framework of the research project PID2022-137896OB-100 »Antiquae Feminae« funded by MICIU/AEI /10.13039/501100011033 and for FEDER, UE.

³ I would like to express my gratitude to Marie-Claire Savin, Laura Galán and Andrea Collado for the marble analyses of the pieces and specially to María Pilar Lapuente Mercadal for her invaluable help in interpreting the results obtained.

We also carried out interventions typical of conservation/restoration, such as organoleptic examination of the sculptures and analysis of the patinas that remain on the marble surfaces, applying the Wolbers cleaning method, which meant we could buffer the solutions to ensure a constant pH so that there were no variations when we cleaned the pieces, thereby enabling us to obtain more data. We worked together with the manager, restorer and archaeologist of the Restoration Unit of the Museu d'Arqueologia de Catalunya Isabel Moreno Martínez, who is a member of our research team and whom we thank for her unconditional availability. The combination of the results of these analyses, carried out from different study approaches, provided complementary data that better substantiated the chronological interpretation of the investigated pieces⁴.

STUDY CASES

A total of 79 % of the sculptures in this group were carved from a single block of marble, including the ideal head preserved in the Museu d'Arqueologia de Catalunya under inventory number MAC-19030 (cat. 6; fig. 1)⁵. Even though at first glance we judged this head to be modern, we considered it would be interesting to carry out a stone analysis of it to see the intrinsic characteristics of the works produced in modern workshops for the antiquarian market⁶. The stylistic and iconographic study of this work allowed us to verify that its creator used a mixture of characteristics of models created in the Late Classical period, and that it represents a Herakles, or another mythical young man based on the various types established in the 4th century BC such as the Lansdowne Herakles and the Herakles Genzano. Its stone marble was shown to have come from the Luni-Carrara quarries, which we now know were used for carving both ancient and modern works. The lack of patinas anywhere on its surface indicated that it was not deposited in an archaeological context, which aligns with the properties of its style, its bulkiness and the lack of detail in its volumes, bringing it closer to classical-style carved sculptures from the 17th century onwards.

Similar conclusions were drawn for the five busts traditionally attributed to the collection of the Marquises of Barberà (cat. 10–14) and preserved in the warehouses of the Museu d'Arqueologia de Catalunya (hereinafter MAC) in Barcelona⁷, where they probably arrived in the 19th century with the sculptural collections housed in Barcelona's Reial Acadèmia de Bones Lletres⁸. Cleaning using deionised water dressings and cellulose pulp showed that the patinas covering them were just layers of dust, and that there were no other pathologies and/or traces of oxalates indicating that they may have been buried in an archaeological context⁹. The stylistic and iconographic study of these busts led us to conclude that they were sculpted at the end of the 16th century in a workshop in northern Italy¹⁰. Like the previous piece, analysis of the marble they were carved from revealed all of them to be made from Luni-Carrara marble¹¹.

A head of Marcus Aurelius (cat. 29)¹², two female busts (cat. 36. 38)¹³ and a smaller-format copy of the sarcophagus of Adonis exhumed from Rome's Via Latina in the mid-19th century (cat. 39)¹⁴ are examples of other modern works carved in Luni-Carrara marble with, aside from dust

⁴ Claveria – Moreno 2018, 217–222.

⁵ Claveria 2013b, 119–122 pls. 3–4.

⁶ Rodà et al. 2010, 8 f.

⁷ MAC-7579. MAC-7577. MAC-7580. MAC-7581. MAC-7575.

⁸ Claveria 2010, 355–358; Koppel 2013, 305 f.

⁹ Claveria et al. 2015, 15–25; Moreno Martínez 2017.

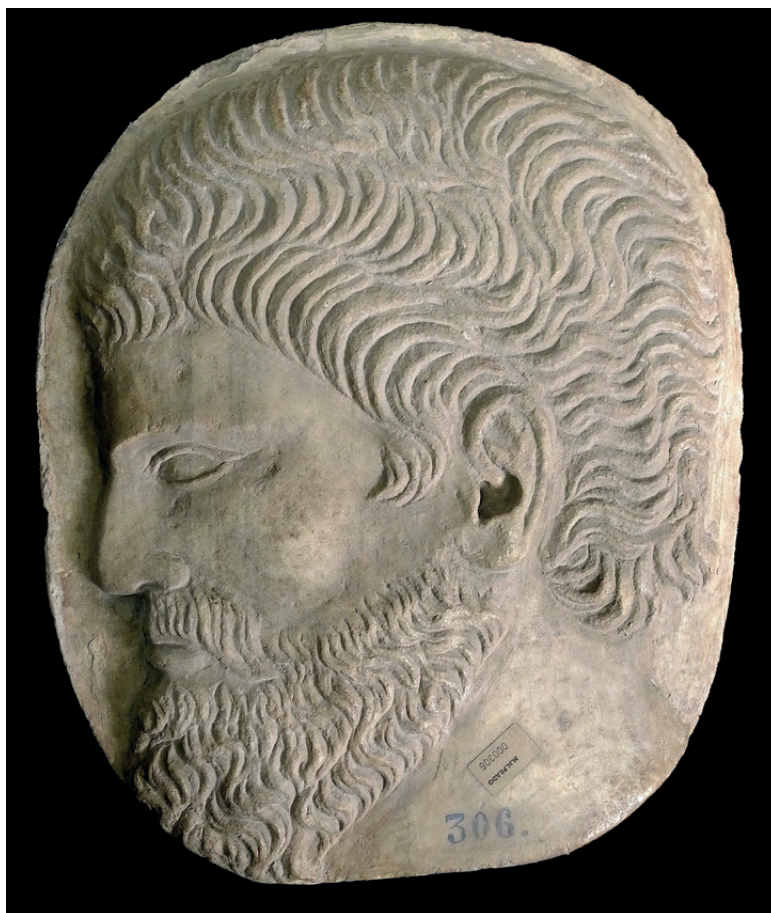
¹⁰ Koppel 2013; Claveria et al. 2015, 25–43.

¹¹ Rodà et al. 2010, 30 f. 37–44.

¹² MAC-7572; Claveria – Moreno 2018, 227–229 pl. 5.

¹³ The first without inventory number and the second with MAC-7595; Rodà et al. 2010, 35 f. 45 f.

¹⁴ MAC-9524; Domínguez 2008; Trunk 2008, 210–213; Rodà et al. 2010, 47 f.; Moreno Martínez 2025, 320–322.



2 Modern medallion from the Museo Nacional del Prado. E-306
(photo: M. Claveria)

deposits, clean surfaces. To these five works can be added two more from the Mateu collection in Castell de Peralada (Girona) and currently preserved in the MAC. One of them is a male head (cat. 32)¹⁵ with the general traits of portraits from the Antonine and Severa periods, and the other (cat. 31)¹⁶ is a faithful reproduction of a private female portrait from the middle of the 3rd century AD. However, the lack of patinas on their surfaces and the presence of unusual stylistic features for antiquity¹⁷ reveal that they were manufactured in modern times, an assumption that is supported by the origin of their material being the Luni-Carrara quarries and by the highly veined appearance of the female portrait, which is comparable with other busts made for the modern antiques market, and whose surfaces are covered with ageing patinas to imitate the antique appearance of Classical sculptures.

The surfaces of four medallions with portraits of famous people from the Museo Nacional del Prado (hereinafter MNPrado) (cat. 22–25)¹⁸ had a similar appearance to the busts analysed previously, their iconographic examination confirming their modern chronology, belonging to a specific genre created in the 15th century to decorate façades and prominent entrances to northern Italian palaces and some buildings used for funerary purposes or for worship¹⁹. Three of them

¹⁵ MAC-19.059; Claveria 2013a, 289–293 pls. 5–8.

¹⁶ MAC-19.029; Rodà et al. 2010, 22 f.; Claveria 2013a, 285–288 pls. 1–4.

¹⁷ Such as the roundness of the contours of the face and the exaggerated width of the forehead.

¹⁸ E-204. E-252. E-306. E-310.

¹⁹ Claveria 2017a, esp. 271–275. 277 f. pls. 3. 5. 9–12.



3 Ancient female portrait from the Museu d'Arqueologia de Catalunya.
MAC-15090 (photo: M. Claveria)

were made of Luni-Carrara marble²⁰ and the fourth from Proconnesian marble (cat. 24; fig. 2)²¹, indicating that looted Roman sculptural or building material was probably used to make them, since the marble quarries of the Eastern Mediterranean were in territory controlled by the Ottoman Turks at that time, making it difficult to import material extracted from them²².

The patinas of the female head MAC-15090 (cat. 35; fig. 3)²³, however, did reveal the presence of oxalates on its surface, oxalic acid salts characteristic of soils from archaeological contexts. The style of the head and the hairstyle confirm its ancient chronology from the mid-1st century AD, its material from Naxos adding weight to the evidence of antiquity provided by the previously obtained data. Similar cases in this regard were the reused male bust from Bárcino dated to the first half of the 2nd century BC²⁴, a late-Republican portrait broken in half²⁵, and a statue of Harpocrates with his head and limbs missing²⁶. The rough workmanship of the first (cat. 34)²⁷ is in keeping with the bulkiness and lack of detail of the sculptural production of the Bárcino

²⁰ E-204. E-252. E-310; Rodà 2015, 19–25. 30–32; Claveria 2017a, 280.

²¹ E-306; Rodà et al. 2015, 26–29; Claveria 2017a, 280.

²² Maischberger 1997, 39. 61. 67. 86.

²³ Trillmich 1993, 63 pl. 25.

²⁴ MAC-1346.

²⁵ MAC-44056.

²⁶ MAC-19041.

²⁷ Moreno Vide 2018, 283 f. pl. 6.



4 Ancient female head from the Museu d'Arqueologia de Catalunya. MAC-19.604 (photo: courtesy of the museum)

workshops, an assumption that was confirmed on analysing the material from which it is made, proving to have come from the local stoneware quarries of Mt. Montjuïc²⁸. The style and iconography of the second (cat. 27) indicate that it was produced at the end of the 1st century BC, the appearance and homogeneity of the patinas covering the entire piece attesting to the breakage already having occurred in antiquity, prior to it being deposited in an archaeological context²⁹. Its material from the Luni-Carrara quarries is entirely in keeping with the type of marble materials used in Rome and the western provincial area in this Early Imperial period for portrait carving³⁰. With the naked eye, we identified the same material used for the torso of Harpocrates (cat. 8), a small-format statue made between the end of the 1st century and the middle of the 2nd century AD and intended for ornamentation in a private home³¹.

The study of a bearded male head (cat. 7)³² and an oversized female head (cat. 9; fig. 4)³³ revealed traces of pigments from the layer of colour used for its finishing³⁴, an important clue as to the antiquity of the two pieces since, as is known, classical-style sculptures in the modern age were made

from white marble without polychromy because it was believed that the Greek-Roman originals were not painted but were left to show the diaphanous surface of their marble materials. The stylistic and iconographic parallels led us to believe the male bust to be part of a herm from the Antonine period, imitating the model of a divine image from the first half of the 5th century BC³⁵, while the closest parallels for the female head are the images of goddesses and princesses of late Ptolemaic Hellenism³⁶. We currently do not have sufficiently contrasted results on the materials used to carve the two pieces, which in the case of the male head pointed to Paros marble, while CL applied to a sample of the female head indicated Pentelic marble. Nonetheless, what is certain is that the oriental origin revealed by these analyses reinforces the antiquity of the two heads. Another female head from the MAC (cat. 37)³⁷ is of a style and displays a hairstyle typical of the first half of the 1st century AD. Its deficient state of conservation and the colour of the patinas on its surfaces align with those verified in other pieces from archaeological contexts, such as the previously mentioned head MAC 44056 (cat. 27), and *de visu* its material is fully consistent with that of the Luni-Carrara quarries, a material frequently used for portrait carving in this Early Imperial period. Taken as a whole, these data indicate that the piece was created in antiquity, although our

²⁸ Rodà et al. 2010, 16 f.

²⁹ Claveria – Moreno 2018, 222–224 pls. 2–3.

³⁰ Rodà et al. 2010, 4 f.

³¹ Claveria 2013b, 125–127 pls. 7–8.

MAC-15098.

³² MAC-19604.

³³ Claveria 2013b, 123. 130.

³⁴ Claveria 2013b, 122–125 pls. 5–6.

³⁵ Claveria 2013b, 127–130 pls. 9–10.

³⁶ MAC-15089; Sáez 2013, 106.

³⁷ MAC-15089; Sáez 2013, 106.

observations on the patinas and the marble should be corroborated using multimethod analysis³⁸.

Regarding the bust of Nero (MAC-7571, cat. 28; fig. 5), it could not be demonstrated with any certainty whether it is ancient or modern since its style and iconography are perfectly comparable to ancient works, but some details of the hairstyle do not fit with them. Analysis of the patinas proved to be inconclusive as to whether it had been buried in ancient times³⁹. Furthermore, the 2010 analysis of the marble by OM showing that it originated in Luni-Carrara⁴⁰ shed no light on the matter either. However, subsequent analysis of some of its patinas, similar in appearance to oxalates, turned out to be colonies of fungi from its conservation in the open air⁴¹, and recent reanalysis of the marble using the multimethod approach determined a material that is unreferenced for ancient sculptures in the ICAC Archaeometric Studies Unit. Therefore, the results of the analysis of the patinas and those of the marble provide key data against the antiquity of this head⁴².

The almost true-to-life-size herma also preserved in the MAC (cat. 30)⁴³ was a similar case in point. Its stylistic-iconographic study revealed that it is a modern copy from the classicist period of a private portrait from the first decades of the 2nd century. Microscopic analysis of its patinas confirmed this conclusion, determining that there were no traces of oxalates but rather that it was covered with a biogenic layer formed in an open-air context causing its corrosion⁴⁴, while its Luni-Carrara material⁴⁵ and the letters A.P., which identify it as Antoninus Pius, corroborate the modernity of the piece⁴⁶.

Three unknown male portraits and another of Augustus complete the series of sculptures discussed so far, carved from a single block of marble. All of them belong to the MAC and have in common the difficulty of assigning them to ancient or modern times. The first three⁴⁷ show the char-



5 Modern head of Nero from the Museu d'Arqueologia de Catalunya. MAC-7571 (photo: I. Moreno Martínez)

³⁸ The study and analysis of this female portrait are research tasks to be carried out under the previously mentioned current project »Antiquae Feminae« funded by the Spanish Ministry of Science, Innovation and Universities.

³⁹ Claveria – Moreno 2018, 224–227 pl. 4.

⁴⁰ Rodà et al. 2010, 28 f.

⁴¹ Vendrell – Giraldez 2017, 4–10; Claveria – Moreno 2018, 225.

⁴² I thank María Pilar Lapuente Mercadal for her invaluable help and comments on the interpretation of this head material.

⁴³ MAC-7574.

⁴⁴ Claveria – Moreno 2018, 229–231 pls. 6–7.

⁴⁵ Rodà et al. 2010, 20 f.

⁴⁶ Claveria – Moreno 2018, 231.

⁴⁷ MAC-7582 (cat. 1). MAC-7585 (cat. 2). MAC-7586 (cat. 4).

acteristics typical of private Roman busts with features of the Republican realist tradition, while also including details of the ideal abstraction introduced during the reign of Augustus because he wanted to recover the classical Greek style, making them artistically consistent with the private effigies produced in the last decades of the 1st century BC⁴⁸. Two of them are made from Luni-Carrara marble (cat. 1. 4)⁴⁹, the most used material for carving portraits at the time, and the third is from Paros 2 (cat. 2)⁵⁰, a marble which, as we have seen, was much more used in ancient times, while in the area of modern Europe it was only accessible if the materials used for works or blocks preserved from antiquity were reused. However, some authors are hesitant to put an ancient age to either this portrait or to the one corresponding to MAC-7582 (cat. 1)⁵¹. The ancient chronology of the portrait of Augustus (cat. 3)⁵² is likewise unconfirmed, despite it being carved from Paros 2 marble, indicating its antiquity⁵³, and the fact that the head seems to be a replica of the Augustus Prima Porta type and is very consistent with ancient portraits of the Julio-Claudian period. Having said that, certain details in some locks of his hair cannot be found in any other Roman portraits of this emperor⁵⁴, which is why some authors believe this bust to be modern⁵⁵. We have not yet been able to study these four pieces in terms of their patinas, and the thick layer of dust that covers the surface of most of them is an obstacle to obtaining more information in this regard simply from careful visual observation. We trust that future analyses of these busts from this perspective of conservation/restoration will produce useful results in terms of determining their age.

The remaining 21 % of the sculptures in the group we wanted to study are assemblies of different pieces made in modern times to obtain sculptures for antiquarian collections. Two types of assemblages can be observed in the nine busts that make up this group. The first type are heads made from a single block attached to busts carved in modern times. Five of the nine busts are of this type, of which four have ancient heads carved with oriental marble. These data ratified the results of the stylistic and iconographic analysis and the result obtained from their patinas, which likewise indicated their Greek-Roman origin. Regarding the marble used, a portrait of Lucius Vero (MAC-7578, cat. 16) turned out to come from Lefkes (Paros 2)⁵⁶. The sample taken from another portrait attributed to Zeno but actually representing Miltiades (MNPrado E-14, cat. 19)⁵⁷ was not representative, although *de visu* it looks like Afyon marble⁵⁸. One portrait of Miltiades (MNPrado E-23, cat. 20; fig. 6) is made from Pentelic marble⁵⁹, and another attributed to Lysias (MNPrado E-25, cat. 21) is made from Lychnites marble⁶⁰. Only in the case of a bust of Pseudo-Vitelio (MAC-7576, cat. 15) did both the head and the bust turn out to be modern, probably made at the end of the 16th century in a workshop in northern Italy⁶¹, and both from Luni-Carrara marble⁶². Of the rest of the busts, only the one of the aforementioned Lucius Vero (cat. 16) was analysed, also

⁴⁸ Claveria 2010, 358–361 pl. 1 (MAC-7586, cat. 4); 361–364 pl. 2 (MAC-7582, cat. 1); 364–366 pl. 3 (MAC-7585, cat. 2).

⁴⁹ Rodà et al. 2010, 18 f. (MAC-7582, cat. 1); material confirmed by the analyses carried out using CL and isotopes in 2022. See also Rodà et al. 2010, 3 (MAC-7586, cat. 4).

⁵⁰ Rodà et al. 2010, 10 f. (MAC-7585, cat. 2); material confirmed by the analyses carried out using CL and isotopes in 2022.

⁵¹ Claveria 2010, 361 n. 38; 364 n. 50.

⁵² MAC-7584.

⁵³ Rodà et al. 2010, 26 f.; material confirmed by the analyses carried out using CL and isotopes in 2022.

⁵⁴ Boschung 1993, 75. 144 f. pl. 121; Claveria 2010, 366–368 pl. 4.

⁵⁵ Claveria 2010, 366.

⁵⁶ Regarding the material and the interpretation of this piece, see Rodà et al. 2010, 34; Koppel 2013, 310–312 pls. 6–7; Claveria et al. 2015, 19 f. 25. 28 f. pl. 9; Moreno Martínez 2017, 212 f. pl. 3.

⁵⁷ Cacciotti 2017, 93 f. pl. 3.

⁵⁸ Rodà et al. 2015, 7–10.

⁵⁹ Rodà et al. 2015, 11–14; Cacciotti 2017, 106–108 pl. 12.

⁶⁰ Rodà et al. 2015, 15–18; Cacciotti 2017, 96. 101 pl. 6 f–g.

⁶¹ Koppel 2013, 312–314 pls. 8–9; Claveria et al. 2015, 19. 23. 25. 31–33 pls. 11–12; Moreno Martínez 2017, 212.

⁶² Rodà et al. 2010, 53–57.



6 Modern bust of Lucius Verus from the Museu d'Arqueologia de Catalunya. MAC-7578 (photo: M. Claveria)

turning out to come from the Luni-Carrara quarries⁶³. All five of these busts, including those in the form of a herm (cat. 19–20), the one with a bare chest (cat. 21) and those dressed in a tunic and paludamentum (cat. 15–16) were made in the modern period to be adapted to the galleries of the illustrious of the collections to which they belonged⁶⁴.

The second type of assemblage consists of heads or busts made of fragments of different marble remains of ancient statues, completed with new marble to produce antiquarian works. The joints between the different parts are often hidden with layers of intentional ageing, thereby achieving smoother and more uniform surfaces. The head of an athlete in the polycletic style preserved in the MAC (cat. 5; fig. 7)⁶⁵ is a good example of this type, dependent on the model of the Doryphorus, Herakles or the Boboli-type Hermes of Polykleitos. Analysis of the patinas and the stylistic study enabled us to discern the core part of this piece⁶⁶, which was carved in Pentelic marble, as the analysis of its material showed⁶⁷. These data reaffirm the antiquity of the piece and its possible origin in Greece or Rome, while the rest of the head is made up of modern additions of Carrara marble to complete its ancient core.

⁶³ Rodà et al. 2010, 32 f.

⁶⁴ Koppel 2013, 318 f.; Claveria et al. 2015, 41–43; Cacciotti 2017; Moreno Martínez 2017, 214 f.

⁶⁵ MAC-19057.

⁶⁶ Claveria 2013b, 116–119 pls. 1–2.

⁶⁷ Rodà et al. 2010, 14 f.; the analyses carried out using CL and isotopes in 2022 rejected the 2010 result (polarised light microscopy), according to which it was Luni-Carrara, and confirmed that it is Pentelic marble.



7 Ancient male head in polykletean style from the Museu d'Arqueologia de Catalunya. MAC-19057 (photo: courtesy of the museum)

sole sovereign in a state of severe deterioration, which a conservation/restoration study determined to be consistent with having been exposed to fire. The missing parts of this head were reintegrated at an undetermined time using mortars and pestles to improve its appearance⁷⁴. The high degree of granular decohesion and dehydration of the marble has so far prevented us from reliably determining the origin of its stone material⁷⁵. The second portrait depicts a philosopher (cat. 18; fig. 8)⁷⁶, or possibly a cultured citizen, who cannot be identified due to the parts of the brow, nose and mouth added with a different marble in modern times. However, its sculptural typology entirely coincides with the heads of Hellenistic philosophers and orators, and its style is characteristic of the beards of the last Antonines and the first Severus, verifying that it was carved in Roman times⁷⁷. Its material, from Paros 1, confirms that it was produced in antiquity⁷⁸.

Another similar example is the bust of Caracalla housed in the MNPrado (cat. 26)⁶⁸. The core of the head and that of the bust can be considered ancient due to their style, and are easily distinguishable from the modern additions by the yellow and pink patinas that can be seen on their surfaces⁶⁹. The core of the head turned out to be made of Göktepe marble⁷⁰. The type and chronology of the head ratify the antiquity of this fragment, which corresponds to an »Alleinherrscher«-type image of Caracalla from around AD 212. The head and the centre of the bust have been completed with modern-style fragments carved in Carrara marble⁷¹.

Two more heads complete the group illustrative of this type of assemblage. Both belonged to the collection displayed by Cardinal Antoni Despuig in Raixa (Palma de Mallorca) and acquired after its dispersal by Ròmul Bosch i Catarineu, finally joining the MAC collection in the 1930s, where they are still kept⁷². One of them is a reproduction of an effigy of Caracalla (cat. 17)⁷³ in his first type of portrait as

⁶⁸ E-379.

⁶⁹ Claveria 2019, 234–238 pls. 1–7.

⁷⁰ Rodà et al. 2015, 33–35.

⁷¹ Claveria 2019, 234–238 pls. 1–7.

⁷² Claveria 2013a, 292 f.

⁷³ MAC-7583.

⁷⁴ Claveria 2013a, 293–296 pls. 13–16. 296–302.

⁷⁵ Claveria et al. 2015, 45–57 pls. 19–24; Moreno Martínez 2017, 216–219 pls. 8–12; Claveria 2019, 234. See also Rodà et al. 2010, 51 f., where it was reported to be carved in Luni marble (polarised light microscopy), although recent analyses from 2022 (CL and isotopes) have not provided satisfactory results.

⁷⁶ MAC-7573.

⁷⁷ Claveria 2013a, 293–296 pls. 9–12; Claveria et al. 2015, 57–61 pl. 25; Moreno Martínez 2017, 215 f. pls. 6–7.

⁷⁸ Rodà et al. 2010, 24 f., where it was identified as Parian marble (polarised light microscopy), and recent analyses from 2022 (CL and isotopes) have ratified that the material of this head is from Paros 1.

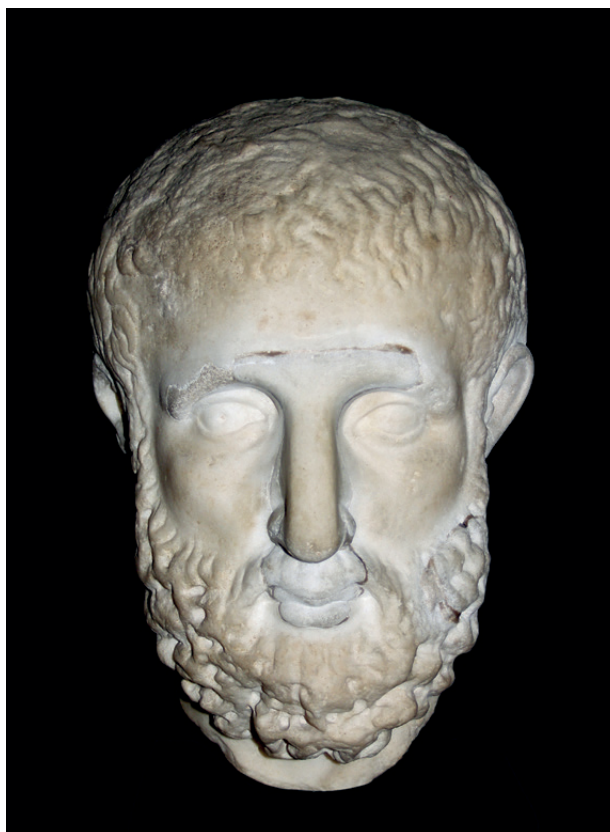
CONCLUSIONS

Analysis of this set of 39 sculptures meant that we could verify that 49 % of them are modern and 41 % are from antiquity, while the age of the remaining 10 % of the pieces could not be determined because we were unable to examine them from the point of view of the patinas preserved on their surfaces. Regarding the materials used, 56.4 % of them were carved from Luni-Carrara marble and 33.3 % from Greek and Asia Minor marbles, among which are Paros 1 and Paros 2, Pentelic, Gök-tepe, Prokonnesos, Naxos and probably Afyon. Local marble from the quarries in Montjuïc in Barcelona was used for 2.6 % of the pieces, and the type of marble of 7.7 % of them could not be determined due to their poor condition (cat. 17) or a lack of reference samples in the available databases (cat. 28), the latter case leading us to deduce the modernity of the marble used to sculpt the head of Nero (fig. 5).

All the modern pieces are made from Luni-Carrara marble, except for one medallion (cat. 24; fig. 2), which is made from Proconnesian marble. This medallion belongs to a sculptural genre created between the end of the 15th century and the beginning of the 16th century to decorate the façades of churches and palaces in northern Italy with architectural motifs in the so-called Antico style, which imitated ancient coins and gems. This piece testifies that it was probably made with reused materials from antiquity, since the Eastern Mediterranean was in the hands of the Turks at the time, making the extraction of these marbles from Greece and Asia Minor difficult. Carrara marble was notably not only the marble used most frequently in modern times to make sculptural works »à l'antica«, but also the most used to recompose deteriorated ancient sculptures that were recovered for sale in the antiques market. In this regard, our analyses verified that all the works made by assembling multiple fragments of different marbles align with the reuse of remains of ancient sculptures to create works for antiquarian collections.

The ancient sculptures are mostly made from oriental marbles: three from Pentelic (cat. 5. 9. 20), four from Paros 2 (cat. 2. 3. 7. 16), two from Paros 1 (cat. 18. 21), one from Gök-tepe (cat. 26), another from Naxos (cat. 35; fig. 3) and another probably from Afyon (cat. 19). Only four ancient sculptures (cat. 4. 8. 27. 37) turned out to be from the Luni-Carrara quarries, all of them belonging to early periods from the end of the Republic to the first half of the 2nd century, indicating the preference in the 2nd and 3rd centuries AD for Greek and Asia Minor marbles⁷⁹.

Multimethod analyses of marble and patinas are crucial in the equivocal field of study of sculptures belonging to antiquarian collections. We calculated that the study of the set of works



8 Ancient head of philosopher from the Museu d'Arqueologia de Catalunya. MAC-7573 (photo: courtesy of the museum)

⁷⁹ This is in agreement with the results obtained with a set of marble sarcophagi from the Museo Nazionale Romano in Rome, see Van Keuren et al. 2011, 167.

Cat.	Museum Inv.	Sample	Object	VE	OM	CL	CO-Isotopes	Material	Ancient or Modern
1	MAC-7482	BCN-0540	Male portrait	x	x	x	x	Luni-Carrara	A (?)
2	MAC-7585	BCN-0536	Male portrait	x	x	x	x	Paros 2	A (?)
3	MAC-7584	BCN-0544	Augustus' portrait	x	x	x	x	Paros 2	A (?)
4	MAC-7586	BCN-0556	Male portrait	x				Carrara	A
5	MAC-19.057	BCN-0538	Polycletian ideal head	x	x	x	x	Pentelic	A (core)
6	MAC-19.030	BCN-0535	Ideal male head	x	x	x	x	Luni-Carrara	M
7	MAC-15.098		Ideal male head	x				Paros (?)	A
8	MAC-19.041		Harpocrates torso	x				Luni-Carrara	A
9	MAC-19.604	BCN-1487	Ideal female head	x	x	x	x	Pentelic (?)	A
10	MAC-7579	BCN-0552	Hadrian bust	x	x			Luni-Carrara	M
11	MAC-7577	BCN-0550	Domitian bust	x	x			Luni-Carrara	M
12	MAC-7580	BCN-0551	Antoninus Pius bust	x	x			Luni-Carrara	M
13	MAC-7581	BCN-0546	Otho bust	x	x			Luni-Carrara	M
14	MAC-7575	BCN-0553	Unknown emperor bust	x	x			Luni-Carrara	M
15	MAC-7576	BCN-0560 BCN-0559	Pseudo-Vitellius head Pseudo-Vitellius bust	x	x			Luni-Carrara Luni-Carrara	M M
16	MAC-7578	BCN-0548 BCN-0548-R BCN-0547	Lucius Verus head Lucius Verus head Pseudo-Vitellius bust	x x x	x x x	 x	 x	Unrepresentative Paros 2 Lefkes Luni-Carrara	 A M
17	MAC-7583	BCN-0558	Caracalla's portrait	x	x	x	x	Unrepresentative	A
18	MAC-7573	BCN-0543	Philosopher's head	x	x	x	x	Paros 1	A
19	MPrado E-14	MDR-1087	Zeno's head on a modern herma bust	x	x	x	x	Afyon (?)	A
20	MPrado E-23	MDR-1088	Miltiades' head on a modern herma bust	x	x	x	x	Pentelic	A
21	MPrado E-25	MDR-1089	Lysias' head on a modern herma bust	x	x	x	x	Paros 1	A
22	MPrado E-204	MDR-1090	Marble medallion	x	x	x	x	Luni-Carrara	M
23	MPrado E-252	MDR-1091	Marble medallion	x	x	x	x	Luni-Carrara	M
24	MPrado E-306	MDR-1092	Marble medallion	x	x	x	x	Prokonnesos	M
25	MPrado E-310	MDR-1093	Marble medallion	x	x	x	x	Luni-Carrara	M
26	MPrado E-379	MDR-1094	Caracalla's bust	x	x	x	x	Göktepe (?) (core head)	A
27	MAC-44.056	BCN-0532	Male portrait broken	x	x			Luni-Carrara	A
28	MAC-7571	BCN-0545	Nero's head	x	x	x	x	(?)	M
29	MAC-7572	BCN-0537	Male head	x	x	x	x	Luni-Carrara	M
30	MAC-7574	BCN-0541	Male portrait herma	x	x			Luni-Carrara	M
31	MAC-19.029	BCN-0542	Female portrait head	x	x			Luni-Carrara	M
32	MAC-19.029		Male portrait head	x				Carrara	M
33	MAC-9581	BCN-0534	Female portrait head	x	x			Luni-Carrara	A
34	MAC-9584	BCN-0539	Male portrait bust	x	x			Montjuïc stone-ware	A
35	MAC-15.090	BCN-0557	Female portrait head	x	x	x	x	Naxos	A
36	MAC	BCN-0554	Female bust	x	x			Luni-Carrara	(?)
37	MAC-15.089		Female portrait head	x				Carrara	A
38	MAC-7595	BCN-0549	Female bust	x	x			Luni-Carrara	M
39	MAC-9524	BCN-555	Sarcophagus	x	x			Luni-Carrara	M

Table 1 List of sculptures analysed, methodologies used and determination of their material, and ancient or modern origin. Abbreviations: MAC = Museu d'Arqueologia de Catalunya; MPrado = Museo Nacional del Prado; VE = visual examination; OM = optical microscopy; CL = cathodoluminescence

presented here contributes 59 % to verifying the results obtained using other archaeological-artistic approaches, lending a certain solidity to the conclusions reached. A total of 31 % of the results were decisive in determining the antiquity or modernity of the pieces, and in 10 % of the cases they may be determinate in future studies. Analysis of the patinas also provided new data to advance the knowledge of the contexts of conservation and use of these works, and in the ways to proceed in terms of reusing ancient marbles to produce modern sculptures.

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