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## Exploring Ancient Colour at the Villa dei Papiri at Herculaneum: the Peplophoros and its Setting

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# Exploring Ancient Colour at the Villa dei Papiri at Herculaneum: the Peplophoros and its Setting

*Elisabetta Canna – Kenneth Lapatin – Paola Marraffa – Francesco Sirano – Marie Svoboda*

## Abstract

The international loan exhibition «Buried by Vesuvius: Treasures from the Villa dei Papiri» presented at the Getty Villa in Los Angeles, 26 June – 28 October 2019, provided the opportunity for a collaborative investigation of the ancient polychromy of select artefacts generously lent by the Parco Archeologico di Ercolano and other Italian institutions. In addition to examining marbles, bronzes, and frescoes recovered by the Bourbons in the 1750s and now housed in Museo Archeologico Nazionale di Napoli, particular attention was paid to fresco panels more recently removed from rooms g and r of the atrium quarter of the Villa dei Papiri, to the marble head of an Amazon, and especially to the statue of a female peplophoros conventionally but erroneously identified as «Hera/Demeter», which was excavated in the newly discovered seaside pavilion in April 1997 (PA-Erco 4331/81595 and 4296/80499). This study focuses on the peplophoros and its architectural setting. A combination of non-destructive techniques such as digital microscop-

ic examination, broadband spectral imaging, portable X-ray fluorescence spectroscopy (XRF), and fiber optics reflectance spectroscopy (FORS) was used to identify the existing ancient pigments, to map how they were used, and to better understand other features, both technical and iconographic. Peptide mass fingerprint analysis and liquid chromatography mass spectrometry (LC-MS-MS) were also conducted with the aim of characterizing protein binders, albeit without reaching definitive conclusions. The authors and their collaborators identified pigments commonly used in antiquity to enhance decorative details, revealing the artist's intention to imitate luxurious materials. They present here a new digital reconstruction commissioned from information architect Mieke Roth to aid the understanding of the polychrome statue in its sumptuous ancient architectural context.

**Keywords:** Roman, marble, sculpture, Villa dei Papiri, peplophoros, Herculaneum, polychromy, opus sectile, imitation stone

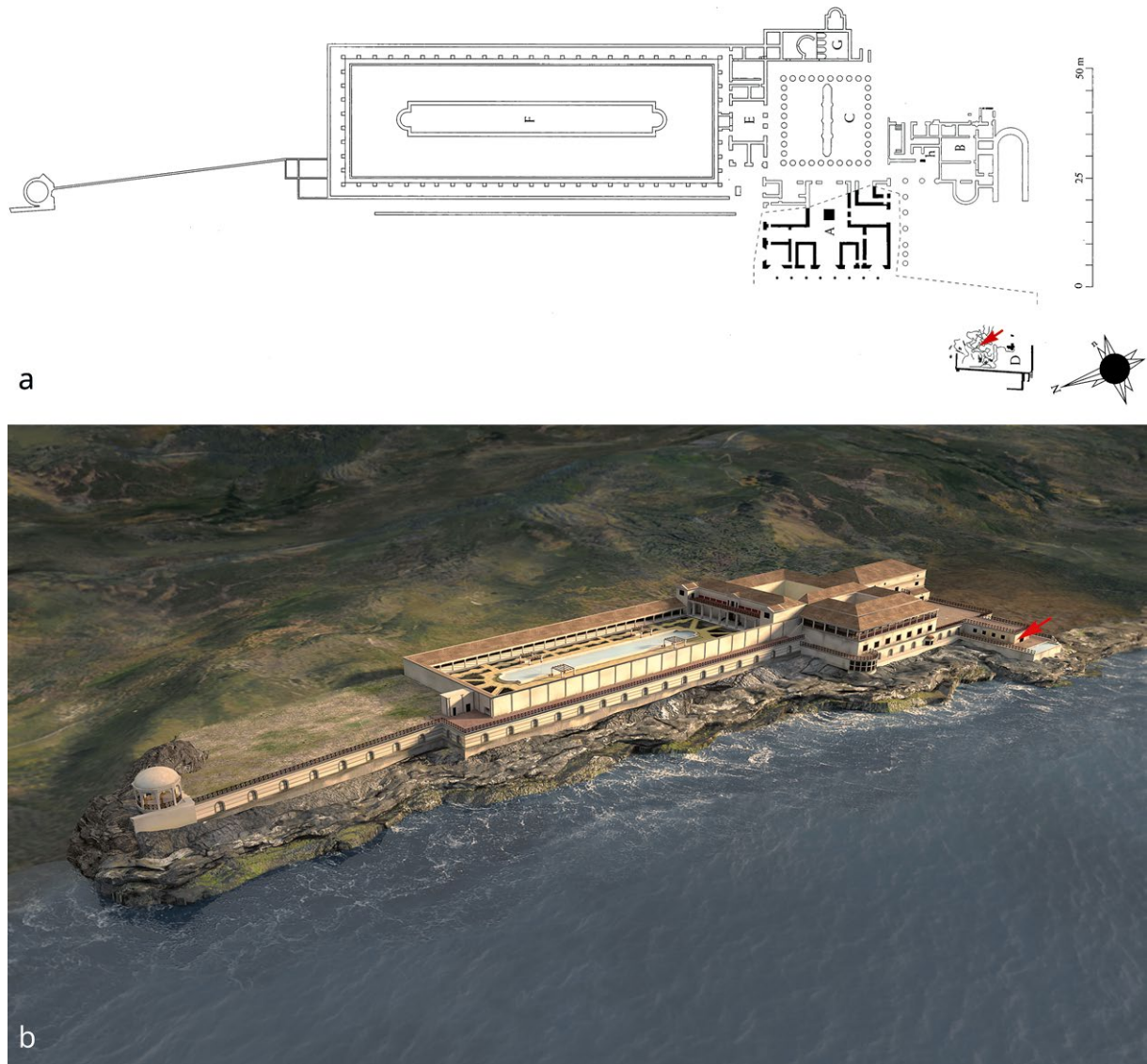
## Discovery and Description

On 21 April 1997, excavators under contract with Infratecna directed by Antonio de Simone unearthed from the ruins of a recently discovered lower terrace of the Villa dei Papiri at Herculaneum (so-called VPSO – Villa dei Papiri area Sud-Ovest – a zone not

explored by the principal excavator of the Villa, Karl Weber, in the 1750s and early 1760s) a finely carved 1.88 m tall statue of a female figure wearing a peplos preserving significant traces of its original polychromy (Figs. 1–3)<sup>1</sup>. Carved of fine-grained marble (visual-

<sup>1</sup> Infratecna excavations: conveniently summarized in de Simone 2010, esp. 13 f.; see also Guidobaldi – Esposito 2009; Guidobaldi – Esposito 2010; Guidobaldi et al. 2010; Camardo 2019. Weber's excavations: Parslow 1995, 77–106; Guzzo et al. 2018; Sirano 2020; see also Lapatin 2019. Peplophoros (PA-Erco 4331/81595): Sirano 2019; see also Pagano 1997, 98; Guzzo 1999, 846 f.; Adamo Muscettola 2000, 6 f.; Ciardello 2001, 139–141; de Simone – Ruffo

2002, 336–340; d'Ambrosio et al. 2003, 100 no. I.1 (A. d'Ambrosio); de Simone – Ruffo 2003, 305; Guzzo 2003, 110; Pagano 2003, 114; Gaspari 2005, 55–59; Mattusch 2005, 282 n. 11; Valeri 2005, 191; Guidobaldi 2006a, 126. 129; Guidobaldi 2006b, 399; Guidobaldi 2008, 249, no. 6 (V. Moesch); Guidobaldi – Esposito 2009, 357, figs. 35–37; Guidobaldi – Esposito 2010, 48; Guidobaldi – Esposito 2013, 99; Sirano 2017a, 254–256.



1 a. b) Plan and digital reconstruction of the Villa dei Papiri. D at lower right= VPS0 (Villa dei Papiri area Sud-Ouest) consisting of a lower terrace, seaside pool, and pavilion, in which the peplophoros, marked ←, was discovered (A and D are areas brought to light in 1997 and 2007).

ly characterized as Pentelic), the statue had been toppled by the force of the eruption of Mt. Vesuvius in A.D. 79, its head separated from the body, neck and left shoulder shattered, delicate drapery folds damaged, and both hands largely lost. Conservation was undertaken immediately in situ, and many fragments were reintegrated<sup>2</sup>. One finger recovered from the area may or may not pertain to the statue, as other sculptures were evidently displayed nearby<sup>3</sup>.

The statue represents an adult female in the bloom of life. She stands on a low integral plinth leaning on a parallelepipedal pilaster. Her peplos, pinned at the shoulders, has a long overfold (apoptygma) that falls to mid-thigh and is tied by a thin belt at the waist. Her weight is on her straight right leg, which is obscured by deep columnar folds, while her left is bent, with knee forward, visible through the drapery, and foot withdrawn. She wears thick-soled sandals, with no evidence of carved straps on her otherwise bare feet.

2 The statue was subsequently coated in silicone and removed from the excavation area to be taken to the site museum. The authors are grateful to colleagues at the Soprintendenza Archeologica di Pompei for providing a copy of an unpublished conser-

vation report dated March 10, 2003 produced by Opus Restauratori Consorziati with analyses by Artelab s.r.l.

3 PA-Erco VPSO-16.2007.



2 a. b) Excavation of the peplophoros, 23 April 1997, two days after its discovery

While her right arm is extended slightly forward, supported by a strut from her hip, the left, which is tightly wrapped in a himation (mantle), rests on the pillar that rises from behind her left foot. The right hand is entirely lost, though two drill holes at the wrist suggest the attachment of jewellery, some attribute, or an ancient repair. The back and palm of the left hand survive, but not the fingers, although drill holes at the break edges suggest ancient repairs. Two drill holes are also present on opposite sides of the integral plinth.

The figure's head inclines slightly downwards. She has a calm, youthful expression, with straight, slightly parted lips. Her face is framed by an orderly coiffure of wavy locks flowing from a central part and is gathered behind in a *sakkos*. A drill hole in each earlobe indicates that she originally wore earrings, presumably added in metal (Fig. 4).

The small strut connecting the figure's right wrist and hip not only secures the long, hanging right arm, but also suggests and perhaps even emphasizes the idea that the statue was carved from a single block of marble (including the plinth and pilaster)<sup>4</sup>. The proper left forearm and hand, however, were carved separately and attached into a socket, where the join is

disguised by the complex folds of the himation. This component is likely secured with an iron pin, indicated by the orange-coloured staining of the marble and corroborated by a metal detector.

The sinuous pose of the body, which is alternately concealed and revealed by the magnificently carved drapery, as well as the bare shoulders and arms and the slight exposure of the flesh of the torso through the opening of the drapery on the proper right side, all contribute to the eroticism of the figure. Although the fabric of the peplos, masterly rendered with deep complex folds, is doubled over her upper body, it nonetheless reveals the contours of the breasts. Overall, the peplophoros is carved in the style of Athenian works of the later 5<sup>th</sup> cent. B.C. This is particularly evident in the small weights carved at the corners of her peplos, both at the thighs and near the feet, and especially the *pie-crust* folds of both garments. These and other technical features allow the statue to be attributed to a sculptural workshop active at Baiae and Puteoli in the Augustan age, when sculptural types of the *Golden Age* of Classical Greece were not only faithfully reproduced but also recombined into eclectic new Roman creations<sup>5</sup>.

<sup>4</sup> See, e.g., Anguisola 2018.

<sup>5</sup> Valeri 2005; Sirano 2017a; Sirano 2017b; Sirano 2019.



3 Statue of a peplophoros (woman or goddess wearing a peplos) in visible light. Pentelic marble; h 1.88m. Herculaneum, Parco Archeologico di Ercolano inv. 4331/81595. N.b. – the only polychromy visible on the rear of the statue is on its integral plinth, see Figs.6b.c.

## Identification

The peplophoros has come to be known conventionally as Hera or Demeter, although both identifications are misleading. The head of the figure replicates a famous ancient type, named after its best-known exemplar, the so-called Hera Borghese, which was discovered outside Rome in 1834<sup>6</sup>. This type, however, is now recognized as a representation of Aphrodite, not Hera. The Herculaneum peplophoros has also been associated with Demeter on account of the resemblance of the body with the so-called Demeter of Eleusis, a now armless and headless statue of the late 5<sup>th</sup> cent. B.C., without attributes, recovered from the famous Attic sanctuary of that goddess<sup>7</sup>. Whether the Eleusinian statue actually represents the titular deity of the site, however, re-

mains uncertain, and A. Stewart has recently presented other parallels for the pose and drapery in statues of Athena and especially Artemis<sup>8</sup>. This last parallel is especially intriguing, as the head of an Amazon combining features of the Sosikles and Sciarra types, both associated with ancient authors' tales of a sculpture competition at the sanctuary of Artemis at Ephesos, was discovered in close proximity to the peplophoros and apparently occupied a position in the opposite corner of the same room (Fig. 5)<sup>9</sup>. The possible identification of the peplophoros as Artemis is supported by her *sakkos*, a type of head covering that in ancient Greece functioned as an attribute of attractive young, sexually mature, single women.

<sup>6</sup> «Hera» Borghese: Copenhagen, Ny Carlsberg Glyptotek I.N. 473, unearthed at the Villa dei Bruttii Praesentes at Monte Calvo outside Rome in 1834, sometimes considered an ancient copy of the *Aphrodite Euploia* from Amyklai. Other ancient replicas are preserved in the Museo Nazionale Romano, Palatine Antiquarium (acephalous), and two (acephalous) at the Castello Aragonese, Baiae. Ancient copies of the head are also preserved in Paris, Baltimore, and elsewhere. See Neudecker 1988, 181 no. 35, 2; Delivorrias 1993; Moltesen 2002, see also 15, fig. 4; 42–46 no. 1.

<sup>7</sup> «Demeter» of Eleusis: Eleusis Museum 5076: Boardman 1985, fig. 137.

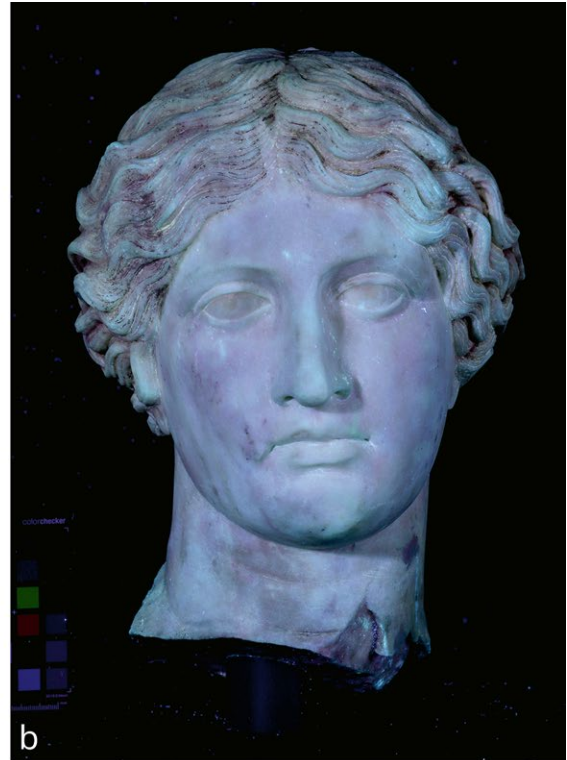
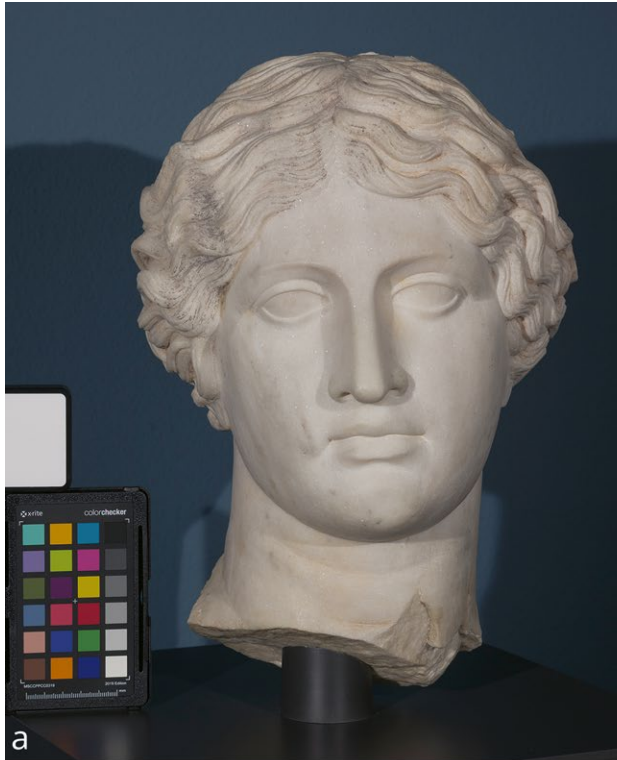
<sup>8</sup> In a presentation at the Getty Villa, Los Angeles, on 21 October 2019, Stewart adduced the following parallels for the figure's

pose and drapery: Athena from the Athenian Agora, Agora Museum S1232: LIMC II (1984) 980 no. 243 s. v. Athena (P. Demargne); «Artemis» from Ariccia, also wearing a *sakkos*, Rome, MNR 80941: LIMC II (1984) 636 no. 125 s. v. Artemis (L. Kahil – N. Icard); Ame-lung 1922; Artemis from Delos, Delos Museum A 4126: LIMC II (1984) 636 no. 126 s. v. Artemis (L. Kahil – N. Icard); and Artemis from Larnaca, Vienna, Kunsthistorisches Museum I 603: LIMC II (1984) 654 no. 406 s. v. Artemis (L. Kahil – N. Icard).

<sup>9</sup> PA-Erco 4296/80499, discovered 28 April 1997: Lapatin 2019, 214 f. (F. Sirano) with bibliography. For the Ephesian Amazons see, e. g., Ridgway 1974; Stewart 1990, 162 f. 262.



4 Head of the peplophoros



5 Head of an Amazon recovered from the Villa dei Papi, VPSO, Parco Archeologico di Ercolano inv. 4296/80499. a) Visible light; b) Ultraviolet induced visible fluorescence; c) Detail of hair. Delineation of irises and pupils is evident through differential weathering. Evidence of pigment was not detected by XRF. The presence of elevated iron levels in the hair, where two discernible shades of red (light and dark) are visible, likely indicates earth pigments.

## Visible Polychromy

Well-preserved traces of ancient colour are clearly visible on the surface of the figure's eyes, hair, garments, pilaster, and plinth, making the peplophoros an exceptional and important example of Roman artistry. The eyes are faintly defined in dark and reddish pigments. Traces of ochre-coloured pigments are visible in the hair, at the hairline across the forehead, and on the sakkos, with evidence of a darker red pigment visible in the recesses of the hair. Dark red, blue, and yellow

decorate the edges of the peplos and himation. The pilaster on which the figure leans has been painted with decorative grain or spiral striation patterns, while the plinth is red with superimposed irregular blue spots, resembling coloured stone. The colours on the plinth have been applied over a thick white ground layer with coarse-grained inclusions and are best preserved at the back of the statue, although traces of this painted scheme are also present on the front (Fig. 6).



6 Details of polychromy visible on the peplophoros. Front, trim of the garments, pilaster, and plinth:  
a) Front center trim of peplos; b) Front, bottom trim, plinth and pilaster; c) Reverse, top of plinth; d) Reverse, plinth 20× magnification



## Archaeological Context

The Infratecna excavations of the late 1990s were left incomplete due to high water levels and other issues, but in 2007 and 2008 archaeologists from the former Soprintendenza Speciale per i Beni Archeologici di Pompei, Ercolano, e Stabia (SSPES) and the Herculaneum Conservation Project (HCP) re-excavated the area, now called VPSO (Villa dei Papiri area Sud-Ovest), and recorded significant remains of the display context of the peplophoros and above-mentioned head of an Amazon, including their statue bases in the two corners of the large room that were unearthed a decade earlier. On a terrace fronting on a seaside swimming pool was a large hall, 10.80 m in width, with a wide central doorway (6.60 m) and large windows (2.14 m wide) on each side (the original length of the hall is unknown as its full extent remains unexcavated). Its walls consist of opus reticulatum with yellow tufa *cubilia*, adorned with pilasters, straight arches, and relieving arches built in opus testaceum with simple and bipedal tiles. Externally, the walls are covered with a thick layer of white plaster engraved with lines that appear to imitate slabs of marble veneer. Outside, the doorway in west façade is framed by a pair of large L-shaped composite pillars composed of rectangular pilasters joined to three-quarter columns. These supported Corinthian capitals and were placed on a curvilinear base covered with pink plaster, while both column and pilaster were covered with a thick layer of white stucco imitating fluted column shafts. The roof of the hall was evidently flat, and the height is estimated to have been 7.60–8 m<sup>10</sup>.

Inside, the hall was richly decorated. It had an elegant pavement in opus sectile, composed of coloured stone tiles and strips, many of which had been removed for some kind of renovation at the time of the eruption in A.D. 79. According to M. P. Guidobaldi and D. Esposito, «the decorative scheme of the pavement may be reconstructed on the basis of the surviving elements: a double slate fascia (thickness 4.4 and 6.3 cm) runs along the walls of the hall and frames a marginal band composed of *giallo antico* lozenges (29 cm wide), arranged in three rows along the west wall and six rows along the south wall and separated

by *rosso antico* listels (8 mm thick); a second slate fascia (10 cm thick) framed by two other *rosso antico* listels separates the edge frill from the central area of the pavement, which is composed of square *giallo antico* tiles framed by *rosso antico* listels» (Fig. 7 a. b). They further observe that this pavement is typologically similar to that of Sacellum B of the Sacred Area at Herculaneum<sup>11</sup>.

The lower walls were adorned with polychrome marble *crustae*, to a height of 1.10 m: «A low plinth of African marble (12 cm high) runs along the walls and is crowned with a white marble moulding cornice, on which a covering of rectangular African and *giallo antico* marble slabs is placed (height of the slabs: 70 cm). A second moulding cornice runs above this row of slabs, on top of which a second row of rectangular slabs made of African, *bardiglio* and *cipollino* marbles (22 cm high) is placed<sup>12</sup>».

At the east and south inner corners of the hall were two quadrangular brick bases, clad with luxurious coloured stone veneers, each with an irregular concave depression in its upper surface. They rest on plinths of *Africano* and are faced with slabs of *bardiglio* framed by white marble mouldings (Figs. 8. 9). The better-preserved base associated with the less well-preserved statue of an Amazon protrudes from the corner at a 54-degree angle, suggesting that both statues were oriented at a diagonal towards the centre of the room. Such placement of the bases, which creates an ideal observation point inside the room, is rare in the Roman world and must have contributed, together with the polychromy and the rather elevated position of the statues, to create a solemn and intimate atmosphere. Moreover, as de Simone observed, «the symmetrical arrangement of the statue bases within the room allows the hypothesis that there were other statues in the [still unexcavated] corners on the north-east side of the room, opposite the explored area<sup>13</sup>.» It is intriguing to think that these might be two additional Amazons, representing more instances of the types associated with major 5<sup>th</sup> cent. B.C. Greek sculptors who allegedly competed at Ephesos, according to Pliny the Elder (nat. 34, 75)<sup>14</sup>.

<sup>10</sup> Guidobaldi – Esposito 2009; Guidobaldi – Esposito 2010; Guidobaldi et al. 2010; Camardo 2019.

<sup>11</sup> Guidobaldi – Esposito 2010, 47 f. For Sacellum B now see Guidobaldi et al. 2014, 28 f., pl. CXII.5 (F. Guidobaldi).

<sup>12</sup> Guidobaldi – Esposito 2010, 48.

<sup>13</sup> de Simone 2010, 13 f.

<sup>14</sup> See also note 9 above.



7 a. b) Interior of seaside pavilion (VPSO) from above, with collapsed wall segment in centre. N. B. – opus sectile floor, with wide doorway at top, and base associated with statue of an Amazon at upper left



8 Base associated with the Amazon with polychrome marble veneers set against walls with similar veneers and white marble mouldings



9 Base associated with the peplophoros set against walls with coloured marble veneers and white marble mouldings (cf. Fig. 2 above)

## Technical Study

The generous loan of artefacts from the Parco Archeologico di Ercolano to the J. Paul Getty Museum for the 2019 international loan exhibition ‘Buried by Vesuvius: Treasures from the Villa dei Papiri’ provided the opportunity to study and non-invasively access many of the artefacts included, and in particular the peplophoros<sup>15</sup>. The sculpture was examined in the museum’s galleries using portable non-destructive methods such as broadband spectral imaging, digital magnification, X-ray fluorescence (XRF), and fiber op-

tics reflectance spectroscopy (FORS). DStretch<sup>16</sup>, a plug-in for an imaging processing programme developed to enhance faint traces of colour preserved on rock art, improved the legibility of the painted decoration, specifically on the pilaster. Lastly, after the statue was returned to Herculaneum, minute samples of paint were submitted for peptide mass fingerprinting (PMF) analysis for protein identification, in the hope of revealing the presence of ancient binding media<sup>17</sup>.

<sup>15</sup> For the exhibition see <[http://www.getty.edu/art/exhibitions/villa\\_papiri/](http://www.getty.edu/art/exhibitions/villa_papiri/)> (04.08.2024) and Lapatin 2019.

<sup>16</sup> <<https://www.dstretch.com/>> (04.08.2024).

<sup>17</sup> Kirby et al. 2011.

## Surface Preparation

The surface finishing of the stone varies across the statue. Fine parallel marks of tools employed to smoothen and polish the marble are clearly visible on the arms and drapery; a more refined polish, leaving less evidence of tool marks, can be observed on the face and feet. The lack of pigment detected in these areas may reflect the artist's intention to utilize the translucent quality of the marble in contrast to painted areas as are observed on other ancient Roman

sculptures<sup>18</sup>. Coarser tool marks are visible in the hair, on the horizontal strut (flat chisel), and on the pilaster (point chisel). The horizontal surface of the plinth was also intentionally roughened with a point chisel, creating a pitted surface. The surface texture on the reverse of the plinth appears more coarse and uneven. The various surface textures suggest that the artist attempted to produce different surface effects for receiving the paint and contrasting textures<sup>19</sup>.

## Pigment Identification

The most obvious evidence of colour is visible to the unaided eye. The edges of the peplos and himation exhibit well-preserved traces of dark red, yellow, and blue pigments. The plinth is painted using a vibrant red with seemingly random blue marks on top; the pilaster exhibits decorative patterns in shades of ochre. Minor traces of colour can also be observed in the eyes, defining the pupils, and shading the hair and *sakkos*.

To locate and characterize the pigments, this study began with broadband spectral imaging: visible and raking illumination, ultraviolet radiation (UVF and UVR), reflected infrared (IR), and visible-induced infrared luminescence (VIL). Each technique helped in the mapping of surface features, distinguishing between ancient pigments, modern repairs, and fills as well as assessing the general condition of the sculpture.

Microscopic examination using a Keyence digital microscope enabled detailed inspection of the pigments, their particle size, and the methods of application. Under magnification, the polychromy appears to be finely ground and very homogenous with no apparent pigment mixtures. The difference in the shades of the earth pigments seems to be a result of how the paint was applied: thin and directly on the marble (pilaster, hair, eyes); slightly thick (peplos and himation trim); and more thickly applied over a white preparatory layer (plinth) (Fig. 10 d).

Visible-induced infrared luminescence (VIL) is a diagnostic imaging technique used for visualizing the presence of Egyptian blue ( $\text{CaCuSi}_4\text{O}_{10}$ ), the earliest known synthetic pigment<sup>20</sup>. By capturing the unique infrared luminescence of this pigment when excited by visible light, the presence of Egyptian blue is not only revealed but can also be mapped, indicating where the pigment was used. On the peplophoros, the characteristic luminescence suggests that Egyptian blue was used as a layer of trim on the peplos, himation, on the soles of the sandals (not otherwise visible), and on the upper surface of the red plinth where the pigment was applied to produce an irregularly spotted decoration (Fig. 11). X-ray fluorescence spectroscopy (XRF) confirmed the presence of copper, strongly supporting the use of Egyptian blue. Fiber optics reflectance spectroscopy (FORS) further corroborated the use of Egyptian blue.

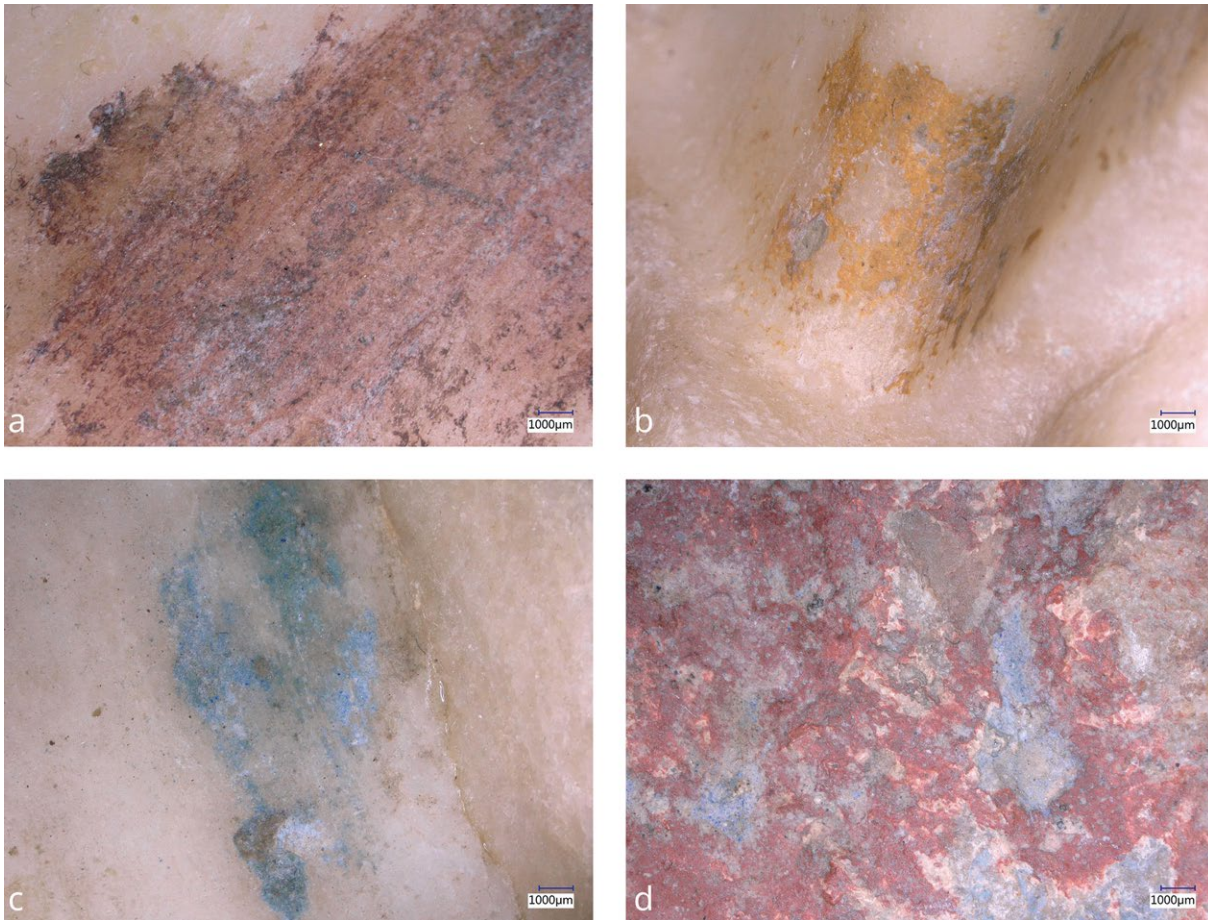
Red and yellow shades on the peplos, hair, pilaster, and plinth were created using earth pigments, as shown by the elevated iron content detected by XRF and the typical iron earth spectral shape shown by FORS. Trace amounts of lead detected by XRF, which are associated with all the pigments, could be the result of the addition of a minor amount of the white pigment used as an opacifier.

The use of broadband spectral imaging – primarily VIL and digital microscopy, XRF, and FORS analyses – assisted in mapping the traces of polychromy on

<sup>18</sup> Skovmøller 2020, 15. 212 f.

<sup>19</sup> See Skovmøller 2014.

<sup>20</sup> Skovmøller et al. 2016, 372–375.



10 Micrographs at 20× magnification, of the decorative trim on the peplos and plinth. a) Red pigment; b) Yellow pigment; c) Egyptian blue; d) Red and blue on plinth

the hair, peplos, himation, plinth, and pilaster, while little or no pigment was identified on the highly polished areas such as the face, arms, and feet. This may suggest an intentional colour scheme to emphasize and contrast the visual appearance of the flesh, drapery, and supports (i. e., pilaster and plinth).

The well-preserved and abundant polychromy on the peplophoros also provided an opportunity, through minimally invasive analyses, to explore whether traces of a binding medium might be detectable. While the investigation of ancient binders is complicated by numerous factors, such as the passage of time, biological deterioration, wear, contam-

ination (environmental and modern consolidation efforts), and insufficient sample size, recent advances in analytical techniques have significantly improved the possibility of obtaining results. Advances in scientific instrumentation have also greatly reduced detection limits and in most cases require much smaller sizes than previously needed. As the study of binders used for polychrome marble sculptures is evolving<sup>21</sup>, current media studies of other ancient painted artefacts, such as Romano-Egyptian mummy portraits, may provide clues regarding the materials and methods used by ancient painters of marble sculpture<sup>22</sup>.

21 See Aggelakopoulou – Bakolas 2022.

22 See Mazurek et al. 2019 and Mazurek 2020 for recent binding media analysis of Romano-Egyptian Mummy portraits.



11 a. b) Visible-induced infrared luminescence (VIL) images of peplophoros and the back of its integral plinth indicating the presence of Egyptian blue at the edges of garments and the top of its base

## Binder Identification

Upon the return of the peplophoros to Herculaneum, micro samples of paint were collected: one each of the red, blue, and yellow pigments from the peplos, and one from the red of plinth. The samples were submitted for peptide mass fingerprint analysis (MALDI/PMF), a technique used for identifying the presence and type of proteins<sup>23</sup>. In these instances, a protein binder was not confirmed in any of the samples. Another analytical technique, liquid chromatography mass spectrometry (LC-MS-MS) was also carried out on the same samples, but again there was no indication of an organic binder. A negative result, however, does not indicate the lack of a binding medium but only that one could not be detected, possibly for one of the reasons stated above.

## The Imitation of Luxury Materials I: the Pilaster

Methods of faux finishing or imitating rare and exotic materials were common in antiquity. The desire to emulate luxurious surroundings, even when materials were not available, can be seen in the numerous examples of frescoes mimicking coloured stones<sup>24</sup>.

The pilaster on which the peplophoros leans is clearly intended as a structural support for the sculpture. Unlike other supports that take on a distinctive shape, such as a tree trunk, herm, Eros, or dolphin, the rectangular form of this pilaster is ambiguous<sup>25</sup>. This pilaster, however, exhibits a distinctive spiral polychrome pattern painted with iron-based pigments confirmed by XRF, which are faintly visible under normal lighting conditions and are further enhanced through modern image processing. Applying DStretch significantly enhanced the painted decoration, improving legibility (Fig. 12). Sometimes de-

<sup>23</sup> Peptide mass fingerprinting (PMF) analysis involves the enzymatic digestion of proteins into peptide mixtures followed by analysis by «Matrix Assisted Laser Desorption-Ionization Time of Flight mass spectrometric (MALDI)». A «peptide mass fingerprint» is obtained from the protein present and compared to known references for identification.

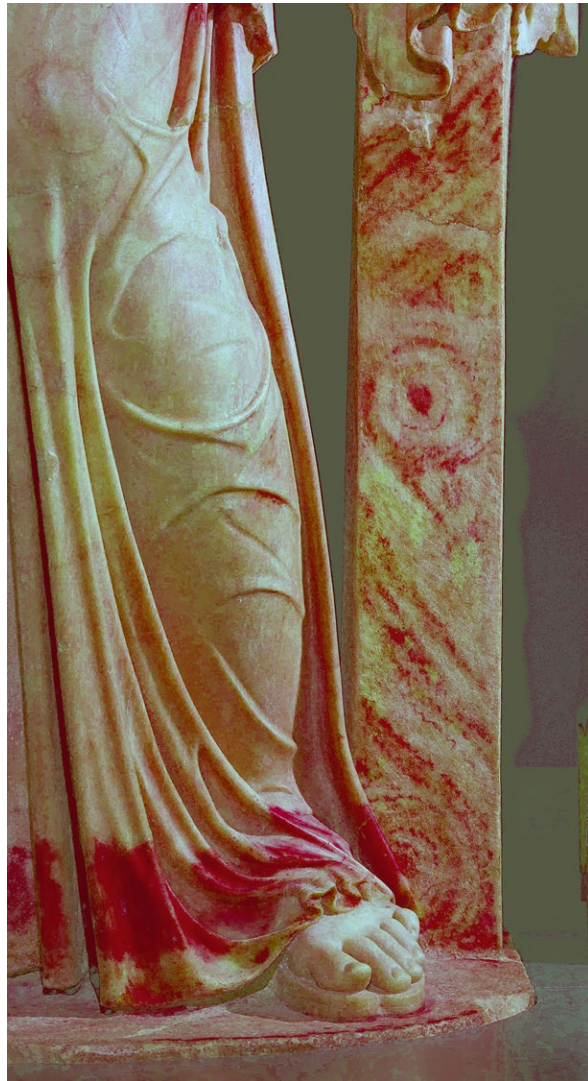
<sup>24</sup> *Vitr.* 1, 5, 1; see also Lazzarini 2019, 368; Barker – Taelman 2021; Claridge 2021.

<sup>25</sup> On supports in general now see Anguissola 2018.

scribed as a running-dog pattern or a Vitruvian scroll, the decoration appears to imitate a veined stone, such as *alabastro fiorito*, *calacatta*, *cippolino*, or *cippolino rosso* (*marmor Carium* or *Iassense* from Asia Minor)<sup>26</sup>. Another possibility is that the pilaster was painted to imitate the grain patterns of a luxurious wood. Stabilizing marble supports carved in the shape of tree stumps were a popular structural device in antiquity, but the parallelepipedal pilaster of the peplophoros makes this less likely, although exotic woods with elaborate grain patterns were highly prized in the ancient Roman world<sup>27</sup>.

## The Imitation of Luxury Materials II: the Plinth

The upper marble surface of the plinth is unevenly finished, and its surface is levelled using an aggregate-rich calcium-based preparatory material followed by a red painted layer with irregular spots of blue pigment (Figs. 6, 11 b). The painting on the plinth is well-preserved on the reverse, with fewer traces remaining on the front and sides. While such a decorative scheme has not, to our knowledge, been similarly identified elsewhere, evidence of red pigment used in Roman architectural construction and to decorate sculptural plinths has been attested<sup>28</sup>, being either painted red or mottled in colours such as red and with traces of blue and browns<sup>29</sup>. This decorative approach suggests an aesthetic function, likely an attempt to imitate a luxurious stone such as *rosso antico*, a red marble with inclusions, or porphyry, a dark red/purple igneous rock that contains large crystal inclusions resembling spots. The use of such lavish materials were common at the Villa dei Papiri<sup>30</sup> as well as elsewhere in the region, where there is also ample evidence of faux decorative techniques preserved in wall paintings<sup>31</sup>. One motivation for the plinth's unique, illusionistic decoration appears to



12 DStretch enhancement of the spiral pattern painted on the pilaster of the peplophoros as well as the hems of her garments and the top of her integral plinth

have been to visually integrate the sculpture with the coloured stone cladding that covers the base on which it stood and the walls of this grand and luxurious room, described above and virtually reconstructed here (Fig. 13).

<sup>26</sup> The literature on ancient marbles is vast: see, e. g., Gnoli 1971; Lazzarini 1990; Lazzarini 2004; Lazzarini 2007.

<sup>27</sup> E. g., Plin. nat. 9, 39, 13; 96–97, 33, 145–146; see also Meiggs 1982 and Lapatin 2015, 180 f. with additional references.

<sup>28</sup> E. g., Blume 2015, 147; pls. 49, 68, 77; Augustus from Via Labianca: Museo Nazionale Romano 56230. See also Tucci 2011.

<sup>29</sup> Skovmøller 2020, 57. The marble plinth of a sculpture of Fundilius preserves traces of colour: brown, red, black and Egyptian blue. The reason for this colour scheme, however, is not addressed.

<sup>30</sup> Lazzarini 1990, 238; V. Papaccio, in: Lapatin 2019.

<sup>31</sup> Moormann 2010, 72; D. Esposito, in: Lapatin 2019. See also note 24 above.



13 a) Digital reconstruction of polychrome peplophoros and of the statue in its architectural setting



13 b) Digital reconstruction of polychrome peplophoros and of the statue in its architectural setting

## Virtual Reconstruction

Based on both published and unpublished photographs of the Infratecna excavations of 1997 and those of the former Soprintendenza Speciale per i Beni Archeologici di Pompei, Ercolano, e Stabia in 2007–2008, as well as verbal descriptions and measurements provided by the excavators, the authors, together with M. Roth and T. Swanson of Getty Digital, have produced a 3D virtual reconstruction, of which Figures 13a and b are two dimensional excerpts. A full reconstruction of the peplophoros with her polychromatic decoration and added gold earrings modelled on a pair found at Herculaneum was placed on a polygonal base faced with marble veneers modelled on the better-preserved base on the opposite side of the wide doorway, on which a ghostly ver-

sion of an Amazon has been placed as only the head of that statue survives. The room's opus sectile floor, which consists of *giallo antico* squares and lozenges with *rosso antico* listels and black stripes, has been reconstructed on the basis of the surviving stone veneers in situ, as have the more colourful veneers on the lower sections of the walls and the white marble mouldings (compare Figures 7, 8, 9, and 13). The plaster upper walls with rectangular panels outlined in red were modelled on surviving fragments, while the eight-leaved wooden folding door was reconstructed on the basis of cuttings in the surviving threshold blocks as well as finds from nearby sites, especially Oplontis. Fragments of wooden shutters for the windows also survive.

## Conclusions

The opportunity to examine the peplophoros using a combination of investigative techniques has provided a deeper understanding of ancient Roman polychromy. This technical study suggests that select white marble surfaces were painted to imitate luxurious stones in an effort to create a more sophisticated rendering of the sculpture and to match its surroundings in the larger context of the architectural environment. Although the colour palette employed for the drapery using red and yellow earth pigments and Egyptian blue is characteristic of Roman polychromy, the excellent preservation of the paint on this artefact has enabled a visual map to be created, showing how colour was used to decorate the marble surface and revealing the artist's intention to produce a visually evocative display. Different methods of using earth pigments for

the trim on the peplos, the himation, hair, eyes, the upper layer of the plinth, and the pilaster were utilized to achieve striking visual effects. Egyptian blue, which is confirmed as a layer of trim on the peplos and himation as well as the soles of the sandals and isolated spots on top of the red painted plinth, was added as a distinct detail. The lack of identifiable colour on the flesh, along with the difference in surface finishing treatment, may have also been intentional to emphasize decorative contrasts on the marble and to further support the artist's manipulation and use of texture. The subtle colour palette further highlights the extremely skillful carving of the peplophoros, which was displayed to brilliant effect in a sumptuous seaside pavilion with floor and walls adorned with a variety of imported coloured stone slabs.

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## Methodologies

The peplophoros was examined using the following non-invasive methods:

- Broadband spectral images were captured using a Canon 80D 24.2 megapixel modified camera with the UV-IR blocking filter removed, hence providing UV-VIS-IR functionality. The camera was outfitted with a Zeiss Milvus 50 mm macro lens. For visible images a CCI filter was used. As control targets a Labsphere Spectralon 99% reflectance target and Passport Colour Checker were included in all images.
- Ultraviolet-induced visible fluorescence and reflected UV (UVF, UVR) images were captured in the darkened gallery space with two Wildfire Long throw series (365 nm peak) UV radiation sources. UVF filters used were X-nite CC1 and Peca 916 filters and the X-nite 330C for UVR.
- Reflected infrared (IR) images were captured using an X-nite 830 filter with halogen light sources.
- Visible-induced infrared luminescence (VIL) images were taken with two Flashpoint Zoom Li-on XR2 TTL On-Camera Round Flash Speedlight for Canon with X-nite CCI filters on each, and a X-nite 830 filter on the camera lens.
- In situ digital microscopy was performed using a Keyence VHX-6000 Series microscope with a VH-Z20R zoom lens (20–200×). Images are photo documented.
- X-ray fluorescence (XRF) spectroscopy was performed using a Bruker Tracer 5i X-ray fluorescence spectrometer, outfitted with a rhodium tube operated at 40 kV and 10 mA. The experiments were conducted with a 3 mm collimator, and with 30–45 seconds accumulation.
- Fiber optics reflectance spectroscopy (FORS) measurements were collected using an ASD FieldSpec 4 Hi-Res spectrophotometer with a standoff distance of approximately 1 cm, producing a measurement spot about 5 mm in diameter on the surface of the object. The raw data were splice-corrected using the ASD ViewSpec software.
- Minimally invasive techniques performed were Peptide Mass Fingerprint (PMF) analysis and Liquid Chromatography Mass Spectrometry (LC-MS-MS). Pigments samples were collected by conservators at Herculaneum.
- PMF analysis involves the enzymatic digestion of proteins followed by Matrix Assisted Laser Desorption-Ionization Time of Flight mass spectrometric (MALDI) analysis of the resultant peptide mixture to compare the spectra of unknown samples with known reference materials.
- Liquid Chromatography Mass Spectrometry LC-MS-MS is a highly sensitive analytical technique for identifying organic materials using high performance liquid chromatography, followed by tandem mass spectrometry to detect and identify analytes.

## Bibliography

- Adamo Muscettola 2000** S. Adamo Muscettola, *La Villa dei Papiri a Ercolano*. Guida Breve (Naples 2000)
- Aggelakopoulou – Bakolas 2022** E. Aggelakopoulou – A. Bakolas, What Were the Colors of the Parthenon? Investigation of the Entablature's Cornice Blocks, *JASc* 140, 2022, 105553; <https://doi.org/10.1016/j.jas.2022.105553>
- d'Ambrosio et al. 2003** A. d'Ambrosio – P. G. Guzzo – M. Mastroroberto, *Storie da un'eruzione. Pompei, Ercolano, Oplontis*, Exhibition catalogue Naples (Milan 2003)
- Amelung 1922** W. Amelung, Kolossalstatue einer Göttin aus Ariccia, *JdI* 37, 1922, 112–137
- Anguissola 2018** A. Anguissola, Supports in Roman Marble Sculpture. Workshop Practice and Modes of Viewing (Cambridge 2018)
- Barker – Taelman 2021** S. J. Barker – D. Taelman, Painted Imitation Marble and the Marble Economy in the Roman Period. Examples from Pompeii, in: M. Cisneros (ed.), *Imitaciones de piedras preciosas y ornamentales en época Roman: color, simbolismo y lujo*, *Anejos de Archivo Español de Arqueología* 93 (Madrid 2021) 233–269
- Blume 2015** C. Blume, Polychromie hellenistischer Skulptur. Ausführung, Instandhaltung und Botschaften, *Studien zur internationalen*

- Architektur- und Kunstgeschichte 127 = Studien zur antiken Malerei und Farbgebung 9 (Petersberg 2015)
- Camardo 2019** D. Camardo, Recent Excavations in the Villa dei Papiri: 1990s–2008, in: K. Lapatin (ed.), *Buried by Vesuvius: the Villa dei Papiri at Herculaneum* (Los Angeles 2019) 105–113
- Ciardello 2001** R. Ciardello, *Archeologia ercolanese*, *CronErcol* 21, 2001, 139–141
- Claridge 2021** A. Claridge, Some Observations on Colour and Imitation in Roman Material Culture, in: M. Cisneros (ed.), *Imitaciones de piedras preciosas y ornamentales en época Roman: color, simbolismo y lujo*, *Anejos de Archivo Español de Arqueología* 93 (Madrid 2021) 19–25
- Delivorrias 1993** A. Delivorrias, Der statuarische Typus der sogenannten Hera Borghese, in: E. Berger – H. Beck – P. C. Bol (eds.), *Polykletforschungen, Schriften des Liebieghauses* (Berlin 1993) 221–252
- Gasparri 2005** C. Gasparri, Due nuove sculture da Ercolano, in: P. G. Guzzo (ed.), *Storie da un'eruzione. In margine alla mostra. Atti della Tavola Rotonda Napoli, 12 giugno 2003* (Pompeii 2005) 51–74
- Gnoli 1971** R. Gnoli, *Marmora Romana* (Rome 1971)
- Guidobaldi 2006a** M. P. Guidobaldi, La Villa dei Papiri, in: F. Pesando – M. P. Guidobaldi, *Gli «Ozi» di Ercole. Residenze di lusso a Pompei ed Ercolano*, *StA* 143 (Rome 2006) 257–270
- Guidobaldi 2006b** M. P. Guidobaldi, La Villa dei Papiri, in: F. Pesando – M. P. Guidobaldi, *Pompei, Oplontis, Ercolano, Stabiae, Guide archeologiche Laterza* 14 (Rome 2006) 392–399
- Guidobaldi 2008** M. P. Guidobaldi (ed.), *Ercolano: tre secoli di scoperte* (Milan 2008)
- Guidobaldi – Esposito 2009** M. P. Guidobaldi – D. Esposito, Le nuove ricerche archeologiche nella Villa dei Papiri di Ercolano, *CronErcol* 39, 2009, 331–370
- Guidobaldi – Esposito 2010** M. P. Guidobaldi – D. Esposito, New Archaeological Research at the Villa of the Papyri in Herculaneum, in: M. Zarmakoupi (ed.), *The Villa of the Papyri at Herculaneum. Archaeology, Reception, and Digital Reconstruction*, *Sozomena. Studies in the Recovery of Ancient Texts* 1 (Berlin 2010) 21–62
- Guidobaldi – Esposito 2013** M. P. Guidobaldi – D. Esposito, *Herculaneum: Art of a Buried City* (New York 2012)
- Guidobaldi et al. 2009** M. P. Guidobaldi – D. Esposito – E. Formisano, L'Insula I. L'insula nord-occidentale della Villa dei Papiri di Ercolano. Una sintesi delle conoscenze alla luce delle recenti indagini archeologiche, *Vesuviana* 1, 2009, 43–180
- Guidobaldi et al. 2014** F. Guidobaldi – M. Grandi – M. S. Pisapia – R. Balzanetti – A. Bigliati, *Mosaici antichi in Italia. Regione prima. Ercolano* (Pisa 2014)
- Guzzo 1999** P. G. Guzzo, Attività della Soprintendenza Archeologica di Pompei nel 1997, in: *Confini e frontiera nella Grecità d'Occidente. Atti del Trentasettesimo Convegno di Studi sulla Magna Grecia*, Taranto, 3–6 ottobre 1997, *Convegno di Studi sulla Magna Grecia* 37 (Taranto 1999) 845–857
- Guzzo 2003** P. G. Guzzo, *Pompei Ercolano Stabiae Oplontis. Le città sepolte dal Vesuvio* (Naples 2003)
- Guzzo et al. 2018** P. G. Guzzo – M. R. Esposito – N. Ossanna Cavadini (eds.), *Ercolano e Pompei: visioni di una scoperta* (Lucerne 2018)
- Kirby et al. 2011** D. P. Kirby – N. Khandekar – J. Arslanoğlu – K. Sutherland, Protein Identification in Artworks by Peptide Mass Fingerprinting, *Preprints, ICOM-CC 16<sup>th</sup> Triennial Conference, Lisbon, Portugal, September 2011* (Lisbon 2011) <<https://www.icom-cc-publications-online.org/1283/Protein-identification-in-artworks-by-peptide-mass-fingerprinting>> (04.08.2024)
- Lapatin 2015** K. Lapatin, *Luxus: The Sumptuous Arts of Greece and Rome* (Los Angeles 2015)
- Lapatin 2019** K. Lapatin (ed.), *Buried by Vesuvius: the Villa dei Papiri at Herculaneum* (Los Angeles 2019)
- Lazzarini 1990** L. Lazzarini, Rosso Antico and Other Red Marbles Used in Antiquities: A Characterization Study, in: *Marble. Art Historical and Scientific Perspectives on Ancient Sculpture. Papers Delivered at a Symposium Organized by the Departments of Antiquities and Antiquities Conservation and Held at the J. Paul Getty Museum, April 28–30, 1988* (Malibu 1990) 237–251
- Lazzarini 2004** L. Lazzarini, *Pietre e marmi antichi: natura, caratterizzazione, origine, storia d'uso, diffusione, collezionismo* (Padua 2004)
- Lazzarini 2007** L. Lazzarini, *Poikiloi lithoi, versicolores maculae: i marmi colorati della Grecia antica: storia, uso, diffusione, cave, geologia, caratterizzazione scientifica, archeometria, deterioramento* (Pisa 2007)
- Lazzarini 2019** L. Lazzarini, Ancient Mediterranean Polychrome Stones, *EMU Notes in Mineralogy* 20, 10, 2019, 367–392

- Mazurek 2020** J. Mazurek, Characterization of Binding Media on Romano-Egyptian Mummy Portraits, in: M. Svoboda – C. Cartwright (eds.), *Mummy Portraits of Roman Egypt. Emerging Research from the APPEAR Project* (Los Angeles 2020) 142–147
- Mazurek et al. 2019** J. Mazurek – M. Svoboda – M. Schilling, GC/MS Binding Media Survey: Beeswax, Oil, Protein, Plant Gum and Resin in Romano-Egyptian Mummy Portraits and Panel Paintings, *Advances of Analytical Chemistry in Cultural Heritage* 2, 3, 2019, 1960–1985
- Mattusch 2005** C. C. Mattusch, *The Villa dei Papiri at Herculaneum. Life and Afterlife of a Sculpture Collection* (Los Angeles 2005)
- Meiggs 1982** R. Meiggs, *Trees and Timber in the Ancient Mediterranean World* (Oxford 1982)
- Moltesen 2002** M. Moltesen, *Imperial Rome. Catalogue Ny Carlsberg Glyptotek 2. Statues* (Copenhagen 2002)
- Moormann 2010** E. M. Moormann, Wall Paintings in the Villa of the Papiri, in: M. Zarmakoupi (ed.), *The Villa of the Papyri at Herculaneum. Archaeology, Reception, and Digital Reconstruction*, *Sozomena. Studies in the Recovery of Ancient Texts* 1 (Berlin 2010) 63–78
- Neudecker 1988** R. Neudecker, *Die Skulpturenausstattung römischer Villen in Italien*, *BeitrESkAr* 9 (Mainz 1988)
- Pagano 1997** M. Pagano, *Ercolano. Itinerario archeologico ragionato* (Torre del Greco 1997)
- Pagano 2003** M. Pagano, *Gli scavi di Ercolano, Archeologia vesuviana* (Pompeii 2003)
- Parslow 1995** Ch. Parslow, *Rediscovering Antiquity: Karl Weber and the Excavation of Herculaneum, Pompeii, and Stabiae* (Cambridge 1995)
- Ridgway 1974** B. S. Ridgway, A Story of Five Amazons, *AJA* 78, 1974, 1–17
- de Simone 2010** A. de Simone, Rediscovering the Villa of the Papyri, in: M. Zarmakoupi (ed.), *The Villa of the Papyri at Herculaneum. Archaeology, Reception, and Digital Reconstruction*, *Sozomena. Studies in the Recovery of Ancient Texts* 1 (Berlin 2010) 1–20
- de Simone – Ruffo 2002** A. de Simone – F. Ruffo, Ercolano 1996–1998. Lo scavo della Villa dei Papiri, *CronErcol* 32, 2002, 325–344
- de Simone – Ruffo 2003** A. de Simone – F. Ruffo, Ercolano e la Villa dei Papiri alla luce dei nuovi scavi, *CronErcol* 33, 2003, 279–311
- Sirano 2017a** F. Sirano, Copiare il Greco. La scultura come sistema di ri-creazione/Produzione dell'immaginario nell'area del Golfo di Napoli nel I secolo d.C., in: M. Osanna – C. Rescigno (eds.), *Pompei e i Greci* (Milan 2017) 253–258
- Sirano 2017b** F. Sirano, Complessi monumentali e arredi scultorei a Capua in età imperiale, in: C. Capaldi – C. Gasparri (eds.), *Complessi monumentali e arredo scultoreo nella Regio I Latium et Campania. Nuove scoperte e proposte di lettura in contesto. Atti del convegno internazionale, Napoli 5 e 6 Dicembre 2013* (Naples 2017) 87–102
- Sirano 2019** F. Sirano, *Peplophoros (Woman Wearing a peplos; «Hera» or «Demeter»)*, in: K. Lapatin (ed.), *Buried by Vesuvius: The Villa dei Papiri at Herculaneum* (Los Angeles 2019) 212 f. no 42
- Sirano 2020** F. Sirano, Die Gleichzeitigkeit des Ungleichzeitigen. Gli scavi borbonici del 1700 come stratigrafia del Parco Archeologico di Ercolano, in: C. Capaldi – M. Osanna (eds.), *La cultura dell'antico a Napoli nel secolo dei lumi. Omaggio a Fausto Zevi nel dì genetliaco. Atti del Convegno Internazionale, Napoli-Ercolano 14–16 novembre 2018, Studi e ricerche del Parco archeologico di Pompei* 43 (Rome 2020) 419–433
- Skovmøller 2014** A. Skovmøller, Where Marble Meets Colour. Surface Texturing of Hair, Skin and Dress on Roman Marble Portraits as Support for Painted Polychromy, in: M.-L. Nosch – M. Harlow (eds.), *Greek and Roman Textiles and Dress. An Interdisciplinary Anthology, Ancient Textiles Series* 19 (Oxford 2014) 279–297
- Skovmøller 2020** A. Skovmøller, Facing the Colours of Roman Portraiture. Exploring the Materiality of Ancient Polychrome Forms, *Image & Context* 19 (Berlin 2020)
- Skovmøller et al. 2016** A. Skovmøller – C. Brøns – M. L. Sargent, Egyptian Blue. Modern Myths, Ancient Realities, *JRA* 29, 2016, 371–387
- Stewart 1990** A. Stewart, *Greek Sculpture. An Exploration* (New Haven 1990)
- Tucci 2011** P. L. Tucci, Red-painted Stones in Roman Architecture, *AJA* 115, 2011, 589–610
- Valeri 2005** C. Valeri, *Marmora Phlegraea. Sculture del Rione Terra di Pozzuoli, Monografie della rivista Archeologia classica* 2 (Rome 2005)
- Zarmakoupi 2010** M. Zarmakoupi (ed.), *The Villa of the Papyri at Herculaneum. Archaeology, Reception, and Digital Reconstruction*, *Sozomena. Studies in the Recovery of Ancient Texts* 1 (Berlin 2010)

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