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**Vitruvius and Antique Techniques of Plaster Work and Painting**

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**Abstract** The current project *Vitruv und die Techniken des Raumdekos* is focused on the investigation of ancient plasters and painting techniques in the context of the specifications of Vitruvius’ *De Architectura Libri Decem*. A multidisciplinary group of scientists composed of conservators, architectural historians, archaeologists and philologists is dedicated to the elaboration of a new German translation and critical annotation of the technical terms and descriptions of Vitruvius’ work, particularly books II, VII and VIII. Instructions from the text will be compared to archaeological proof and experimental archaeology. Research on the reception of Vitruvius’ descriptions in the Renaissance, both in written sources as well as in built architecture, is another aim of the project. Here again the focus is set on plasters and painting techniques.

1 The new edition and translation of Vitruvius’ descriptions of art technology

1.1 Text and present translations

Marcus Vitruvius Pollio (~84–20-10 BC), the author of the *De Architectura*, was a Roman architect, art historian and engineer in military and hydraulic construction. Little is known about his life and information is mostly provided by his own remarks where he relates to his close connection to Imperator Augustus, whom he dedicated his work. Divided into ten sections or “books”, *De Architectura* covers almost every aspect of architecture, from town planning, materials, decorations, temples to water supplies, etc. His work today represents
the only major antique written source on architecture and building techniques in the West.

Since its “rediscovery” in the beginnings of the 15th century, at the very latest since the first printed edition in the 2nd half of the 15th century, Vitruvius’ work forms the foundation for any kind of argument with antique architecture, especially for the Roman culture. His doctrine about proportions and his descriptions of the orders of architecture, henceforth, became a central part of modern architectural theory. Renaissance architects were anxious to employ Vitruvius’ descriptions in their own work, trying to get as close as possible to classical, and therefore renaissance, ideals.

The original text version is lost, but the content has been preserved through the ages by several medieval transcriptions. All of them are faulty and in addition to the difficulties in the interpretation of the Vitruvian language and the peculiarities of his descriptions, the understanding is not always absolutely certain. Its singularity does not allow comparisons to other texts with similar contents. Therefore every edition and translation cannot be more than a careful attempt to reconstruct the original text. Despite the long lasting philological tradition in interpreting Vitruvius’ work there still remain many unsolved questions.

So far De Architectura has been translated into several languages (Italian, Spanish, English, Dutch, German, Polish and French). The latest German edition was published in 1964 [1]. A comparison of various editions points out the mismatches between them. In the context of technological content this is not amazing due to the fact that all existing versions are based only on a philological approach to the Latin and Greek manuscripts. Considering the cloudy indications of Vitruvius, augmented by the incomplete written records this is no wonder, especially as the respective references of modern technical literature provide only inconsistent information.

On the other hand, the different disciplines, which base their research on editions and translations of De Architectura, are confronted with a heterogeneous, and in parts simply misplaced, professional terminology. In the case of the most recent German translation from 1964 [1], the terms are partly antiquated.

1.2 Interdisciplinary co-operation between archaeologists, philologists and conservators

Besides the linguistic difficulties of translating Vitruvius’ texts, the technological contents are also not sufficiently discussed in the existing translations of De Architectura. The different independent references, which are cited in the commentaries, can only provide limited information because the references are rarely based on systematic studies of roman wall paintings. Linking the archaeological-philological and scientific-technological disciplines involves the broad research of all the single facets and edificial details which are described by Vitruvius. The result of the investigation is set to enlighten Roman construction
and decoration techniques, diverging from the current state of research in order to provide a new reference for later studies on the topic.

The existing research and discussions in context with the brilliant smoothness of Roman wall paintings are a good example to demonstrate the difficulties presented by the interpretation of Vitruvius’ descriptions. Book VII, 3 of De Architectura is dedicated, amongst others, to the composition of mortars, the way to apply them to walls and how they are to be treated in order to reach the special shine and firmness which at all times have invited admiration. Comparing various translations shows the wide range of possible interpretations which result from a simple translation of the Latin texts.

“Sed et liaculorum subactionibus fundata soliditate marmorisque candore firmo levigata, coloribus cum politionibus inductis nitidos experiment splendores.” [1, 3, 4]

“[…] sondern sie werfen auch, wenn sie mit Stöcken dicht geschlagen und mit hartem Marmorstaube geschliffen, zugleich aber heym Poliren mit Farben überzogen werden, einen schimmernden Glanz von sich.” [2]

“Wenn aber der feste Verputz infolge der Bearbeitung mit Liacula noch verdichtet und mit hartem festem Marmorweiß (Marmormehl) geschliffen ist, werden die Wände, wenn die Farben zugleich mit dem Putz aufgetragen werden, einen schimmernden Glanz zeigen.” [1]

“Mais lorsque leur solidité, assurée en profondeur par la pression des taloches, aura de surcroît acquis par le lissage la blancheur éclatante du marbre, les murs, grâce aux couleurs étendues avec la couche de finiton, jetteront un brillant éclat.” [3]

“Ma una volta che la loro compattezza è stata consolidata, strofinandola con spianatoi, e levigata con il marmo lucente e duraturo, le pareti irradiano la più smagliante lucentezza dopo che, assieme alla rifinitura finale, vi saranno spalmati i colori.” [4]

“But once the durability of such revetments has been ensured by being worked over with plasterers’s floats and polished with bright and stable marble-powder, they will be brilliantly luminous when the colours have been applied with the final surface.” [5]

The differences between the single translations are obvious: depending on the function of the marble in context with shiny wall surfaces, the interpretation of the sentence leads to completely diverse meanings. On one hand, marble forms the material used to polish a plastered surface and on the other, it has a metaphoric meaning describing the intended effect. From the technical point of view the cited translations involve both completely different working processes and the different associations concerning the tools used.

At the same time scientific approaches have been undertaken in order to separate the problem of translation from the built evidence. Several theories explaining the working-process can be found in related literature:

- The earliest theories focus on the technique of Roman encaustic painting (painting with pigmented, heated beeswax). During a grand dispute amongst experts in Munich about 100 years ago, there were two different beliefs: The first, represented by Berger, thought the secret of the smoothing techniques of
mortars would be the “Ganosis”, i.e., the treatment of the painted walls with hot wax; this theory relates to an interpretation of a quote from Vitruvius about the treatment of cinnabar colour coats with the help of wax (book VII, 9). The second belief was represented by the “fresco theorists” Keim, Donner von Richter, Laurie, Raehlmann and Eibner. The latter led the debate in 1926: in his book “Entwicklung und Werkstoffe der Wandmalerei vom Altertum bis zur Neuzeit”, he primarily described the antique wall painting technique as a fresco technique [6]. As to Eibner, there is no proof of the use of encaustic techniques in the various chemical studies of original and untreated fragments of antique wall paintings.

- The assumption that protein glues could assist in the smoothing process of wall painting surfaces is mentioned often; Klinkert [7] for example, suspects the use of animal glues for fresco wall paintings. In this context he quotes Vitruvius’ remark on the mixing of animal glue with carbon black in order to paint plastered walls (book VII, 10).

- In 1984 Mora and Philippot [8] brought a new aspect to the discussion; they presumed that the addition of clay minerals to the upper layers of mortar was done to ease the smoothing process. This theory is confirmed by the findings of yellow and red ochre with a high content of aluminates and silicates, as well as white pigments based on clay minerals like kaolin, in painting and plastering layers; also Vitruvius himself describes the use of yellow ochre to smooth the surfaces of wall paintings (book VII, 7).

All attempted explanations are associated with the opus of Vitruvius at the one hand and with several independently conducted analytical studies on the other. The described theories coexist until now, and for each, new evidence can be found in the recent past. For example the encaustic theory, which seemed to have been disproved since the final publication of Eibner in 1926, has again been picked up by Augusti during the 1960’s [9], and in the last few years further articles about the application of wax to wall paintings, proved by natural scientific studies, have been published [10, 11].

The approach to the problems, which arise in context with the smoothing process of antique roman wall paintings, show the necessity of more extensive studies relative to the topic. Against this background the current research project intends to create a new German edition of De Architectura, focussing on wall decoration techniques, especially in respect to its technological content. For the first time an interdisciplinary interpretation will be possible by linking an archaeological-philological analysis on the one hand with scientific-technical examinations on the other, supplemented by experimental reconstructions to verify the on-site findings.

Besides better knowledge of the antique working process of wall paintings, the project will illuminate further unexplained questions. The planned chronological, geographical and sociological studies on antique architecture will also provide new insights into the significance of Vitruvius and De Architectura in ancient
times. Because of the lack of comparable antique sources a correlation to other literary works is not possible and today’s interpretation of De Architectura is not easy to achieve. It becomes even more complicated due to the fact, that hardly anything can be said about the author’s life. What we know is that as an architect, Vitruvius did rarely supervise building construction. Therefore, the bigger part of his opus is not based on his own experience, but on other sources: for example, his education by different masters, his own observations and the profound knowledge of various writings from primarily Greek authors.

Against this historical and sociological background it currently appears highly desirable to find out how much De Architectura does indeed represent antique building techniques and in which way Vitruvius’ writings were adapted from the ancient world. Thus, the question as to how much of Vitruvius’ descriptions are based on real ancient traditions, should be discussed in a widespread manner.

2 Project status

In addition to broad research of literature, analyses of roman buildings are the main pillars of the project. The results of the studies on buildings and mortars will then be verified within workshops where the main topics will be mortar components and the techniques of surface treatment. All samples will be available for subsequent analytical research.

In this first stage of the project, Augustan wall paintings on the Palatine will be of main interest for further examination. Parting from the fact, that Vitruvius had close relations to Imperator Augustus, the probability of finding implementations of Vitruvian techniques in these buildings can not be dismissed. Research on these archaeological sites may provide new information which can be used to solve the linguistic problems of the Latin standard text and, in addition, can provide crucial evidence for the understanding of the role De Architectura played in antique times.

During the project several work stays in Italy are planned – the first took place during May 2010 for one month. Besides comprehensive studies at the libraries of the Istituto Superiore per la Conservazione ed il Restauro (IsCR) and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCRoM), the opportunity arose, with the kind permission of the ‘Soprintendenza Speciale per i Beni Archeologici di Roma’, to visit buildings with Augustan wall paintings on the palatine (Casa di Augusto, Casa di Livia, Aula Isiaca) and at other archaeological sites in Rome (Villa di Livia).

In addition to the results achieved in May, ongoing research promises crucial findings. They are to be published altogether in the near future.

Within the studies, regarding the reception of Vitruvius’ descriptions in the Renaissance, the focus is laid on specific buildings in Munich (St. Michael’s church, the Antiquarium at the Munich residence and the arcades of the
Hofgarten) and Bavaria (Stadtresidenz Landshut, Schloß Wetzhausen). Future research will expand the topographical emphasis to Italy, where the Renaissance had its origin and from where many travelling artists communicated both stylistic and technical developments.

Fig. 1 Workshops for the experimental reconstruction of antique roman plaster-techniques at the studio for stucco-works at the Akademie der Bildenden Künste in Munich (Photo: Kilian)

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