NY CARLSBERG GLYPTOTEK — THE COPENHAGEN POLYCHROMY NETWORK

Tracking Colour

The polychromy of Greek and Roman sculpture in the Ny Carlsberg Glyptotek

Preliminary Report 3, 2011

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The Copenhagen Polychromy Network is an interdisciplinary body formed in 2004 on the initiative of the Ny Carlsberg Glyptotek to conduct research on ancient sculptural polychromy, primarily but not only, in the collections of the Glyptotek.

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- The School of Conservation of The Royal Academy of Fine Arts, Copenhagen
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- The Nordic Center for Earth Evolution, Natural History Museum of Denmark
  Professor, Dr. Minik T. Rosing
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The members of the panel are in no way responsible for the content of the present Report.

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Preface

From June 1st, 2011, the NCG/CPN 'Tracking Colour' project has very largely been funded by the Carlsberg Foundation. This financial support will continue until May 31st, 2013. Over that period, the project will also benefit strongly from the non-financial aspect of the Foundation's grant, namely the recognition and encouragement of our work which it signals. We take this opportunity of expressing our gratitude and appreciation to the Carlsberg Foundation.

Our thanks also go to the invaluable contribution made in 2011 by our partners in the Copenhagen Polychromy Network. Mikkel Scharff, M.Sc. and Head of Department at the School of Conservation in Copenhagen, has played a particularly important role in supervising, supporting and encouraging the students from the School active in our project. He has also functioned as a highly constructive sparring partner on numerous occasions. Similar highly qualified assistance has been offered by Jørn Bredal-Jørgensen, lecturer at the School, by professor Minik Rosing of the Museum of Geology/the Natural History Museum of Denmark.

As project director, I must also, and with pleasure, extend my thanks to the team and the interns for the fine contribution they have made – and to everybody at the Glyptotek for their support.

The 2011 annual report follows the pattern of our two earlier ones. It offers an overview of salient aspects of developments in 2011 and three articles focusing on particularly interesting activities. One reports on a late Roman sarcophagus, another on a 3rd century CE Roman imperial portrait, both from Rome itself. A third updates the reader on our project database cum website – just as it is about to go online. With a back-end accessible to researchers and a front-end website interface with a wider public, a prerequisite for future electronic publication of the project results will have been secured.

Preparing the way for such a publication is one of several objectives of our work in 2012. Hopefully, the clear and concise design created by Jakob Helmer MAA will remain a graphic hallmark of our project.

It goes without saying that any critical comments on this Report and suggestions for improvement will be much appreciated.

Jan Stubbe Østergaard
Editor

On behalf of the Ny Carlsberg Glyptotek and the Copenhagen Polychromy Network

‘Tracking Colour’ in 2011

Jan Stubbe Østergaard

PROJECT FINANCING

Until May 31st, 2011, the Ny Carlsberg Glyptotek provided funding for core staff of one full-time classical archaeologist and two half-time project conservators. A full time position for a classical archaeologist as research assistant was funded jointly by the museum and public employment programmes.

Funds have also been made available by the museum for minor ad hoc acquisitions of equipment, and for travel abroad. From June 1st and for two years, the Carlsberg Foundation is funding the project core staff; it has also funded the construction of the project’s database and website.

THE NCG TEAM

The writer of these lines has served as project director throughout 2011. Maria Louise Sargent continued in her half-time position as project conservator. She took 3 months leave to complete her Master’s thesis at the School of Conservation, on “Documentation and investigation of ancient sculptural polychromy – focusing on a Roman marble Amazon”. She became M.Sc. in September.

Project conservator Rikke H. Therkildsen, B.Sc., went on leave for 3 months in the spring, to do thesis work. She will complete her Master’s in 2012, with a thesis on the phenomenon of highly polished surfaces in Roman portrait sculpture, studied as supports for polychromy.

The project has profited from having Charlotte Eschen, B.Sc. from the School of Conservation, on a 4-month internship connected with her MA thesis on wax in ancient painting. Similarly, two BA students from the School – Ida Lipka Flensborg and Mette Aagaard Rønde – joined us for 3 weeks and produced a very useful study of a group of Roman portraits.

Amalie Skovmøller, classical archaeologist with a degree equivalent to a MA, stayed with the project in 2011, as research assistant.

THE CPN PARTNERS

The Copenhagen Polychromy Network partner institutions and their representatives remain the same as in hitherto. They have assisted the project with advice, access to instruments and analytical studies of pigment samples. The contribution made by the partners will be described in more detail elsewhere in this Report.

Steps were taken in 2011 to establish collaboration on binding media analysis with the Department of Conservation at the National Museum of Denmark. We expect to start in the spring of 2012.

THE INTERNATIONAL NETWORK

Relations with colleagues abroad have been strengthened and expanded in 2011. The project has participated actively in a number of meetings – not least the Round Table so successfully held in September, in the British Museum – and lectures have been given at a

number of universities. For the first time, a very promising contact has been established with several Spanish scholars, at Barcelona and Mérida especially.

In January, our German colleagues Ulrike Koch-Brinkmann and Heinrich Piening visited us to take a number of UV-VIS measurements in the collection.[1] The data will be entered into the comparanda library of Heinrich Piening and eventually into our project data base.

After a number of informal discussions, a meeting was held in Berlin, in mid-December, with colleagues at the Antikensammlung. The aim was to discuss the possibility of future research collaboration in the investigation of the polychromy of sculptures in the Berlin collections. The outlook was agreed to be good, as areas of common interest were easily identified. Hopefully, joint activities can begin in 2012.

Details of the project's activities abroad may be found at the end of this report.

THE VISUAL EXAMINATION WORK SPACE AND INSTRUMENTATION

By June 2010, the work space was finally fully equipped to carry out the protocol established for the project's visual examinations. Since then, there have been no significant additions to the space's 'tool box'. The Leica digital video microscope has performed particularly well and has become a real mainstay of project microscopy.

'TRACKING COLOUR' ONLINE

The Carlsberg Foundation's grant has allowed the construction of a database solution for management and communication of our digital data assets.

As research assistant, classical archaeologist Amalie Skovmøller has from the outset been in charge of the project designed to bring 'Tracking Colour' online; since the spring of 2011, she has headed the implementation of our ideas, in collaboration with the firm Oncotype. The combined project database and website is now just about ready to go online. This is the subject of an article by her elsewhere in this Report.

In brief, the site contains a back-end reserved area for storing and accessing the digital data assets of the NCG/CPN project, and also open for data from others working in the field, together with a front-end website for the use of the general public. The front-end offers a bibliographic database of ancient sculptural (and architectural) polychromy and an objects database of Greek and Roman sculptures investigated by the 'Tracking Colour' project – and, hopefully, of sculptures examined by others, elsewhere.

INVESTIGATIONS IN 2011

The renewed in-depth examination of the Glyptotek's portrait of Caligula (IN 2687) and the Palmyrene funerary portrait known as 'The Beauty of Palmyra' (IN 2795) was completed and we then turned to two important Roman sarcophagi: the late-2nd century CE Dionysiac, so-called 'Casali Sarcophagus' (IN 843) and a Late Roman garland sarcophagus (IN 2468). The latter is particularly rich in remains of the original polychromy and is the subject of an arti-

1 Kouros head Rayet IN 418; Kybele IN 480; Artemis and Iphigenia IN 481-82 ; Lion IN 1296; Lion IN 1297; Warrior IN 1508; Sciarra Amazon IN 1568; Dionysiac sarcophagus IN 843; Garland sarcophagus IN 2468; Hellenistic ruler IN 1583; Tiberius IN 1750; Caligula IN 2687; Palmyrene portrait IN 2795.

cle in this report, by Maria Louise Sargent. As part of the sarcophagus element of the project, further investigation was made of Shipping Sarcophagus IN 1299, and an extensive night time VIL-survey was carried out, comprising the majority of the pieces held by the museum. The results are not described in this report but will be made accessible on the project website in the coming months.

The investigation of the Casali Sarcophagus documented that the figurative elements were fully polychrome, whereas traces of colour have not been found on the relief ground (fig. 1–2). The application of colour to the finely smoothened skin surfaces of the figures (fig. 3) made us decide on a deviation from the planned sequence of investigation, according to which portraits were to come into focus at the beginning of 2012.

To answer the question of whether the collection also offered examples of polychromy on highly polished skin surfaces, our two interns from the School of Conservation were asked to do in situ macroscopy, microscopy and photography of a group of high grade Late Severan portrait heads from Rome, including the emperor Maximinus Thrax (IN 818), three portraits of his son, Maximus (IN 819, 823 and 826) and two replicas of a portrait type depicting an unknown youth (IN 821 and 822; fig. 4–6).

Achieved over a two weeks period, their results combined to suggest that these portraits were fully polychrome. This was subsequently confirmed through in-depth investigation, especially of one of the portraits of the crown prince Maximus (IN 826). An article in this report, by Amalie Skovmøller and Rikke Therkildsen, gives a preliminary account of the results.

One result was the discovery of the use of Egyptian blue as a component of the skin colour, especially visible in VIL-imaging of IN 826. We were fortunate to have B.Sc. Charlotte Eschen as an intern: her interest in the use of wax in ancient painting pointed her towards the Glyptotek' small holding of Roman mummy portraits from the Fayum – and VIL-imaging was now added to her methodology in order to explore the use of Egyptian blue in the depiction of skin areas (fig. 7–8). The need to explore potential technical (and aesthetical) analogies between the mummy portrait paintings and contemporary polychromy on marble sculpture has already been recognized by others; in the 2012 report, Charlotte Eschen will be able to offer further valuable documentation.

While Rikke Therkildsen was doing portraits, Maria Louise Sargent completed the major task of investigating the garland sarcophagus and then turned to a related, but much earlier object: an Etruscan alabaster cinerary urn of the mid-2nd century BCE (HIN 60), from a chamber tomb in the environs of Chiusi (fig. 9–10). Study of at least one piece from the large Etruscan collection in the Glyptotek was included in the programme which the Carlsberg Foundation is financing. There are three objectives: to establish a core of comparative data within the very large group of similar Etruscan urns; to provide data which may be compared with findings made on Greek sculpture of the same, Late Hellenistic, date; and, finally, to exemplify the considerable potential which the Glyptotek's collection has for research on Etruscan sculptural polychromy.

LOOKING FORWARD: 2012 – AND ONWARDS

At this point, last year, just as the 2010 Report was on the point of completion, we received the really momentous news that an application to the Carlsberg Foundation for a two-year prolongation of the project, from June 1st, 2011, had met with success.

Now, it's a repeat performance, but this time round, it is of a different order. It is the Ny Carlsberg Foundation which has chosen to meet our application for a three-year Ph.D. studentship. Attached to the 'Tracking Colour' project and in collaboration with the Uni-

versity of Copenhagen, the studentship has been awarded, as of April 1st, 2012, to Amalie Skovmøller, active in the project since mid-2010. Her research will be coordinated with that of our project and will focus on the polychromy of Metropolitan Roman portraits.

And, indeed, the collection of Greek and Roman portraits – the latter especially – will be at the centre of our investigations until this phase of our project ends, in June 2013. In a special section, from January to March, Rikke Therkildsen and Amalie Skovmøller will examine four selected portraits with highly polished skin surfaces, of the 2nd and 3rd centuries, for traces of their polychromy. From mid-March on, the portrait programme proper will begin, mainly in chronological order.

Besides Roman portraits, at least one more Etruscan sculpture will be examined, a terracotta satyr antefix of the mid-5th century BCE (HIN 55); and, as specified in the Carlsberg Foundation programme, we will also be looking at a sculpture from the Egyptian collection, an early 6th century BCE relief fragment from the palace of Apries at Memphis (ÆIN 1048). The objectives set for this foray to the banks of the Nile are – mutatis mutandis – the same as those mentioned above in connection with the Etruscan objects.

The preparations for the 2014-exhibition on ancient sculptural polychromy will pick up speed, and our plans for an international symposium in connection with the opening of the exhibition, in early May, will take firmer shape.

Finally, and hopefully, the project data base and website will become an active asset to us and others, scholars and laymen alike.

Happily, there is much to look forward too – including the unforeseeable, an element inherent to research on ancient sculptural polychromy.

Fig. 1: The Dionysiac ('Casali') sarcophagus IN 843. The wedding of Dionysos and Ariadne. H. 99 cm., l. 222 cm. C. 190 CE. Mapping of pigment remains on the front.

Fig. 2: As fig. 1. Detail of the maenad on the viewer's left: Egyptian blue in the berries of her ivy wreath.

Fig. 3: As fig. 1. Micrograph of the left hand of Ariadne, with remains of the skin colour.

Fig. 4: Portrait of an unidentified Roman youth, IN 822. H. 24 cm. C. 225 CE.

Fig. 5:
As fig. 4.
Detail of the left eye.

Fig. 6.:
As fig. 4.
UV image of the left eye showing the orange red fluorescence of an organic pigment (madder lake?).

Fig. 7: Mummy portrait ÆIN 682. From er-Rubayat in Fayum. Encaustic on wood. H. 25 cm. C. 140–160 CE.

Fig. 8: As fig. 7. Visible-induced luminescence (VIL) image showing the spatial distribution of Egyptian blue, appearing bright white.

Fig. 9:
Etruscan cinerary urn, HIN 60. Eteokles and Polyneikes. Alabaster. From the Purni family tomb, Città del Pieve. H. 116 cm, l. 89 cm. C. 150 BCE.

Fig. 10:
As fig. 9. Visible-induced luminescence (VIL) image showing the spatial distribution of Egyptian blue, appearing bright white.

Recent Investigation of the Polychromy of a Metropolitan Roman Garland Sarcophagus

Maria Louise Sargent

ABSTRACT

The extensive remains of painting and gilding on the chest and lid panel reliefs were visually examined and documented in the course of 2011, according to the methodology and protocol developed by the Tracking Colour project. On the lid panel, the a bozzo portrait head of the deceased carried remains of painting and a bucolic scene was revealed by VIL to include elements shown only in painting. VIL also showed Egyptian blue used profusely on the chest relief, but not visible to the naked eye. As a whole, the investigation documents the wide palette employed by the sculpture painter.

KEYWORDS

Late Roman reliefs, Roman sculptural polychromy, visible-induced luminescence imaging (VIL), a bozzo portrait head, gilding, bucolic scenery

INTRODUCTION

This contribution presents the recent work on a Roman marble sarcophagus dated to 300 CE from the collection of the Ny Carlsberg Glyptotek (fig. 1).[1]

The sarcophagus was brightly coloured and up to this day has preserved extensive traces of original polychromy. The vivid use of gilding on the hair of the figures and on the animals is for the most part considered to be later additions. The secondary gilt was added on top of the original layer in the late 19th century.

The sarcophagi are very interesting in a polychrome context and occupy a unique position in terms of its preservation. Unlike architectural decoration and outdoor sculptures a great many of the sarcophagi have had optimal conservation conditions in tomb buildings well protected from weathering.

The sculptural work on the Roman sarcophagi has been systematically described and documented in detail by archaeologists but often leaving out the painted parts.

Although surviving colours are sparse and our present understanding of painting schemes on Roman sarcophagi is limited, it is generally agreed that many Roman sarcophagi were originally painted, either over their entire surface or perhaps more often, in specific areas.[2]

Due to the remarkably good state of preservation the recent investigation carried out on the reliefs of the sarcophagus not only provides first-hand knowledge of the colour scheme and painting techniques of the period but also throws light on a category of monuments whose polychromy remains poorly investigated.

1 IN 2468; Østergaard 1996, 112–115 no. 48 (with earlier bibl.)

2 Liverani 2010, 293

Fig. 1: Garland sarcophagus, Ny Carlsberg Glyptotek IN 2468, 300 CE. Marble. L. 180 cm. Tungsten light photography.

THE GARLAND SARCOPHAGUS

In 1910 the Ny Carlsberg Glyptotek acquired the garland sarcophagus. It was found in Rome in 1884 during the construction of a building on the via Tiburtina, shortly before the Campo Verano cemetery.[3]

The sarcophagus has a relief on both the lid and the chest. The lid relief has been reassembled from several fragments and the lower right corner is restored.

The centre of the lid relief panel is taken up by two cupids holding a framed inscription honouring the deceased Aurelia Kyrilla. To the right of the inscription two cupids hold up the sides of a curtain suspended from a yellow ring painted over the head of a bust of a woman with a scroll in her hand. The face of the woman has been left unfinished (a bozzo) by the sculptor, perhaps to be completed by a painter to create a portrait of the deceased. To the left of the inscription a shepherd tends two sheep and a goat.[4]

The low relief on the chest is well preserved apart from minor damage. The surface is worked with chisel; details such as the eyebrows, the surface of the fruits as well as the hair are incised while the nostrils, the caruncles and pupils of eyes, the corners of the mouth and the chin are heavily drilled. Traces of mortar are observed covering parts of the relief. The mortar is considered to be modern and can be dated from the excavation of the sarcophagus in the 19th century.[5]

The scene on the chest shows three cupids carrying two garlands suspended between them. Fruits and flowers make up the garlands, over each of which two Dionysiac masks

3 NSc 1884, 42–43. 105 (G. Fiorelli).

4 See note 1

5 NSc 1884, 105 (G. Fiorelli).

face one another. Below the garlands bunches of grapes lying on the ground are being eaten by rabbits and birds.[6]

METHODOLOGY

First, a word about the methodology followed in this study – a brief one, as this has already been discussed more extensively in some of our recent publications.[7]

Initially the sarcophagus was closely examined with the naked eye and with the aid of low magnification, followed by microscopic in situ examination conducted by means of a video microscope. The visual examination was continued by way of technical imaging including Ultraviolet Fluorescence (UV-FL) and Visible-Induced Luminescence (VIL). Based on the data from the initial investigation, further analysis, non-invasive and invasive, was integrated to give details on the elemental composition of the pigments. In this case it was done by means of UV-VIS absorption spectrometry and the taking of samples for petrographic analysis and Scanning Electron Microscopy with Energy Dispersive X-ray spectrometry (SEM-EDX). Details of scientific techniques and equipment used in this study are described in the Preliminary Report 2 from 2010.[8]

RESULTS AND DISCUSSION

The results of the investigation undertaken on the surviving polychromy on the sarcophagus are summarized below and more briefly in Table 1.

A fairly wide range of colours was used to achieve different painterly effects. Red-painted outlines are visible to the naked eye along the contours of most of the carved elements of the sarcophagus in order to make the relief stand out more clearly, just as are many details, such as eyebrows and eyelashes. Large parts of the ground were left unpainted, to appear the colour of the marble. A few simple brushstrokes of red and yellow accentuate the essential lines of the relief and define details which the sculptor was unable or disinclined to bring out in any other way, as is the case with the irises of the masks and the hatchings on the fruits to produce shadows. The simplified use of colour is probably due to the fact that the sarcophagi were to be placed in dark tombs.[9]

THE 'PORTRAIT' BUST OF THE DECEASED

To the right on the lid panel the face of the deceased woman is left unfinished, a bozzo, - the surface is crudely carved with a chisel and rather flat. On the remaining figures on the sarcophagus the marble surface was smoothened down with a file and the facial features were carved in the round. However, a relatively compact layer of a red-brownish colour is present especially, on the right side of the face and hair on the portrait (fig. 2). A closer look at this part of the face shows traces of what may be a painted right eye (fig. 3) – vague dark lines could indicate the contour of the eye and also a blank spot possibly indicates the iris. The red-brownish colour has been identified by SEM-analysis and shows a content of iron (Fe)

6 See note 1

7 Sargent and Therkildsen 2010a.

8 The SEM/EDX analyses were carried out by Jørn Bredal Jørgensen, MSc; the UV-VIS spectroscopy was done by conservation scientist Heinrich Piening. For techniques and equipment see Sargent and Therkildsen 2010a, 11–13.

9 Liverani 2010, 296

Fig. 2: Detail photo of the portrait of the deceased. A compact layer of an iron-based pigment mixed with umber is present on the right side of the face and hair.

Fig. 3: Macro-image of the portrait of the deceased showing vague dark lines – perhaps the suggestion of a right eye.

Fig. 4: Detail photo of mask. Red iron oxide and yellow ochre are used for the rendering of eyebrow, eyelashes and iris.

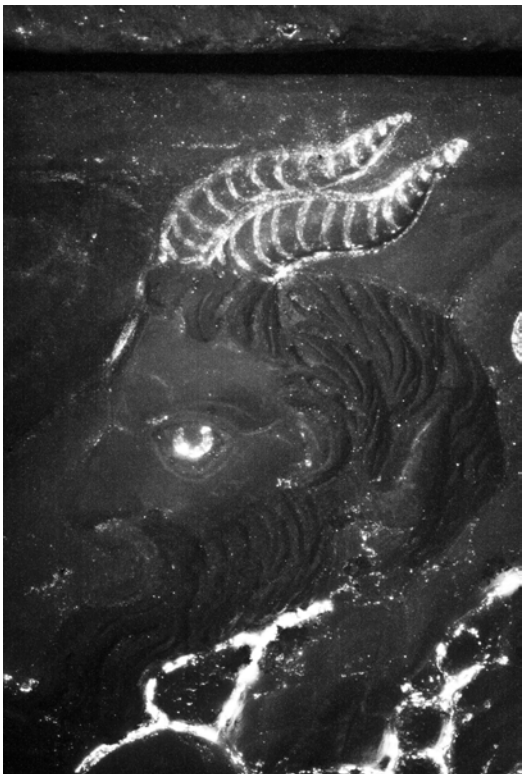

Fig. 5: VIL-image of the mask of Pan. Egyptian blue is seen glowing bright white, in the iris, in the transverse incisions and the contours of the horns.

Fig. 6: UV-FL-image of the head, of one of the cupids on the lid. The pink found in the drill holes of the mouth reveals a pinkish-orange fluorescence under excitation from UV-radiation – presumably indicating the use of an organic colourant.

and manganese (Mn) indicating the use of iron-based red mixed with brown umber due to the manganese content. This suggests that the colour on the portrait may be an intentional skin colour and that consequently the head was not meant to appear in the colour of the marble.

CUPIDS AND MASKS

Turning to the cupids and the masks on the sarcophagus, the colour scheme is different. On the cupids carrying the garlands fine lines of iron oxide red and yellow are used for the rendering of eyebrows, eyelashes and irises (fig. 4).

The masks representing Maenads, Silenus and Pan show the same facial colour scheme as the cupids. This is especially so in the use of Egyptian blue for the irises visible on the right cupid on the chest as well as on the Pan-mask where a large concentration of Egyptian blue is found in the iris and in the transverse divisions and contours of the horns (fig. 5).

Certain recesses and anatomical features, such as the inner part of the mouth, nostrils, ears and drilled holes of the caruncles are coloured using a bright pink pigment which in most cases is seen together with Egyptian blue to obtain the colour of flesh (fig. 6). Under excitation from UV-FL, the areas painted pink show a strong pinkish-orange fluorescence presumably indicating the use of an organic colourant in the form of a lake pigment such as madder lake.

The use of madder lake together with blue colours to accentuate flesh is known from Roman ideal sculptures and portraits in the round. This pattern was reported in the case of a marble portrait of the emperor Caligula from the mid 1st century in the Ny Carlsberg Glyptotek. The UV-FL and VIL-images of the eyes and mouth reveals the same use of madder lake together with Egyptian blue to accentuate the flesh parts along the rim of the eyes and between the lips.[10] Another example is the well-known mid 2nd century 'Sciarra Amazon' also from the collection of the Glyptotek. The Amazon is bleeding from a cut under her arm. On the wound and the carved blood drops traces of madder lake, red iron oxide pigments and Egyptian blue are found.[11]

The colour palette of the cupids appears rich; using different nuances of red and yellow combined with blue and pink but unlike the portrait nothing indicates the use of skin colour. Apart from scattered particles of Egyptian blue and very few grains of red pigments there is no evidence of distinct paint layers on the skin parts of the cupids, the masks and the shepherd. This suggests the skin was left unpainted, only to appear in the colour of the marble.

THE GARMENTS

Microscopic examination of the marble surface compared with samples prepared for cross-section shows that the garments were not completely painted, but it appears that details and decorative bands were applied in a single layer directly onto the marble.

With one exception the cupids follow the same relatively simple scheme: linear paint strokes on the tunics and on the trousers to indicate folds in the fabric or decorative bands. Usually red or yellow is used, sometimes in combination with pink. On a detail photo red and yellow transverse bands appear on the leggings of the shepherd while traces of a pale pink madder lake are observed in the folds on the tunic (fig. 7). The identification of the pink

10 Sargent and Therkildsen 2010a, 20 fig. 10; 21 fig. 11

11 Sargent and Therkildsen 2010b, 34 fig. 5

madder is based mainly upon its distinctive colour and characteristic bright pinkish-orange fluorescence under UV radiation and this is confirmed through UV-VIS (fig. 8).

The portrait bust of the deceased on the lid wears cloak over a tunic decorated with a broad yellow clavus combined with red, sketchy patterns (fig. 9). As for the naked cupids holding the curtain behind the bust, they both have yellow bands with a thin red line on top painted around their arms and ankles to imitate golden bracelets (fig. 10).

In general the wings of all the cupids are painted with yellow and red iron oxide in the incised divisions of the feathers, occasionally together with pink and Egyptian blue (fig. 11).

Concentrating on the centre cupid, two green bands run vertically down its tunic (fig. 12). The VIL-imaging reveals the extensive use of Egyptian blue (fig. 13). A cross-section of a sample taken from the green band shows a single layer. The layer is extremely delicate, almost transparent and shows greenish, blue and one single orange particle (fig. 14). Recent results from the UV-VIS analysis show similarities to the pigment green earth. However, invasive sampling from the same area followed by SEM/EDX points in a somewhat different direction. The result shows a relatively high amount of lead (Pb) together with tin (Tn) and the expected copper (Cu) caused by the Egyptian blue. This could indicate the use of lead white mixed together with Egyptian blue and probably yellow ochre to achieve a green colour. Since the technical and scientific analyses have not been able to provide definitive answers to the question of the manufacture of the green found on the band of the centre cupid, further research should be conducted.

On the right leg of the centre cupid the dark lines appears to be cinnabar, an expensive red pigment which would have appeared as a brilliant red colour. The red colour has meanwhile changed into a dark brown hue. The removal of splashes of 19th century mortar on top of the painted lines reveals the natural mineral's characteristic vivid and beautiful red colour underneath (fig. 15). It was decided not to remove all the mortar in order to leave well preserved pigments for future investigation.

GARLANDS, VEGETATION AND ANIMALS

The animals show the same colour scheme as the cupids and masks. Eyes and eyebrows are accentuated with delicate lines of red and yellow and madder lake is found in the inside of the mouth, nostrils and drilled holes of the eyes (fig. 16). An interesting technical feature is the use of small, sketchy brushstrokes to imitate fur on the rabbit (fig. 17) and on the cock and hen the skin on the legs is executed in red paint.

The garlands made of flowers, grapes, walnuts, pine cones, wine leaves, and pomegranates (and other unidentifiable fruit) are painted in a naturalistic fashion. Shading on the fruit is rendered with fine parallel red and yellow brush strokes (fig. 18) and in a single case in combination with dots of yellow and red (fig. 19).

The VIL-imaging revealed the distribution of relatively large concentrations of Egyptian blue surrounding the fruit and flowers that make up the garlands and also between the grapes being eaten by rabbits and birds, in combination with madder lake (fig. 20).

Not only were the carvings of the sarcophagus richly painted, but the smoothed background of the reliefs also carries traces of the original decoration to create depth and to fill out the empty spaces. On the extreme left side of the lid a tree is painted directly onto the ground. The outlines are executed in Egyptian blue and separate brushstrokes of red and yellow indicate the bark of the tree (fig. 21). The same scheme is observed on the carved trees behind the sheep (fig. 22). In the background between the masks remains of red tendrils grow. The decoration is scarcely visible today but in a b/w glass negative from 1961 it stands out more clearly (fig. 23).

Fig. 7 (left): Detail photo of the shepherd shows the presence of red and yellow transverse bands on the leggings.

Fig. 8 (right): UV-FL-image of the shepherd exhibits a strong pinkish-orange fluorescence in the depth of the folds of the garments.

Fig. 9: Detail photo of the broad yellow clavus on the front of the tunic of the deceased.

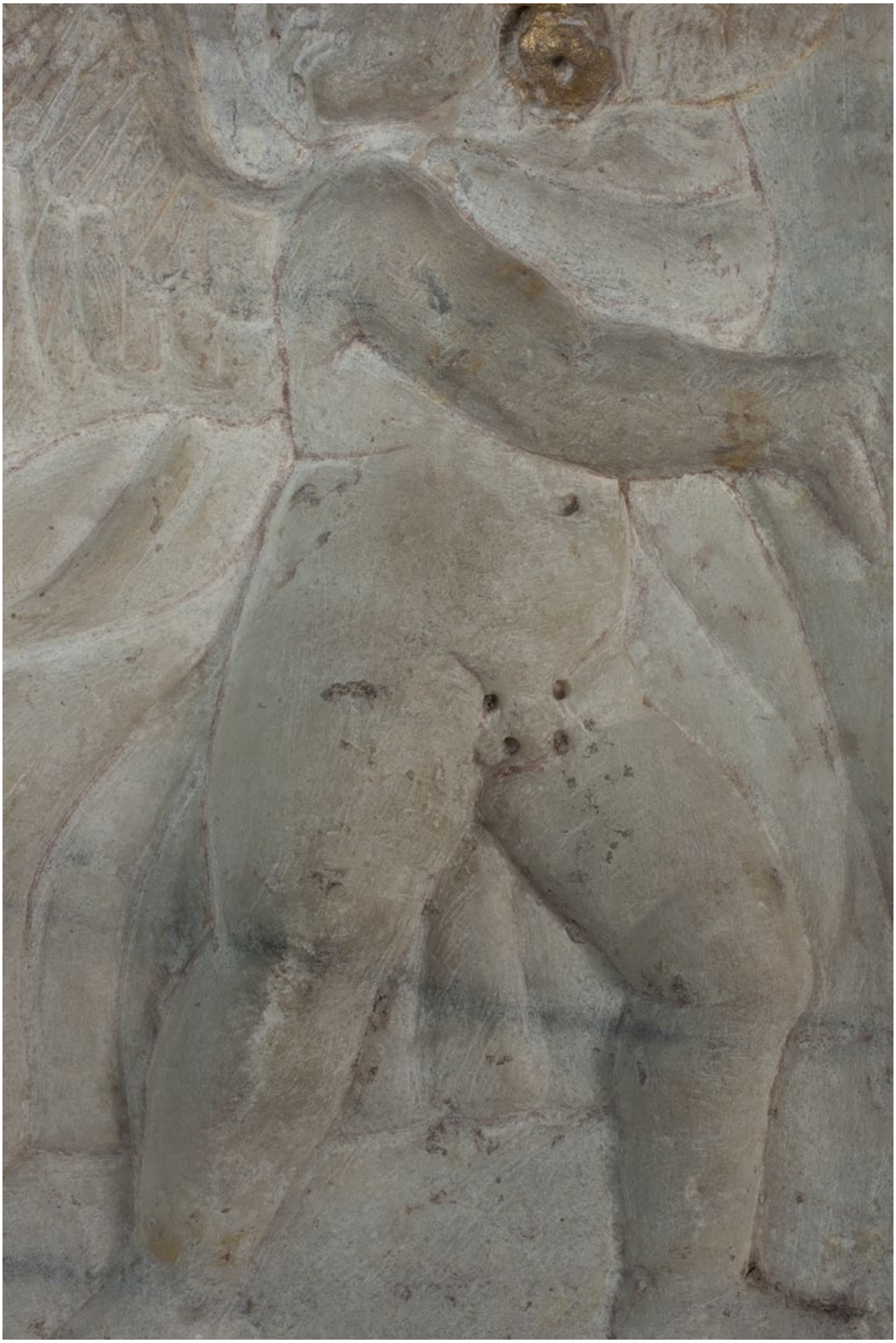

Fig. 10: Detail photo of one of the cupids on the lid with yellow bands around arms and ankles to imitate gold bracelets.

Fig. 11: Detail photo of the wing of the right cupid showing the presence of yellow and red in the divisions of the feathers.

Fig. 12 (left): Detail photo of the centre cupid. Two green bands run vertically down the tunic.

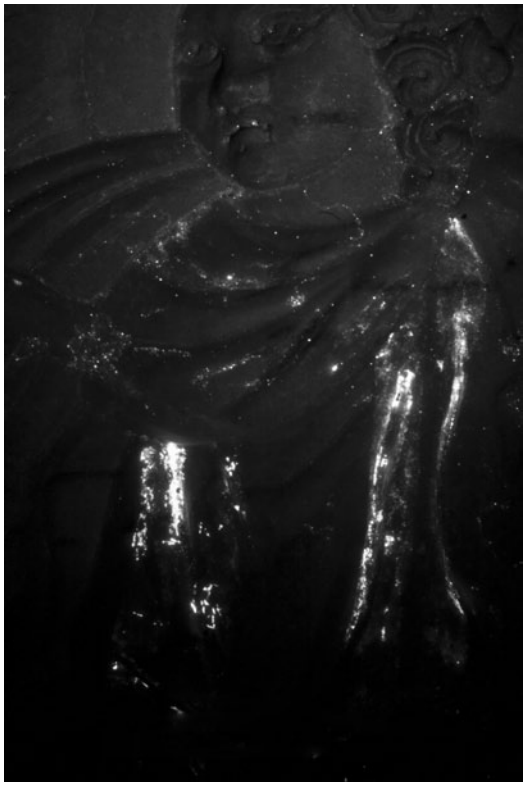

Fig. 13 (right): VIL-image of the centre cupid. Clearly defined bands of Egyptian blue are observed glowing bright white correspond-ing with the visual exami-nation where the green is found.

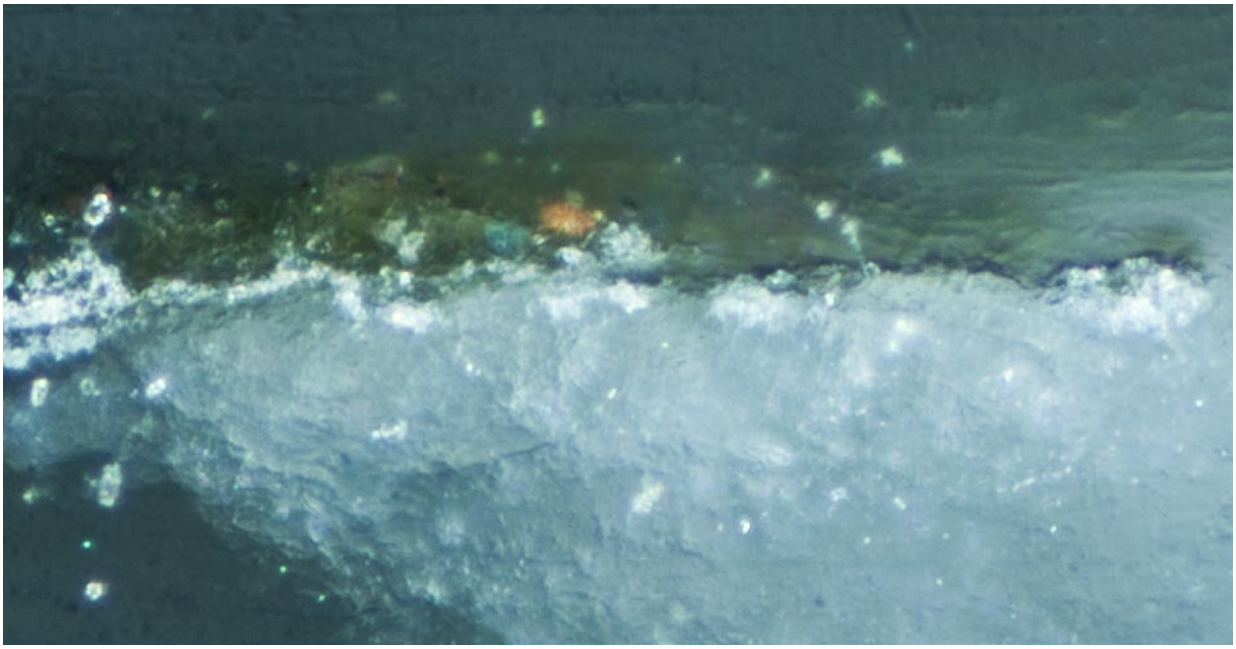

Fig. 14: Photomicrograph of a cross-section of the green band on the centre cupid. Only one greenish-blue layer is observed with a single orange particle. ×200

Fig. 15: Detail photo of the right leg of the centre cupid. The removal of secondary mortar on top of the painted dark lines reveals the beautiful red colour of cinnabar underneath.

Fig. 16: Detail photo of one of the animals on the lid showing eyelashes and eyebrows and small traces of pale pink inside of the mouth, nostrils and drilled holes of the eyes

Fig. 17: Detail photo of a rabbit. Small, sketchy brushstrokes are used to imitate fur.

Fig. 18: Detail photo of the fruit showing hatchings in red and yellow to produce shading.

Fig. 19: Macro-image of fruit. Remaining traces of dots in yellow and red are visible to the naked eye.

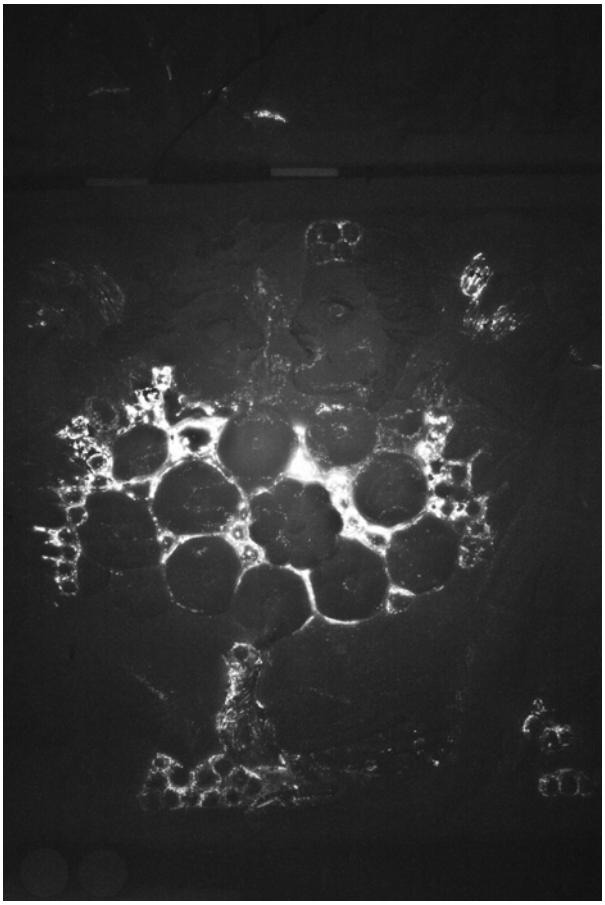

Fig. 20: VIL-image of the fruit in the right-hand garland. Large concentrations of Egyptian blue shining bright white around the fruit. On the peacock the luminescent emission by Egyptian blue appears even though it is hidden beneath a layer of secondary gilding.

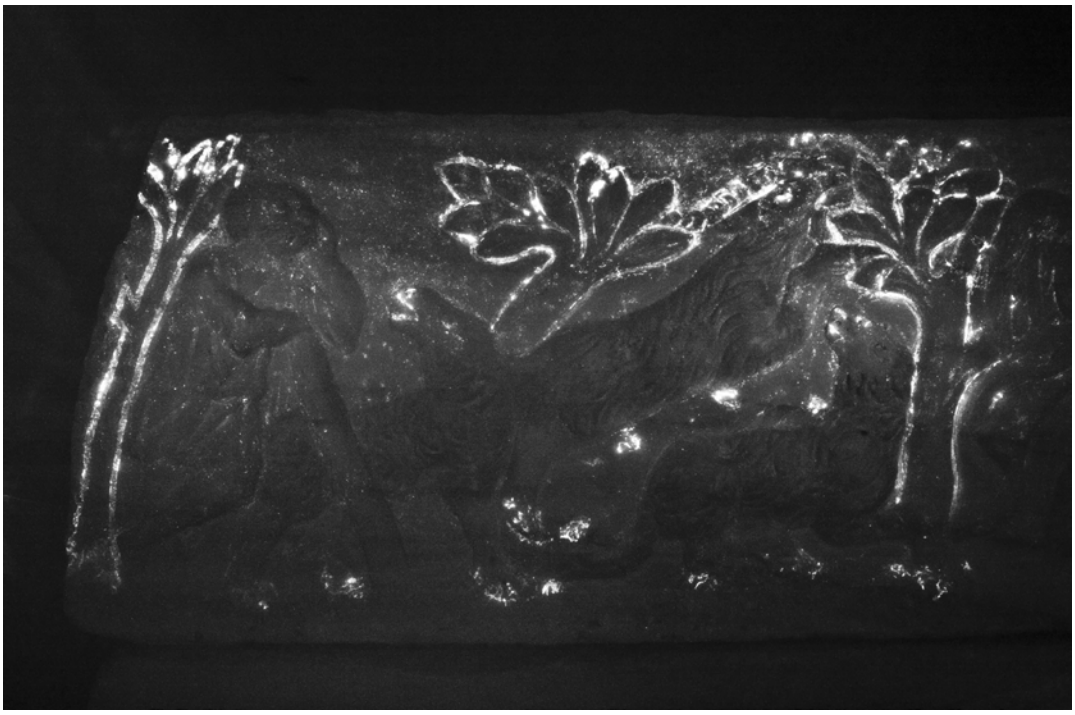

Fig. 21: VIL-image of the tree on the lid. The outline of the tree is executed in Egyptian blue directly onto the background.

Fig. 22: Detail photo of tree in relief to the right of the shepherd showing how separate brushstrokes of red and yellow are used to indicate the bark.

Fig. 23: Detail from a glass negative of IN 2468, from 1961. Traces of a red tendril in the background stand out more clearly.

Fig. 24: Detail photo of the secondary gilding. The gilding has been applied in a rather crude manner and can also be found unintentionally on the background of the relief.

Fig. 25: Detail photo of the original gilding. This was applied in narrow strips on a lock of one of the maenad masks to accentuate the carving of the hair.

Fig. 26: Detail photo of the hen showing the small, remaining traces of strips of gilding on top of a transparent purple layer.

A closer look at the fingers of the cupids shows another interesting feature; some of the fingers are actually carved while the remainder are executed in paint directly on the background. Thus, painting was used as a substitute for the carving of details and as a complement to the modelling of the figure.

GILDING

Two types of gilding are found; one original and the other secondary. The attempt to determine the original gilding is complicated by the distribution of the secondary gilding which was applied shortly after excavation.

The two types of gilding have been analyzed with SEM/EDX. One, most likely the antique, contains a larger amount of gold (Au) than the secondary gilding. In addition the antique gilding contains zinc (Zn) and copper (Cu). Besides gold (Au), the secondary gilding contains silver (Ag) and copper (Cu). The original gilding is only detectable in a few places but is probably preserved beneath the secondary gilding. The secondary gilding has been applied in a rather crude manner and can also be found in the background of the relief, unintentionally, and on top of drops of mortar (fig. 24). The original gilding was probably gold leaf applied in narrow strips on a bolus. A detail photo of the maenad mask to the right shows how delicately this was done. A lock of her hair bears original strips of gilding on top of brownish-red under-drawing to accentuate the carving of the hair (fig. 25).

The applied gilding was closely related to the sculptural use of the drill to create contrasts of light and shadow as a means of defining mass and form.[12] The lavish use of gilding is an important part of the polychrome refinement, building up a visual effect of radiance in a tomb interior. Besides the strips of gilding found on the masks, traces of original gilding are also found on the hair of the cupids, the beard of the shepherd and the skin of the animals, usually on top of red or yellow ochre. The same scheme is found on a sarcophagus with pastoral scenes in the Vatican Museum. In this case, too, one notes the practice of applying strips of gold leaf to animals and the beards and the hair of the figures.[13]

In some areas small traces of original gilding are found on top of a magnificent, transparent purple layer. A close look at the hen beneath the fruits shows traces of a faint purple colour with strips of original gilding (fig. 26). The use of different colours for the ground layer for the gilding is a well known phenomenon. This way of using different colours underneath the gold is also found on 'The Beauty of Palmyra' in the Ny Carlsberg Glyptotek.[14] Here traces of shiny fragments of gold leaf rest on a yellow ground found on the many types of jewellery whereas the ground layer on the decorative pendant is identified as a red iron-based pigment.

12 Cf. Abbe 2010, 280.

13 Liverani 2010, 293.

14 IN 2795 Sargent and Therkildsen 2010a, 14. 17 fig. 3–4.

Table 1: Summary of pigments identified on the garland sarcophagus NCG IN 2468

Sample	Description	Pigment identified
IN 2468-01	Red outline on masks	Red iron oxide
IN 2468-02	Pink on wing of the cupids on the lid	Madder lake
IN 2468-03	Blue surrounding the fruit	Egyptian blue
IN 2468-04	Brownish red on the unfinished portrait	Umber mixed with red iron oxide
IN 2468-05	Pink on the tunic of the right cupid	Madder lake
IN 2468-06	Red on the hose of the centre cupid	Cinnabar
IN 2468-07	Purple ground on hen	Unidentified
IN 2468-08	Yellow on fruit	Ochre
IN 2468-09	Yellow bolus on beard of the satyr	Ochre
IN 2468-10	Red on eyebrow of the sheep	Red iron oxide
IN 2468-11	Red on tendrils in the background	Red iron oxide
IN 2468-12	Green band on centre cupid	Egyptian blue, iron oxide (?) green earth (?) and lead white (?)
IN 2468-13	Original gilding on hair of Maenad mask	Gold with zinc and copper
IN 2468-14	Secondary gilding on the peahen	Gold with silver, copper and iron (?)

CONCLUSION

The investigation of the polychromy of the garland sarcophagus has provided us with valuable insights into chromatic choices of Roman painting techniques. It demonstrates that the range of the palette was fairly wide and the use of it was subject to certain conventions. A few strokes of colour – yellow ochre, red iron oxide, pink madder lake and Egyptian blue – were applied, combined with sketchy gilding added to the coats of animals as well as the hair of the cupids and masks. It is worth noting that the conspicuous amount of gilding is secondary and applied on top of the original gilding around the time of excavation in the 19th century. However traces of original gilding are still visible due to unfinished patches of the secondary gilding.

Splashes of 19th century mortar have acted as a protective layer for the pigments underneath. The removal of the splashes reveals the appearance of a beautiful red colour underneath. This stresses the fact that the removal of modern materials or incrustations must always be handled with care since it might prove to have important information on surviving polychromy underneath.

It seems that the relief ground was not entirely covered with paint but largely left untouched in the colour of the marble. Only a few details were painted on the surface to complement the modelling of the figures and as a way of adding a degree of depth. Furthermore, the use of some particular characteristics such as shading on the fruits, rendered with fine red and yellow brushstrokes, served to highlight the three-dimensional sculptural work.

The painting technique reproduces paradigmatically the work of the ancient sculpture painters which can be proven through a series of preserved painterly details like the use of madder lake to obtain the colour of the inner mouth, nostrils, ears and the caruncles as well as the modelling which is accomplished by applying a few colours in the depth of the folds of the garments.

In the light of the results of the recent investigation it seems that the overall aim of the polychromy of the garland sarcophagus was to create a luxurious golden image with a mixed-media polychrome effect combining painting and gilding and thus achieve a visual effect of radiance in a Late Roman tomb chamber – in Rome itself.

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On the High Gloss Polish of Roman Sculpture

Amalie Skovmøller and Rikke H. Therkildsen

ABSTRACT

Materiality and technique as giving meaning to portraits are often overlooked.[1] In order to discuss the function and meaning of polychrome sculpture in Antiquity not only the identification and technical-analytical investigation of craftsmanship and artistic processes, but also of the often highly complex re-treatment of the antique sculpture after excavation and acquisition, are imperative. Since 2008 the multi-disciplinary Copenhagen Polychromy Network (CPN) at the Ny Carlsberg Glyptotek (NCG) has been committed to research into the polychromy of Greek and Roman stone sculpture to increase our knowledge and to refute myths about not only the 'white' Antique, but also the colourful 'kitsch' Antique. A newly established branch of NCG/CPN's research-strategy is in-depth investigation of the polychromy of highly polished Roman portraits in the collection. Attention has focused on a number of imperial portraits from the 3rd century CE characterized by exquisite refinement in both carving and polish. Spectacular results from microscopy and photo analytical imaging of portrait IN 826 presented in this paper provide new insight into the colour palette and painting techniques on highly polished marble in Antiquity.

KEYWORDS

Sculptural polychromy, Roman portrait, materiality, white marble, polish, microscopy, visible-induced luminescence imaging, VIL.

INTRODUCTION

In the summer 2011 the 'Tracking Colour' team at NCG found traces of original colouring on top of the polished marble surface of a Roman portrait head of Gaius Julius Verus Maximus, dated to 235–238 CE. (IN 826) (fig. 1–4).[2] This article presents the examination and documentation of the portrait head and its original painted polychromy together with subsequent discussions and considerations.

Since Johann Joachim Winckelmann (1717–1768) and other scholars of the 18th century established the aesthetic appeal of the white marble, there has only been limited art historical and archaeological focus on Greco-Roman sculptural white marble as a material handled and manipulated by craftsmen. This legacy has subsequently downgraded the role of the craft and the craftsmen through prioritising the question 'who' above 'how' when viewing Greek and Roman sculptures; first as part of the methodology of iconographical and later as part of semantic theoretical research.[3] Although scholarly attention towards materials used for sculpture in the Greco-Roman culture has increased over the last 30 years, there is still a lack of focus on materiality and its manipulation, and the description and understanding

1 Fejfer 2008, 152–157.

2 Johansen 1995, 106–107 no. 42. Add: Varner 2001, 52 n. 77.

3 Hölscher 1987; Bazant 1995.

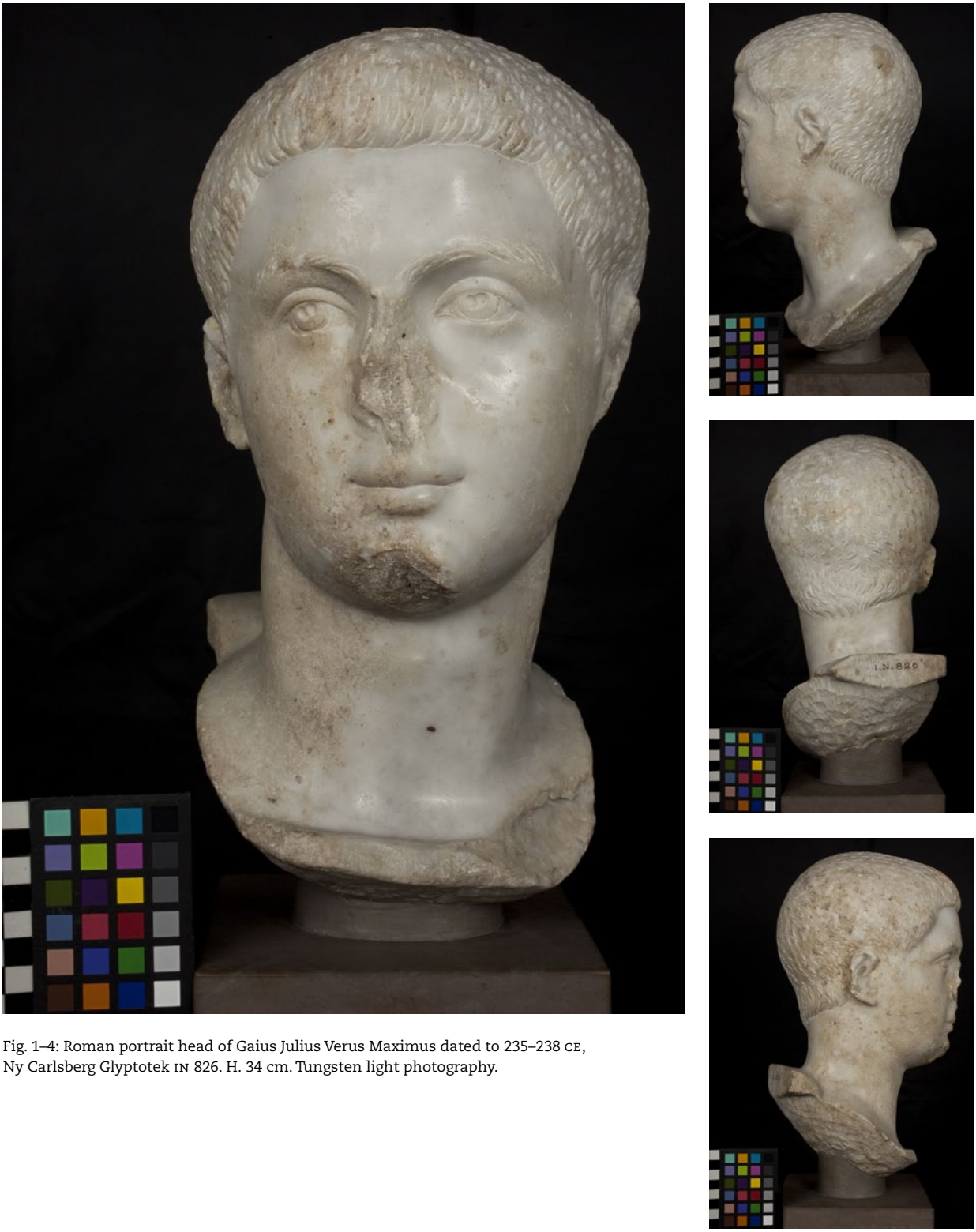

Fig. 1–4: Roman portrait head of Gaius Julius Verus Maximus dated to 235–238 CE, Ny Carlsberg Glyptotek IN 826. H. 34 cm. Tungsten light photography.

of the finish of the marble surface is traditionally restricted to visual examinations of the sculpture as given in, for example, museum catalogues.[4]

One exception to this tendency is a most striking surface treatment: the high-gloss polish that resembles porcelain. Still, interpretations of the functions and significance of this finish are few and far between. Scholars have traditionally viewed the phenomenon as a stylistic detail feature which first appears in the late 1st or early 2nd century CE.[5] In portraiture, this no doubt costly porcelain-like surface is particularly characteristic of works of the most eminent sculptural quality, not surprisingly often depicting persons from the highest strata of Roman society.

In most cases the treatment in question is confined to skin areas of the portraits, and sometimes also details imitating textile and leather.[6] The explanation of the highly polished finish is in some cases that it may be seen as an attempt to imitate precious materials such as the ivory of chryselephantine sculptures.[7] More generally, the high gloss of the white marble is interpreted as reflecting an appreciation of the aesthetics of the material itself, making the surface finish the ultimate objective. On this view, if painted, the colouring would have been sparse and used to enhance eyes, hair and lips.[8] But in the case of IN 826, we need to reconsider whether the desired end effect was in fact the aesthetics of the shiny white marble surface, as people have assumed since the 18th century, or whether that surface should rather be understood as a 'canvas' – carved, and polished with the purpose of providing a smooth ground for particularly sophisticated painterly effects?

THE EXAMINATION OF IN 826

Archaeologists have identified IN 826 as a portrait of Gaius Julius Verus Maximus and dated it to 235–238 CE.[9] Maximus was the son of the Roman Emperor Maximinus Thrax. All we know of Maximus is that as designated heir he was made Caesar probably around 235 CE. and murdered together with his father by their own soldiers in 238 CE.

As is often the case with antique marbles we only have little evidence on both excavation- and acquisition history and no records of the treatment and handling of the portrait exist. However, IN 826 is relatively well preserved. Much of the face and neck are covered with encrustation, but particularly on the forehead and left side cheek the highly-polished marble surface is revealed. The short hair forms a textural contrast to the glossy appearance of the face and is rendered in a different fashion; the hair is unpolished, with the strands of hair indicated by short, fine lines with a pointed chisel. The eyebrows have been worked in the same manner. The nose and chin are missing as are parts of both ears. The neck has the edge of a dress suggesting it was worked for insertion into a larger draped statue or a bust, most probably a toga. Modern fillings (nose and chin) were removed in 1957.[10]

4 Attanasio 2003; Waelkens, Herz and Moens (eds.) 1994. For a thorough description of the different degrees of surface polish see Smith 2006, 32–33, and the individual descriptions in the catalogue of the sculptures excavated in Aphrodisias.

5 Fejfer, 2008, 162–163; Pfanner 1989, 228.

6 Smith 2006, 32–33

7 Abbe 2009, 140.

8 Reuterswärd 1960, 219–224; Fejfer 2008, 162; Abbe 2009.

9 Wiggers and Wegner 1971, 231–235, taf. 70–72; Johansen 1995 as note 2.

10 Poulsen 1974, 163, no. 167.

ANALYTICAL PROCEDURES

The technical investigation was based on a non-invasive approach and divided into two main steps: visual examination followed by technical imaging, including variations in lighting angle (raking light), scale (microscopy) and type of radiation used (ultraviolet fluorescence (UVF) and visible-induced luminescence (VIL).[11]

Initially the visual examination aims at a description of the marble surface and various related features to precede the description and possible identification of remaining antique pigments; the condition of the marble surface is closely connected with the presence or lack of pigments. Microscopy of remaining pigments rarely gives a qualitative identification of them. However, the number of pigments and the way in which they are distributed on the portrait provide us with first-hand knowledge on the chromatic scheme and painting techniques.

The identification of pigments on antique marbles is complicated; mostly, only a few grains of pigment are left and at a preliminary stage a sampling strategy is not recommended. In this respect photo-analytic documentation can be a powerful tool in identifying certain antique pigments that are either too small for sampling or simply not discernable with the naked eye. Organic reds – derived from the root of madder, from cochineal, or from kermes – have been increasingly identified thanks to UVF. Also, fluorescent phenomena due to organic binders or later surface treatments can be identified. Another photo-analytic technique is VIL for the identification of the synthetic pigment Egyptian blue, a calcium copper tetrasilicate. Egyptian blue used for the painting of antique marbles is often invisible to the naked eye; the pigment tends to be preserved in the pores of the stone at a submicroscopic level or hidden beneath secondary incrustations. But a significant property of Egyptian blue is that when excited with visible light, the pigment emits infrared radiation and is recognisable in VIL images as shining white particles or areas.[12] VIL has proven a very helpful tool for the detection of Egyptian blue and for the mapping of the spatial distribution of the pigment on the antique surface.

RESULTS AND DISCUSSION

On the portrait IN 826, much of the skin areas are covered in a greyish-yellow calcareous incrustation characteristic of archaeological marbles. Microscopy reveals criss-crossing scratch marks cutting through both crusting and the marble surface. In other words, at some point after excavation parts of the crusting have been sanded down or removed. The forehead and left side of the face having no crusting stand out with a porcelain-like, shining marble surface. A marble surface with a high polish has usually first been rasped and subsequently smoothened with an abrasive, consisting of a mixture of a fine powder and water to eliminate tool marks and to obtain a high gloss. The removal of incrustation concerned the entire face and the interventions have obviously had a great impact on the preservation of possible original paint layers. At a microscopic level very fine lines intertwine on the glossy surface locally, interrupted by minor cavities and remnants of incrustation (fig. 5).

Microscopy of IN 826 shows a dense concentration of primarily red pigments in the iris and between the lips. Both eyebrows have remnants of a relatively compact pink layer mixed with large red particles and a few yellow particles, while also on the upper lid of the right eye the characteristic pink layer with red grains is found (fig. 6). The use of madder lake in

11 For a description of equipment used see: Sargent and Therkildsen 2010a,12–13 and passim.

12 Verri 2009.

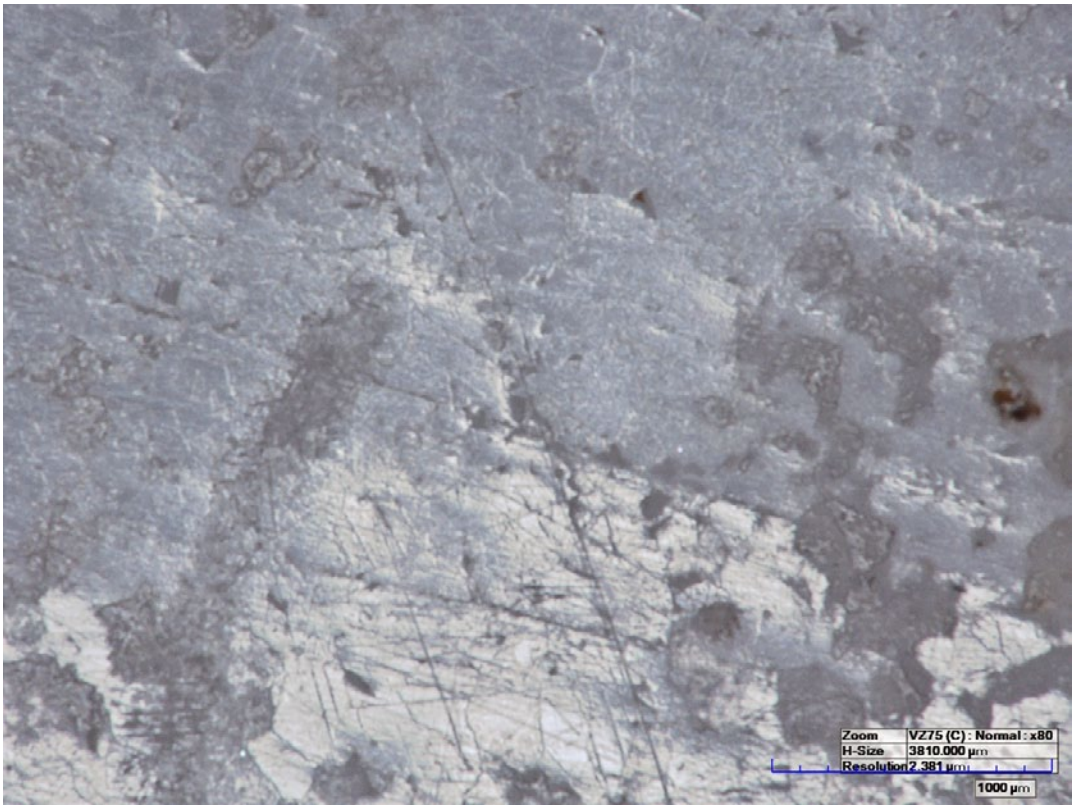

Fig. 5: Photomicrograph of the portraits forehead showing a high polished marble surface with fine, intertwining lines from abrasion locally disrupted by minor cavities and incrustation.

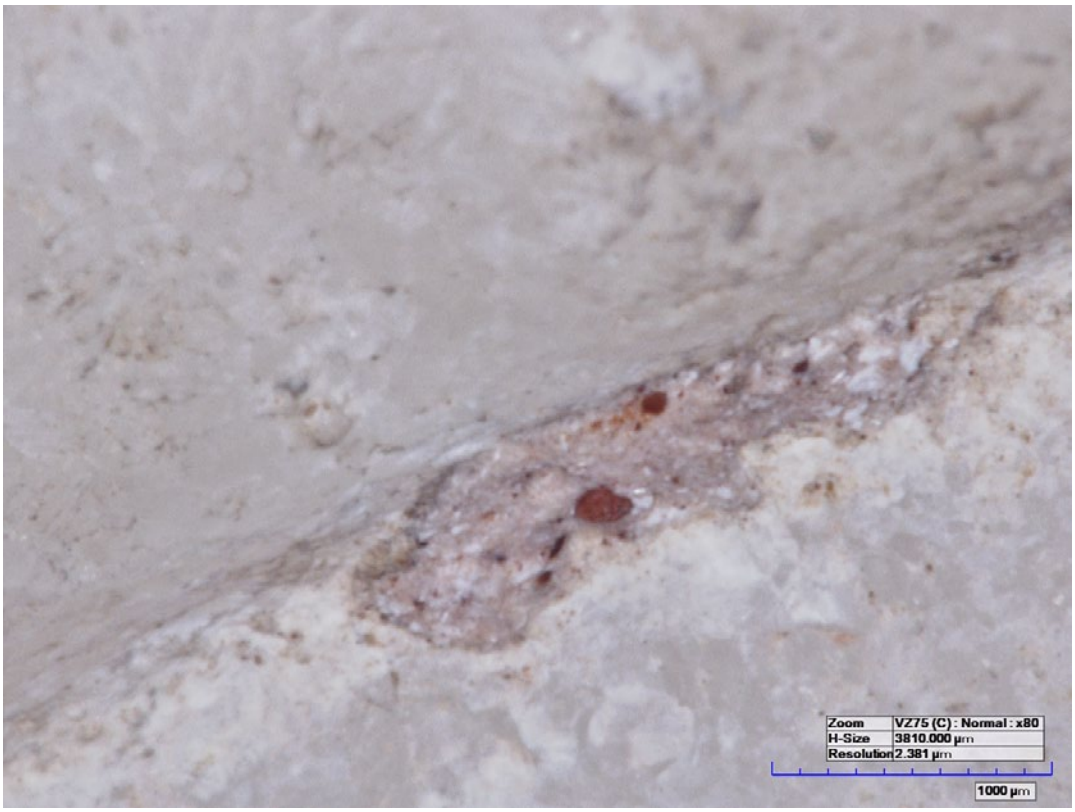

Fig. 6: Photomicrograph of an incision in the right eyebrow showing a compact pink layer with a relatively even distribution of red and dark red particles of varying size. Above the layer remains of a transparent, red colour.

combination with inorganic compounds such as Egyptian blue and iron red to accentuate eye rims, nostrils and the opening of the mouth on Roman sculptures is well documented today.[13] However, close examination of IN 826 by means of ultraviolet-fluorescence imaging reveals no indications of the use of madder lake.

Turning to the skin parts, microscopy and photo-analytical imaging provide us with new and very interesting information on the colour palette and painting techniques employed to create a naturalistic polychromy: on IN 826, a skin colour was applied as part of portrait concept. Only a few scattered blue pigments are detectable on the surface by means of microscopy but visible-induced luminescence imaging reveals a great number of small particles shining bright white (fig. 7–10). The strong luminescence is characteristic of Egyptian blue and the particles are in the main restricted to parts of the face that are covered by incrustations. The strong luminescence of Egyptian blue in combination with the transparent properties of the calcareous incrustation layer makes it possible to identify the well-protected pigment beneath it. The amount and even distribution of the relatively uniform grains on the skin have undoubtedly been part of a mixture of various pigments aimed at obtaining a lifelike colour. And, indeed, microscopy of the skin areas reveals traces of red colours varying from pink to a brownish-red, occasionally in combination with yellow-coloured grains. Usually the coloured grains are found on or held in the calcareous deposits. As for the polished parts without incrustation, the quantity of pigments is very limited. On the forehead and throat red colour and a couple of blue grains are located on the polished surface or embedded in microscopic scratch marks from abrasion (fig. 11).

The hair of the portrait was painted using, for the most part, red and brownish-red pigments (fig. 12). However, disparate particles of yellow and blue discernible through microscopy are most likely part of the original colour scheme of the hair (fig. 13). The greater mass of the hair is covered in incrustation and the pigments appear to have become part of the secondary matrix.

WHY PAINT ON POLISHED WHITE MARBLE?

Given the results of the examination of IN 826 we can with certainty conclude, that the polished surface of the skin together with the hair was entirely painted. This means that the role of the marble and its surface treatment must have been something other than providing the viewer with aesthetic enjoyment of the material itself – yet the final, glossy finish must have been vital for overall visual effect of the portrait.

Polishing the surface of a high-quality marble sculpture is a technically demanding and time-consuming process requiring a dedicated effort.[14] A relief frieze on a sarcophagus found at Ephesus illustrates how the polishing was handled in a local workshop in Asia Minor when it was part of the Roman Empire (fig. 14): the third man from the left is shown leaning over a table engaged in polishing what appears to be a table-leg. The man is clad in a simple loin-cloth which identifies him as a slave and differentiates him from the tunic-clad master carvers seen on both sides of him chiselling a portrait statue and a portrait bust.[15]

The various degrees of polish and surface treatments can be used to manipulate the effect of the surface by creating different textures to catch the light in various ways.[16] Looking at IN 826, the overall finish of the surfaces of the portrait captures light very delicately because

13 Sargent and Therkildsen 2010b; Verri, Opper and Deviese 2010: 46–48.

14 Rockwell et al 2004, 23–43.

15 Smith 2008, 108–110.

16 Rich 1947, 278.

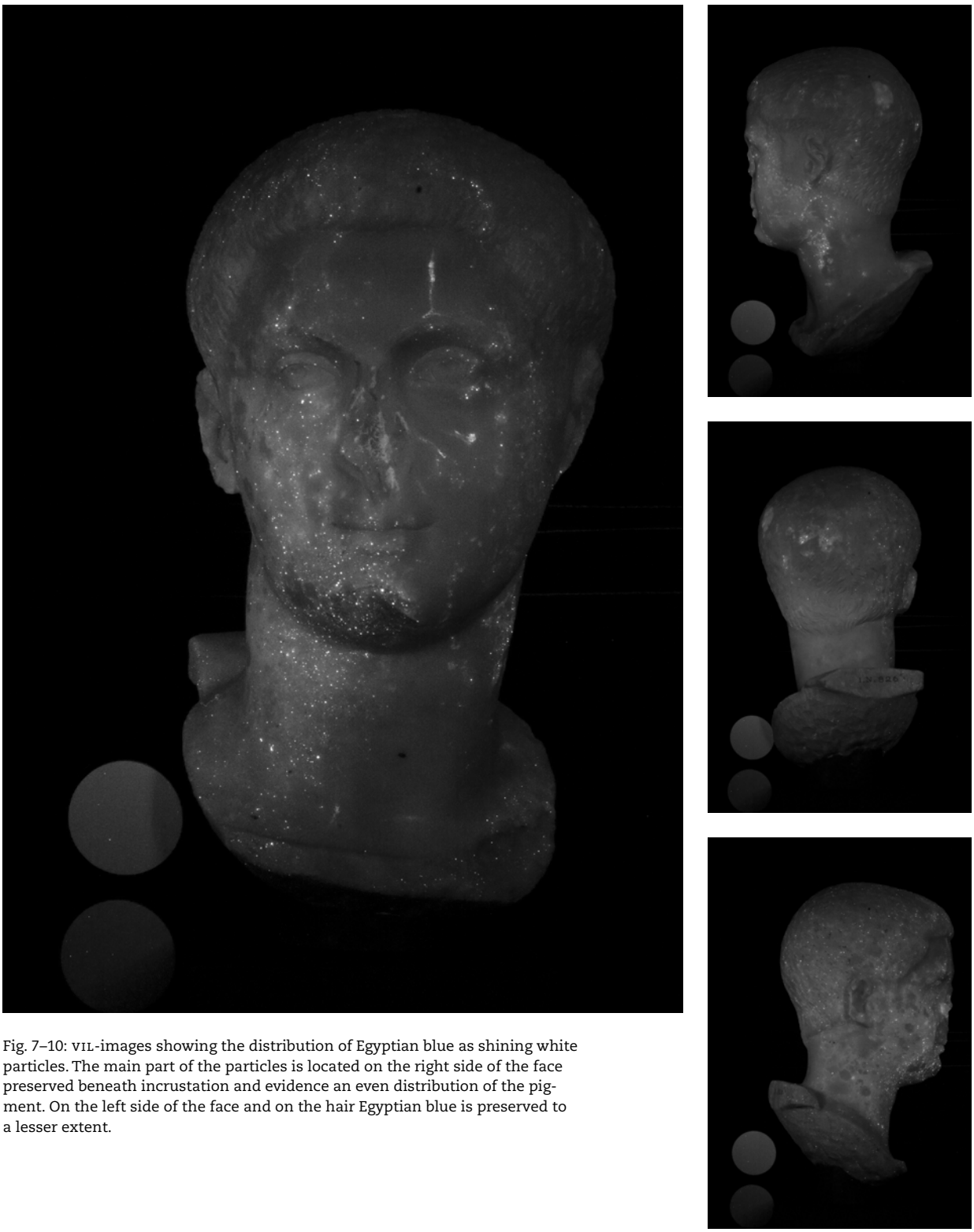

Fig. 7–10: VIL-images showing the distribution of Egyptian blue as shining white particles. The main part of the particles is located on the right side of the face preserved beneath incrustation and evidence an even distribution of the pigment. On the left side of the face and on the hair Egyptian blue is preserved to a lesser extent.

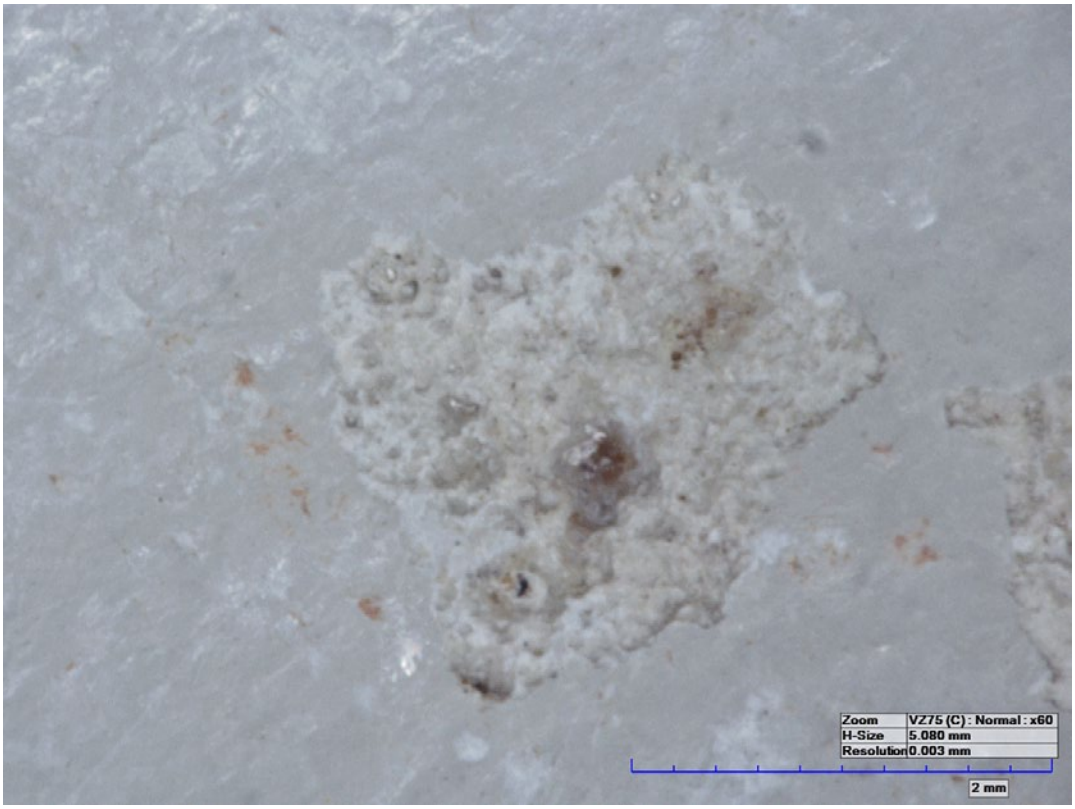

Fig. 11: Photo-micrograph of the portrait's throat. Red colour is concentrated around and possibly beneath a compact, white layer.

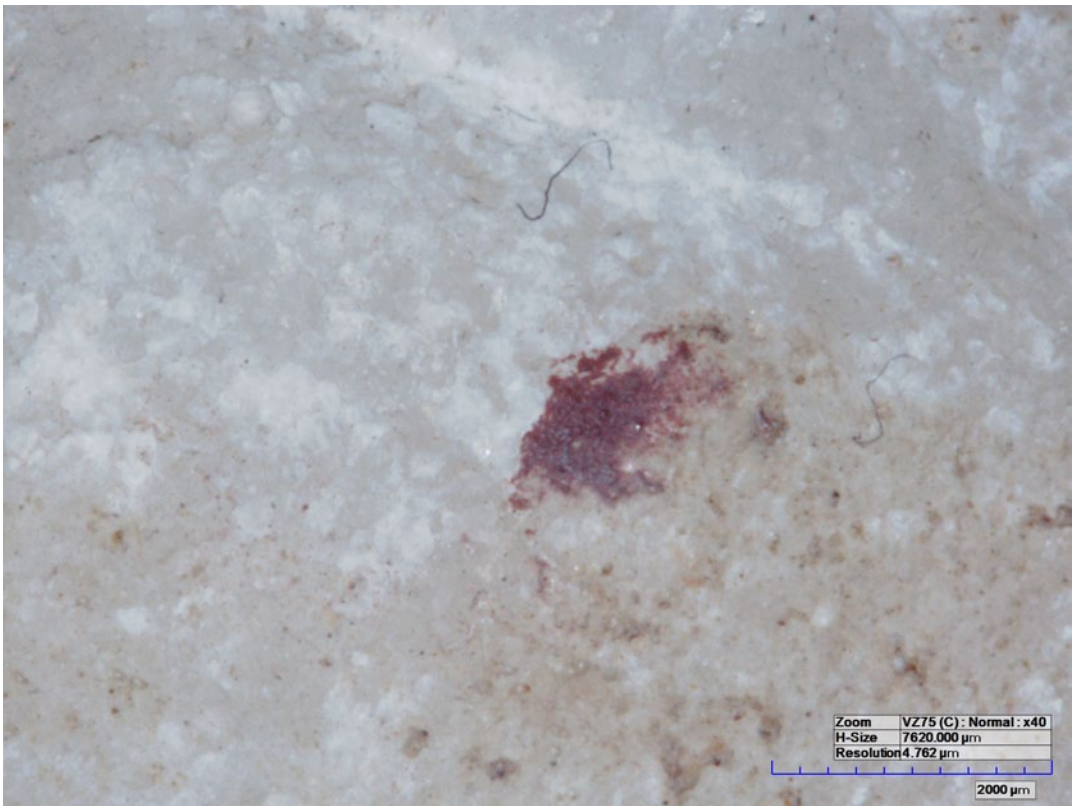

Fig. 12: Photo-micrograph of the hair on the back of the head, showing a brown red layer.

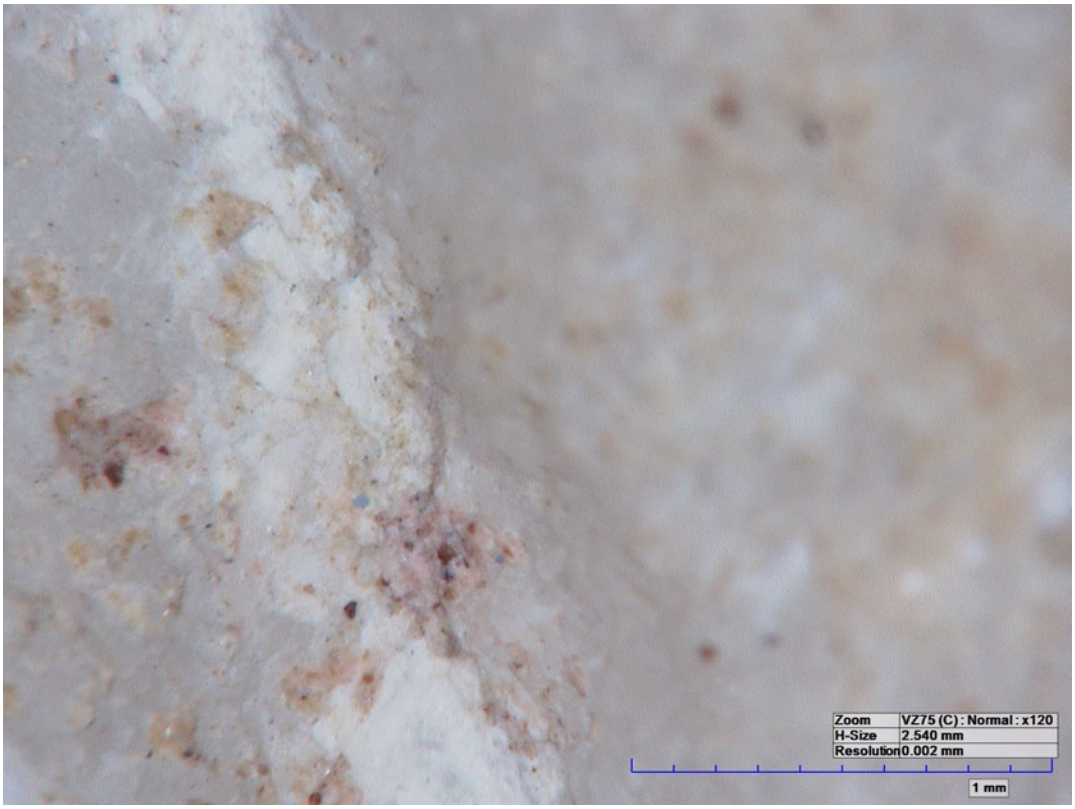

Fig. 13: Microphotograph of a lock of hair showing a pink layer mixed with clear blue grains.

Fig. 14: Sarcophagus relief showing a sculpture workshop. From Ephesos. 2nd century CE. The Archaeological Museum, Istanbul, inv. no. 775. L. 265.5 cm; max h. 34.5 cm. (From Smith 2009, fig. 5 a–b.)

the contrast between the rough texture of the hair and the smoothed skin are recognisably different. Painted over, this effect would still be visible if the craftsman took the relationship between binder and pigments into account. If painted in thin or transparent layers, as seen on the so called 'Treu Head' in the British Museum, the effect of different textures would have been visible and, combined with the luminosity of the high-gloss polished skin, highly effective.[17] The role of the marble in the case of IN 826 should therefore be sought somewhere between being merely a 'canvas' for painters to paint on and an aesthetic white material praised as such since the 18th century. When painted, the combination of the materiality of the stone and additional polychromy could have created a life-like representation of a human head with hair and skin. And by using a binder that produces a subtle, matte finish (like egg, casein or gum arabic) perhaps with additional highlights, this illusion would have been all the more effective.[18]

We know nothing of the find spot of IN 826 and therefore nothing of its original context. The portrait was definitely inserted into a statue or a bust, but whether it was set up in an official, recreational, religious or private space is difficult to establish. Wherever it was, the excellent handling of the marble surfaces would have been wasted on the viewer if the portrait was placed too high above the viewers eye level, and it would, for the sake of preservation, most likely have been provided with protection against the elements. The manipulation of the marble's materiality combined with a painted layer just as sophisticated would have called for a context within a space where the viewer could come close to the portrait(s) and appreciate the costly effects and detailing.

FURTHER CONSIDERATIONS

Integrating the surface treatment of white marble sculptures into research concerning their polychromy could turn out to be very rewarding judging by the results provided by IN 826. It raises questions about the complexity of antique craftsmanship which have not so far been properly investigated. We have established the fact that Greco-Roman sculptures were more or less extensively polychrome, and now we need to establish how they were painted and what effects were in demand (or desired). A sophisticated combination of materiality and painted polychromy to create a life-like portrait presupposes a technically advanced knowledge on the part of the Greco-Roman sculptural craftsmen, sculptor and painter. If the end goal of the polished marble surface of IN 826 was a naturalistic image of the son of the Roman Emperor, Maximinus Thrax, this must have been taken into account throughout the entire process from carving the marble to applying the final highlights of the polychromy. This would suggest a complex artistic process combining various degrees of manipulation of materiality and light interplay requiring a profound knowledge of the different materials and tools available.

In order to understand the craftsmanship of antique sculptors and sculpture painters we must first of all continue to dedicate research not only to the identification of binders and pigments and investigation of the painting techniques but also take the scientific analysis of marbles into consideration. The identification of marble types becomes highly relevant if the advance of the painting technique is bound up with the quality of the marble.

It would, furthermore, be essential to look into the how and whys of the polishing of white marble sculpture in order to develop a more precise descriptive terminology. Smooth surfaces and shiny parts are often mistaken for a high polish, so this calls for further attention

17 Verri, Opper and Deviese 2010.

18 On the discussion on ancient binders see Kakoulli 2002.

to the marble surface from a morphological point of view with particular attention being paid to tool marks, degradation phenomena and various types of surface films from ancient and/or modern treatments.

We must also be aware of the need for several experimental reconstructions and visualizations when debating the final, overall look of each sculpture. The reconstructions should not be regarded as final results but as hypothetical visualizations to incorporate into the theoretical debate concerning the technical handling and visual effect of the sculptures. They should be used as supplements to the scientific analysis when reconstructing the original artistic process based on the results obtained from visual and technical examination.

ACKNOWLEDGEMENTS

First of all we would like to express our gratitude to Jan Stubbe Østergaard for making this research project possible by acknowledging the role of the marble surface in studies of ancient sculptural polychromy. Furthermore, a special thank should go to our enthusiastic interns Ida Lipka Flensborg and Mette Aagaard Rønde for making the first and groundbreaking discovery of Egyptian blue on IN 826.

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The Tracking Colour Website

Amalie Skovmøller

INTRODUCTION

Since August 2010 the team behind the 'Tracking Colour project' in Copenhagen has been building a website for the project and for polychromy research in general. In our Preliminary Report 2, 2010, I wrote an article on the website project, and our considerations and expectations.[1] And now I am happy to report that what we hoped to achieve and worked hard for, is becoming a reality: the website will be up and running from April 2012.

This paper will present an overall introduction to the website. One of the many functions of the new website is the workspace in the extended back end, so I take this opportunity on behalf of our project to invite all scholars involved in ancient sculptural and architectural polychromy research to use the workspace as a tool to promote their own research and to engage in an open source international collaboration and exchange with other colleagues.

THE WEBSITE

To refresh what our starting point originally was, we had three main goals (fig. 1):

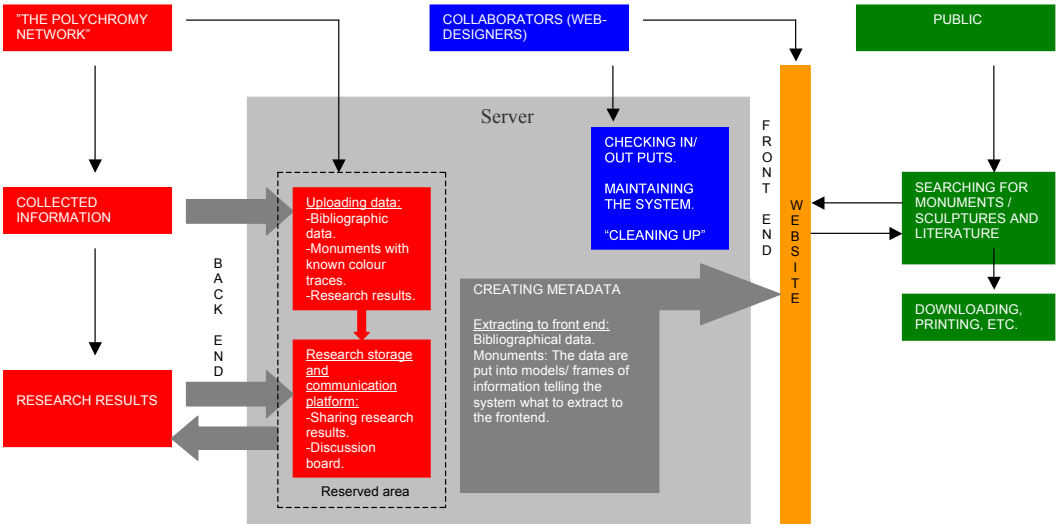

Fig. 1: An illustration of the proposed online solution for research in sculptural polychromy:
The red boxes indicate how researchers can use and benefit from the database. They will work within the reserved area of the server accessing from the back end. From here the metadata will be created by formalizing the research results according to a model. This will be sent to the front end, where the public (green boxes) will have access to the basic research information through a search-engine on the website.
The blue indicates the maintenance of the database.

1 A. Skovmøller 2010.

1 A research data storage and communications platform, where scholars could meet and discuss their research.
2 A bibliographical database containing literature on ancient polychromy from 1960 till present day.
3 A database of sculptures known to have traces of colour, which would be uploaded by scholars active in the research storage facilities.

In cooperation with the website design company Oncotype we have, since June 1, 2011, been working to achieve these three main goals. It has been a time-consuming process to plan the design and functions of the website, the more so since we did not find any direct models to learn from. The site will in several respects be the first of its kind – we believe. The data resulting from the Tracking Colour project are extensive, and we needed to go through every little detail in order to collect and sort out what we wanted to take with us to the website. All present and future data will be gathered in the website's object database with the attached virtual workspace in the back end. This keeps all the data in one place, so we will not have to go back and forth between different servers and external hard discs, a frustrating experience in the long run.

The design and implemented functions of the website are kept as simple as possible. On the front page we have placed a short welcome text to introduce the user to the resources and main purposes of the site (fig. 2). Images of the objects most recently uploaded are shown as 'selected objects' to provide something dynamic for the front page. At the bottom of the page contact information on the Tracking Colour project and all collaborating institutions can be found.

The two databases were among our main goals, and they therefore figure prominently on the front page. The functions and use of the databases are basically similar to those of other virtual databases. The structure ought therefore to be recognisable to almost all users generally familiar with the internet. The user can easily locate and choose between either the bibliographical or the objects database. If the user needs information from both of the databases, he or she can type in the search field located beside the 'Object' and 'Bibliography' buttons, and the system will extract matching results from both databases. Content provision is managed on two different levels: While the data in the object database are uploaded by scholars using the workspace in the back end, the data in the bibliographical database are controlled by the administrator of the website. This arrangement is to make sure that all the uploaded bibliographical data are relevant to polychromy research.

'About' gives access to more detailed and comprehensive texts concerning the Tracking Colour project at the Ny Carlsberg Glyptotek and research on ancient sculptural and architectural polychromy in general. Here the user will be able to find information on the purpose and perspective of on-going research, its methodologies and explanations of the scientific analysis and apparatus brought to bear. 'About' also opens up to more reading on how to apply for a registered professional user account and on the legal aspects of the website and the intellectual property rights of its data. The latter I shall return to below.

For professional users participating in upload and sharing of research results in the reserved back end area, the login is found on the upper right corner of the front page (fig. 3).

When you login you will gain access to the uploading of data. From here on it is quite simple: you can browse through the objects and attach comments or upload and create new objects by filling out the data record form. When filling out the form, the system will let you

Fig. 2: Screen-shot of the front page of the website.

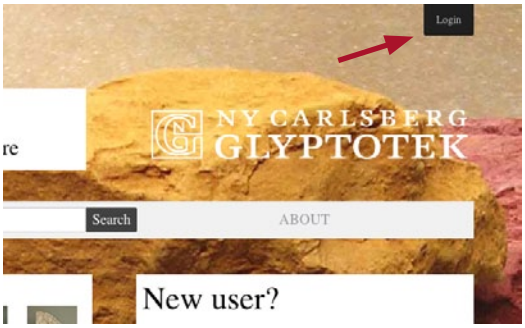

Fig. 3: Screen-shot of the front page of the website: Detail of top right corner.

know if you have left out any of the obligatory information. Pictures and other files can be attached, and you can link to the pictures within the text.

When uploading information to the objects database, you click on the green 'Add new object' button (fig. 4). This directs you to the formula where the research data on the object at hand are to be filled out. Some of the data on the object are obligatory to fill out: object title, inventory number, object type, dimensions, date and so on (fig. 5). The obligatory information is sent to the front end to the advantage of the broader public with no access to the back end.

The non-obligatory information comprises the results of the detailed examinations of the object, results which we think are probably of lesser interest to the broader public using the front end. Access to this data is therefore limited to the professional, back end users.

Under 'Choice of methods' we list currently accepted methodologies for the examination of ancient sculptures for evidence of polychromy (fig. 6). These methodologies have been developed over the last decades as research in sculptural polychromy has picked up speed.[2] The professional user will be able to combine the check-off boxes with more thorough descriptions of the visual and technical investigations. The system is as flexible as we could make it, without compromising the communication of data on the examined objects.

As part of the work space in the back end, all users are invited to attach comments to any and all object profiles. This function is found at the bottom of the page, when viewing the information on the individual objects (fig. 7).

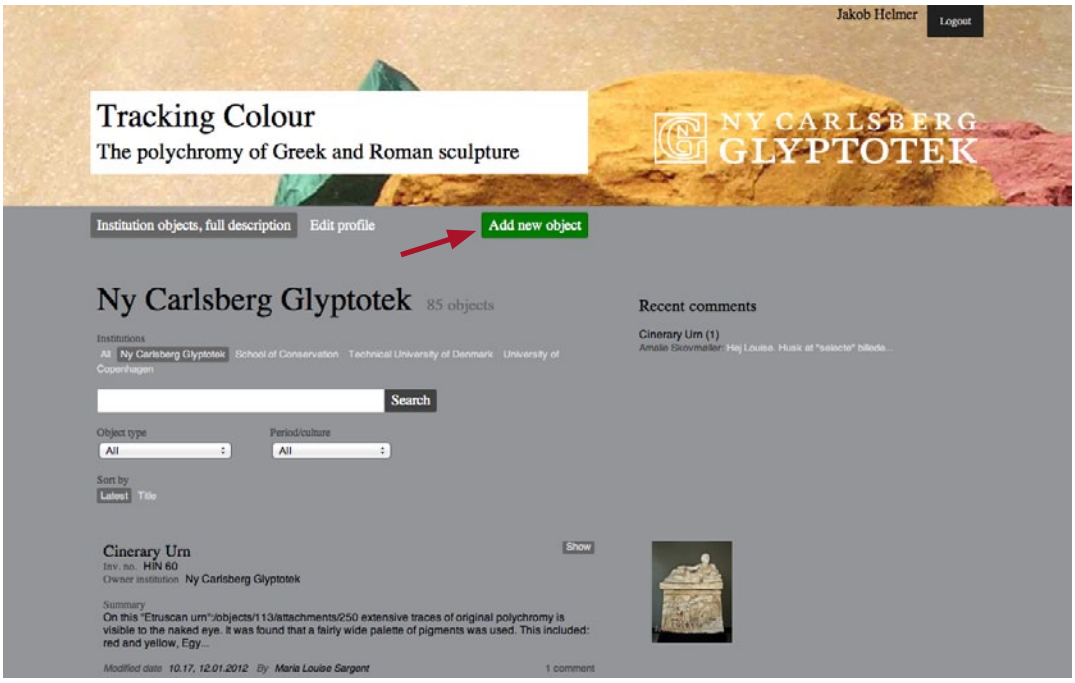

Fig. 4: Screen-shot of the first page of the back end.

2 V. Brinkmann 2010; M. Scharff et al. 2009.

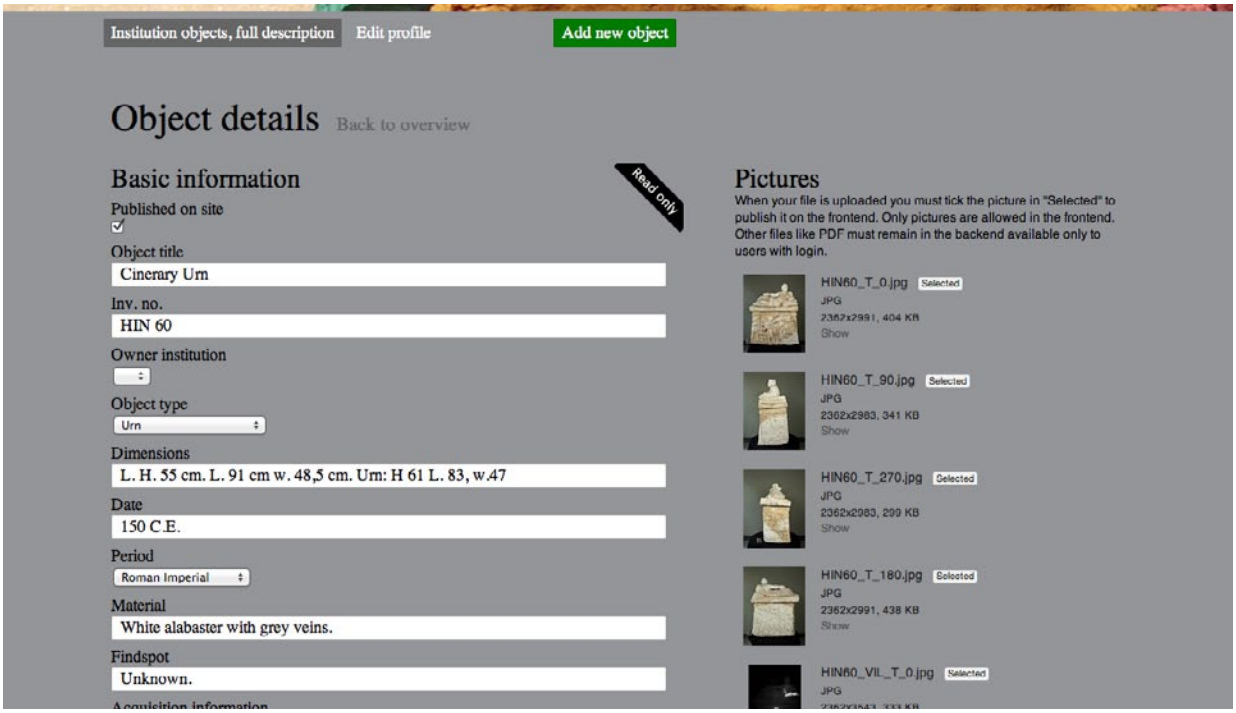

Fig. 5: Screen-shot of the back end: Detail of filling out the formula when uploading a new object.

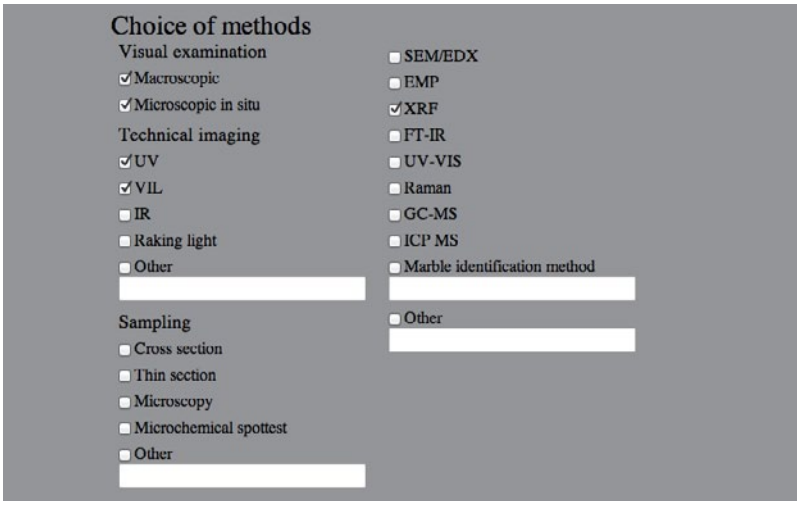

Fig. 6: Screen-shot of the back end: Detail of filling out the formula when uploading a new object: Choice of methods.

Fig. 7: Screen-shot of the back end: Detail of the bottom of the page when viewing the individual objects.

OPEN SOURCE, COPYRIGHT AND VIRTUAL WORKSPACE

The website and all the data it contains are based on an open source system. By this we mean that all data and information contained in the system may be used free of charge for non-profit purposes.

The most important functions of the website are the exchange of research data between scholars and the communication of research activities and results to the broader public. To a modern Western public it is almost a shock that Greek and Roman sculpture and architecture in white marble was in fact originally polychrome. A website with searchable databases therefore seemed an important tool for communicating and sharing the data, and doing this without restrictions is today the premise of exchanging information on the internet.

This does, however, clash with the traditional mentality of the academic community.[3] For many scholars this is determined by the simple fact that their academic career depends on the quantity and quality of their publications, so their scepticism towards sharing knowledge in open source systems is very understandable. We hope that this website can contribute to a change of mentality, or at least to the development of programmes and systems facilitating exchange and sharing of intellectual properties.

FUTURE WORK ON THE WEBSITE

Although the website will hopefully be on-line from April 2012, work on the site will by no means cease. Maintaining the website will be an everyday job, making sure that the system and its functions are up to standard. Moreover and as importantly, the site has many functions that need to be continuously developed. As we have no prior experience, we cannot really tell which functions our users will miss, both in the front and the back end. We first need to see and evaluate the use of the website. For example, we wanted the users of the back end to have some sort of communication platform that contributed to the exchange of knowledge, but we had difficulties in visualizing the design and functions of such a tool. The compromise in the end was to give the users the opportunity to communicate through comments attached to the individual objects. We will then wait and see what the actual needs turn out to be and develop the function accordingly. Providing our users with too many options at the outset might well in the end lead to a loss of interest.

Thus, work on the website does not end when we go on-line. On the contrary, work on the website will continue, but it will change character to become more directed towards developing its functions in the light of the needs identified by users of the site.

So: let us know what you think and send us your suggestions for improvements!

3 J.L. Hilton 2003.

Other NCG/CPN activities in 2011 53

Lectures and Papers Presented at Scholarly Meetings

M.L. Sargent and J.S. Østergaard
"Farven i antik skulptur: Et tværfagligt forskningsprojekt"
Organization of Danish Museums, Annual Meeting, 18 November 2011.

A. Skovmøller
"The NCG/CPN polychromy project database and website"
Ancient Sculptural Polychromy: A Round Table Workshop at the British Museum 15–16 September 2011.

R.H. Therkildsen
"The Copenhagen Polychromy Network: Visual Examination Procedures and Protocols in Documenting and Investigating Ancient Sculptural Polychromy"
International conference on the aesthetics of ancient art. Medelhavsmuseet, Stockholm, 14 January 2011.

R.H. Therkildsen
"Recent investigations into the polychromy of a Late Roman garland sarcophagus, IN 2468"
Ancient Sculptural Polychromy: A Round Table Workshop at the British Museum, 15–16 September 2011.

J.S. Østergaard
"The Copenhagen Polychromy Network: Aims, Organisation and Activities"
International conference on the aesthetics of ancient art. Medelhavsmuseet, Stockholm, 14 January 2011.

J.S. Østergaard
"The 'Sciarra Amazon' in the Ny Carlsberg Glyptotek and the polychromy of Roman ideal sculpture"
Archäologisches Institut, Universität zu Köln, 1 February 2011.

J.S. Østergaard
"Farven i antik skulptur: Europæiske idealer udfordres"
Saxo Institute, University of Copenhagen, 4 May 2011.

J.S. Østergaard
"The Polychromy of Greek and Roman Sculpture in the Ny Carlsberg Glyptotek, Copenhagen"
VII Reunión de escultura romana en Hispania, Santiago de Compostela y Lugo, 4–6 July 2011.

J.S. Østergaard
"Reflections on the typology and context of the Richmond Caligula"
Caligula Symposium. Virginia Museum of Fine Arts, Richmond Virginia, 4 December 2011.

J.S. Østergaard
"Colour: The Fourth Dimension of Ancient Sculpture
Research on Greek and Roman sculpture in the Ny Carlsberg Glyptotek, Copenhagen: organization, methodology and recent results"
Archäologisches Institut, Universität Hamburg, 7 December 2011.

J.S. Østergaard
"Ancient sculptural polychromy in the Ny Carlsberg Glyptotek: research and recent results"
Winckelmann-Institut der Humboldt Universität zu Berlin, 14 December 2011.

Ancient Sculptural Polychromy: A Round Table Workshop at the British Museum 15–16 September 2011

LIST OF PARTICIPANTS (SPEAKERS HIGHLIGHTED •)

Janet Ambers: Scientist, Department of Conservation and Scientific Research, BM
- **Clarissa Blume**: Researcher, Goettingen University
- **Brigitte Bourgeois**: Scientist, Institut National d'Histoire de l'Art, Paris
- **Hariklia Brekoulaki**: Researcher, National Hellenic Research Foundation, Athens

Vinzenz Brinkmann: Head of Antiquities Collection, Liebieghaus Skulpturenslg, Frankfurt a.M.
Amanda Claridge: Professor of Roman Archaeology, Royal Holloway, University of London
- **Joanne Dyer**: Scientist, Department of Conservation and Scientific Research, BM

Lesley Fitton: Keeper, Department of Greece and Rome, BM
Catherine Higgit: Head of Science, Department of Conservation and Scientific Research, BM
Peter Higgs: Curator, Department of Greece and Rome, BM
Jeremy D. Hill: Research Manager, Directorate, BM
Ian Jenkins: Department of Greece and Rome, BM
- **Ulrike Koch-Brinkmann**: Archaeologist, Stiftung Archäologie, Munich
- **Annemarie La Pensée**: Scientist, Conservation Technologies, National Museums Liverpool
- **Paolo Liverani**: Professor, Dipartimento di Scienze dell'Antichità, Università di Firenze

Trinidad Nogales Baratte: Minister, Ministry of Culture and Education, Extremadura Province, Spain; prevented
Mark Norman: Chief Conservator, Department of Conservation, Ashmolean Museum, Oxford
- **Thorsten Opper**: Curator, Department of Greece and Rome, BM

David Saunders: Keeper, Department of Conservation and Scientific Research, BM
St John Simpson: Curator, Department of the Middle East, BM
- **Sophia Sotiropoulou**: Senior researcher at the Ormylia Foundation, Art Diagnosis Center, Greece
- **Jan Stubbe Østergaard**: Research Curator, Ny Carlsberg Glyptotek

Judith Swaddling: Curator, Department of Greece and Rome, BM
Tracey Sweek: Conservator, Department of Conservation and Scientific Research, BM
- **Heinrich Piening**: Conservator, Bayerische Verwaltung der staatlichen Schlösser, Gärten und Seen
- **Maria Louise Sargent**: Conservator, Ny Carlsberg Glyptotek
- **Peter Schertz**: Curator, Virginia Museum of Fine Arts
- **Amalie Skovmøller**: Research Assistant, Ny Carlsberg Glyptotek
- **Rikke H. Therkildsen**: Conservator, Ny Carlsberg Glyptotek
- **Giovanni Verri**: Lecturer, Centre for Sustainable Heritage, Bartlett School of Graduate Studies, University College London

Susan Walker: Keeper, Department of Antiquities, Ashmolean Museum, Oxford

Further colleagues joined at least some of the sessions.

THURSDAY, 15 SEPTEMBER 2011

09.30 – 09.45 Arrival at Sackler Rooms, British Museum

09.45 – 10.00 Welcome and Introduction

10.00 – 10.45
Thorsten Opper*, Joanne Dyer*, Giovanni Verri, Lorenzo Lazzarini
Rome to Cyrene and Beyond: Recent work at the British Museum

Work has continued on the Treu Head (1884,0617.1), an important Roman marble head of the mid-second century AD. Stable isotope analysis (carried out by Prof L. Lazzarini) has identified the marble source and strongly indicates that all fragments belong together, confirming our previous observations. This may also provide further clues to the sculpture's ancient appearance. The head has been laser-scanned and a first replica produced in preparation for a future physical reconstruction of its polychrome rendering.

The methodology employed in the examination of the Treu Head (non-invasive imaging techniques and invasive analytical methods) has in the meantime been applied to other examples of potential sculptural polychromy within the collection. A particular recent focus has been on marbles from the ancient city of Cyrene (modern Libya), partly in order to explore the potential for a larger project focussing on this site (the British Museum contains a strong collection of Cyrenean sculpture acquired through R. Murdoch Smith and E. A. Porcher in 1860–1861).

On a marble portrait head of Marcus Aurelius from Cyrene dating to AD 160–180 (1861,1127.162), hematite was identified on the lips and a remnant of hematite-based skin tones and carbon black on the beard. In this case, no evidence of Egyptian blue was observed. In addition, the eyes were originally inlaid in a different material. The examination of a slightly earlier Cyrenean full-length female portrait statue has only just begun (1861,1127.19).

Work was completed on two marble heads discussed at previous meetings, a marble head of Queen Berenike II from Cyrene (1861,1127.145) dating from 246–221 BC, and the head of a marble figure from the Classical Temple of Artemis at Ephesos (1872,0405.121) of the fourth century BC. In addition to Egyptian blue, traces of skin tones were found in both cases, but there was no surviving evidence for the type of elaborate composition used to create the subtle tonal variations in the depiction of skin found on the Treu Head. Instead these were largely composed of hematite with possible calcite highlights.

Throughout this work, it has proved essential to use complimentary techniques of imaging, microscopy and analysis to identify polychromy, as such traces would not always be apparent using any single method. In the cases discussed above, such an approach has been successful in confirming the existence of surviving traces of colour. However, none of these remnants are as intricate in composition or execution as those found on the Treu Head. This may relate to the original use of less complex or less profuse paint layers or merely reflect greater losses over time, but these traces nonetheless represent real examples of colour on sculpture. It is likely that the objects examined in this study may be more typical of what is to be found in museum collections than exceptional pieces such as the Treu Head, but it is important that these often minimal but still significant traces of colour are not overlooked in our search for another piece of such quality.

10.45 – 11.05 Coffee

11.05 – 11.50
Vinzenz Brinkmann, Ulrike Koch-Brinkmann*, Heinrich Piening
The Colours of Chiotissa

Last August the polychromy of Acropolis Kore 675 (the so-called Chiotissa) was re-examined in collaboration with the Acropolis Museum team. The new insights gained, together with the faithful documentations of Gilliéron père and detailed remarks of W. Lermann, did enter in a reconstruction which is applied on a PMMA 3D print and has been accomplished lately. The Chiotissa project will be "launched" on the occasion of the Vienna Bunte Götter show, which will take place next spring in the Kunsthistorisches Museum.
(A short report on the activities of Stiftung Archäologie will be incorporated, especially on the joint efforts with the University of Göttingen.)

11.50 – 12.35
Clarissa Blume*
The Frankfurt Muses: Appearance, Shared Polychrome Characteristics, Origin, Re-Painting Over the Course of Time

As part of my wider research on the polychromy of Hellenistic sculpture, I examined a group of Muses in Frankfurt. The findings are of great interest. The statues' polychromy is well preserved and raises a number of thrilling questions. With different empiric analyses, such as with the naked eye, a microscope, UV-light, the VIL-technique developed by Giovanni Verri, as well as colour-analyses by Heinrich Piening, it was possible to gain a good understanding of how the sculptures were designed. Based on that, further questions could be addressed. The paper presents the polychromy of the Muses and continues with three particular questions: firstly, to what extent did the polychrome layout of the sculptures match one another? Secondly, are we able to tell the origin of the sculptures by particular characteristics of their polychrome layout? And thirdly, might we have evidence here for a re-painting of sculptures, possibly even at different periods?

12.35 – 13.30 Lunch

13.30 – 14.15
Jan S. Østergaard
The Copenhagen Polychromy Network Main Project: A brief update

Activities and selected results for 2009 and 2010 are found in our two preliminary reports (http://www.glyptoteket.dk/sites/default/files/tracking-colour_report01_2009.pdf and http://www.glyptoteket.dk/sites/default/files/tracking-colour_report02_2010.pdf).

An outline of activities carried out in the spring of this year, of the status of the project and of plans for the future will be given.

Rikke H. Therkildsen*
Recent investigations into the polychromy of a Late Roman garland sarcophagus, IN 2468

Basic information on the sarcophagus is found in J.S. Østergaard et al., Catalogue. Ny Carlsberg Glyptotek. Imperial Rome (1996) 112–115, no. 48. It was found in 1884 on the Via Tiburtina near the Campo Verano in Rome. The suggested date is c. 300 CE

This contribution reviews the interesting results of the technical investigations into the polychromy of the reliefs on the front of the chest and on the lid panel. They have extensive remains of original colour: besides gilding, the sarcophagus reveals a rich colour-palette of pigments such as Egyptian blue, madder lake, cinnabar and ochre. The garland sarcophagus not only provides first-hand knowledge on the chromatic scheme and painting techniques

in the Late Roman period but is also representative of a category within sculptural polychromy which remains poorly investigated. Although sarcophagi are frequently well-preserved due to their funerary context, the colour scheme of their reliefs have only been studied in a few cases.

The visual examination of the garland sarcophagus included handheld video microscopy followed by technical analytical imaging using ultra violet fluorescence (UVF) and visible-induced luminescence (VIL). Furthermore, to obtain insight into the stratigraphy and composition of the paint layers, samples were taken for cross-sectioning. The cross-sections were analysed by means of polarised light microscopy (PLM) to provide data on particle size, size distribution, colour, shape and morphology which are critical for the identification of the different types of pigments. These data are compared and supported by non-destructive quantitative chemical analysis of the paints-layers by means of electron microprobe analysis (EMPA).

Amalie Skovmøller*
The NCG/CPN polychromy project database and website

Background information on this element of our project is found in A. Skovmøller, Tracking Colour Online: Managing and Sharing the Digital Assests of the CPN/NCG Project, in: J.S. Østergaard (ed.), Tracking Colour. The polychromy of Greek and Roman sculpture in the Ny Carlsberg Glyptotek. Preliminary report 2, 2010, 61–67 (http://www.glyptoteket.dk/sites/default/files/tracking-colour_report02_2010.pdf). Since May, the base and the site have been under construction. This contribution reports on progress so far.

14.15 – 15.00
P. Schertz
The Virginia Museum of Fine Arts' Caligula
(No summary)

15.00 – 15.20 Coffee

15.20 – 15.45
Paolo Liverani*
A progress-report on ongoing projects in Italy

In the last year the efforts of our group were focused on the Polychromy Meeting held in Florence in November, where some of the participants to this Round Table kindly intervened with very interesting papers together with other Italian colleagues. Ulderico Santamaria and I hope to publish the proceedings by the first part of the next year.

In the same period the Laboratory for Diagnostic, Conservation and Restoration of the Vatican Museum directed by U. Santamaria acquired the equipment necessary for VIL examination. The shots are in course and I hope to give some first elements: in our project there is the Augustus of Prima Porta, the Ara dei Vicomagistri and some sarcophagi. On the other hand we depend on the resolution of some problems due to the daylight, which in summer is particularly strong in the Galleries of the Museum.

We hope in the near future to be able to carry out the same kind of examination also on works of other museums in central and southern Italy.

I can also give some preliminary news about other projects of younger colleagues related to our issue. Eliana Siotto embarked on a systematic survey of the sarcophagi of the National Museum of Rome, obtaining several samples that will be examined in the laboratory of the CNR at Pisa. She is now in charge to develop this studies and the virtual reconstruction of the colours on 3D model of sculpture in a three year joint-project between CNR and "Normale" University of Pisa.

Sara Lenzi (University of Florence), began the study of the so-called monochrome slabs from the National Museum of Naples and – less known – of a couple of similar slabs of the Kunsthistorisches Museum in Vienna, obtaining new UV-light photographs which revealed interesting details and a painting technique more complex and interesting than previously believed.

15.45 – 16.30
Trinidad Nogales Baratte (read by J.S. Østergaard)
Sculptural Polychromy in Ancient Hispania: The Example of Augusta Emerita
(No summary)

16.30 – 17.05
Annemarie La Pensée*, Martin Cooper
Non-contact replication, using 3D laser scanning and rapid manufacture techniques, to create reconstructions of sculpture for research, visitor interpretation and interaction.

Non-contact replication using 3D laser scanning in combination with rapid manufacture and robotic machining techniques allows highly accurate replicas of objects with friable and vulnerable surfaces to be created in a wide range of natural and synthetic materials. These replicas can be used in real world reconstructions of colour, form or both. Replicas created by Conservation Technologies – National Museums Liverpool for use in reconstructions have been used for research, on-gallery visitor interpretation and hands-on public engagement.

This talk will examine some of the ethical questions that can arise in the course of replication projects, such as; Replica, copy or fake? What is highly accurate? Is human subjectivity removed if we use laser scanning and rapid manufacture? Do we need real world reconstructions, or can it all be done on-screen? These questions will be discussed in the context of example case studies of projects undertaken by Conservation Technologies (NML) including; A replica marble head of Caligula from the Ny Carlsberg Glyptotek; A replica nylon Treu head from the British museum; An interactive based on a sculpture of Artemis (NML), and some pre-historic footprints.

19.30 Speakers' dinner

FRIDAY, 16 SEPTEMBER 2011

09.30 – 10.00
Brigitte Bourgeois*
A beeswax coating on the portrait head of Berenike II at Mariemont

Kept at the Royal Museum of Mariemont, Belgium (inv. B 264), the marble head of a Ptolemaic queen, usually identified as Berenike II and dated to the end of the 3rd century BC, bears important remains of ancient polychromy (painting and gilding), known since the discovery of the object in Egypt, in 1901. It belonged to an official statue of the queen that stood in a temple in Hermoupolis Magna. A scientific study has recently been undertaken - and is still under way - with the support of C2RMF (Centre de recherche et de restauration des musées de France, Paris). It has started to yield a number of results on the ancient painting and gilding techniques, as well as on traces of refurbishing in antiquity. It has also brought forth new evidence in favour of an ancient coating of the surface with beeswax. A brief preliminary report will be given on the detection and analysis (through FTIR and gas chromatography) of this wax coating, related probably to some ganôsis treatment.

10.00 – 10.45
Hariklia Brekoulaki*, G. Kavvadias, S. Sotiropoulou
A preliminary examination of the polychromy of Classical Attic marble vases from the National Museum Collection at Athens

A group of early Classical marble pyxides from the collection of the National Museum at Athens, deposited as luxurious offerings to a female burial in Attica, are preserving significant traces of figural compositions and polychromy. They represent rare testimonies of Classical "miniature" painting of a high artistic skill, using an extraordinary gamut of pigments. The present study focuses on the results of a non-invasive analytical examination at the National Museum with XRF, RAMAN, XRD and near-infrared digital imaging. The potential of a new portable XRD-XRF instrumentation (Duetto XRD/XRF) will also be discussed. Among the gamut of pigments – including lead white, hematite, cinnabar, orpiment, carbon black and gold leaf – lapis lazuli was identified for the first time as a pictorial material in ancient Greek painting of the historical periods, reflecting the luxurious character of those rare artefacts. (Dr. Giorgos Kavvadias is curator of the vase collection at the National Museum at Athens)

10.45 – 11.05 Coffee

11.05 – 11.45
Heinrich Piening*
Gold to purple: a corrosion product of gold on ancient marble

Traces of a violet colour can occasionally be observed on the surfaces of ancient marbles. At first sight, this colour seems to be associated neither with the former polychromy of the sculpture nor with the surrounding areas. However, close observations revealed that in each case the violet colour seems to occur near formerly gilded areas. So far, the colour could not be identified by using XRF technology.

In May 2011, the Brinkmann team in cooperation with Jan Stubbe Østergaard was given the opportunity to carry out analyses on polychromy on an Artemis figure at the Ny Carlsberg Glypthotek in Copenhagen, showing a violet colour phenomenon also observed on other antique marbles. Research in several spectra libraries revealed a first hint at the origin of the violet material. The UV-VIS-spectra show a close similarity to gold purple, a pigment made of gold and tin which is known as 'purple of Cassius'. Purple of Cassius is a synthetic pigment but it can develop as a corrosion product of gold in the presence of trace elements

naturally occurring in the marble. In practical tests very similar gold purple could be synthesized on marble samples. The spectra of these products are very similar to those of the Copenhagen Artemis.

11. 45 – 12.30
Giovanni Verri*, Janet Ambers, Judith Swaddling
The embroidered garment of an Etruscan female figure from Polledrara

Many Etruscan sculptures bear extensive remains of pigment but the gypsum statue of a woman from the so-called Polledrara or Isis Tomb at Vulci, ancient Etruria, is rare in that it retains extensive evidence of intricate painted patterns on the drapery. Dating from about 570–560 BC (BM 1850,0227.1) the statue represents a woman making an offering. She is elaborately dressed in a chiton, a long tunic, belt, which once had gilt decoration, an himation, or mantle, and sandals, originally painted red. The figure has clearly been subject to fire at some time and parts of the sculpture show considerable damage. Traces of very fine painted decoration remain, however, in particular towards the base of the figure, and are visible to the naked eye.

In the attempt to reconstruct the original painted border of the chiton, technical imaging (infrared-reflected, ultraviolet- and visible-induced luminescence imaging) and Raman spectroscopy of microscopic samples were undertaken. The visualization of the lotus embroidery on the hem of the tunic using infrared-reflected and visible-induced luminescence imaging has allowed a new interpretation of its composition.

12.30 – 14.00 Speakers' Lunch

14.00 – 16.00 Closed session for speakers

Various Activities in 2011

PARTICIPATION IN PROJECTS ABROAD

Stiftung Archäologie, München[1]
J.S. Østergaard is a member of the Wissenschatfliches Beirat of the Stiftung.

The Virtual World Heritage Laboratory, University of Virginia at Richmond
J.S. Østergaard has been a member of the international advisory group for the Laboratory's project to virtually reconstruct the polychromy of the portrait statue of Caligula in the Virginia Museum of Fine Arts.[2] The project results were communicated and discussed at a symposium in the VMFA on December 4, 2011: 'Caligula 3-D: Man, Myth, Emperor'.

PUBLICATIONS

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INTERNET AND FILM

The project to produce a documentary film entitled 'Tracking Colour', on the NCG/CPN project, still lives. The film received development funding in 2009 from the Danish Film Institute and from the EUROMedia programme in 2010. Shooting has continued in 2011, but funding of the production phase has yet to be found.

The 'The Colour Portal' project, a website resource on ancient sculptural and architectural polychromy, received a 200,000 DKK grant from the Danish Ministry of Education in early 2011. Unfortunately, strenuous efforts to raise the remaining 50 % have not born fruit, and the project has therefore been closed down. The NCG/CPN participated in an advisory capacity.

1 http://www.stiftung-archaeologie.de/

2 Cf. http://www.digitalsculpture.org/caligula/index01.html
http://www.vmfa.museum/uploadedFiles/VMFA/Learn/adults/Caligula_schedule.pdf

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Anter, K.F.: Colour in the Pompeian cityscape, in: Wilguni, M. (ed.), Streets, Spaces and Places. Three Pompeian Movement Axes Analysed, Uppsala 2011, pp. 243-313

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Bookidis, N.: Corinth. Results of excavations conducted by the American School of Classical Studies at Athens. Vol. XVIII.5. The Sanctuary of Demeter and Kore. The terracotta sculpture. New Jersey 2010. On the polychromy, materiality and technique of the terracotta sculptures see pp. 63–77. Colour plates 1–8.

Brinkmann, V.: The Persian Rider from the Athenian Acropolis; or, a reconstruction of the Third generation . Source. Notes in the History of Art XXX, no. 3, Spring 2011, pp. 12–17.

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Graepler, D. (ed.): Bunte Götter. Die Farbigkeit antiker Skulptur. Eine Einführung. Archäologisches Institut der Georg-August Universität Göttingen 2011.

1 Some 2010 publications were overlooked in bibliography given in our Preliminary report 2, 2010, and are therefore included here. We are bound to have missed relevant publications and would greatly appreciate corrections and additions to the bibliography. These will be entered into the bibliographical database on the Tracking Colour website which is now in the final stages of construction. The contact person is Amalie Skovmøller, project research assistant, at amsk@glyptoteket.dk.

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