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Vitruvius and antique techniques of plaster work and painting

Laura Thiemann[1], Stefanie Gerzer[2], Ralf Kilian[3]

[1] Technische Universität München, Lehrstuhl für Restaurierung, Kunsttechnologie und Konservierungswissenschaft, thiemann@rkk.arch.tu-muenchen.de

[2] Technische Universität München, Lehrstuhl für Restaurierung, Kunsttechnologie und Konservierungswissenschaft, gerzer@rkk.arch.tu-muenchen.de

[3] Fraunhofer Institute for Building Physics, Holzkirchen, Preventive Conservation and Heritage Preservation, ralf.kilian@ibp.fraunhofer.de

Abstract The current project *Vitruv und die Techniken des Raumdekors* is focused on the investigation of ancient plasters and painting techniques in the context of the specifications of Vitruvius' *De Architecura 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 about 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.

Since its "rediscovery" in the beginnings of the 15th century, at the 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 of interpretation of 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, French). The youngest German edition was published in 1964 [1]. A comparison of various editions points out the mismatches between them. In context with technological contents 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, even more due to the fact that the respective references of modern technical literature provide only inconsistent information.

On the other hand, the different disciplines, which base their researches on editions and translations of *De Architectura*, are confronted with a heterogeneous, 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 cooperation between archeologists, philologists and conservators

Besides the linguistic difficulties translating Vitruvius' texts also the technological contents are 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 rarely are based on systematical studies of roman wall paintings. But linking

archaeological-philological and scientific-technological disciplines involves broad researches of all the single facets and edificial details which are described by Vitruvius. The result of the investigations is set to enlighten Roman constructions and decoration techniques parting 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 how to apply them on the 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 beym 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, assureé en profondeur par la pression des taloches, aura de surcroît acquis par le lissage la blancheur éclatante du marbre, les murs, grâce aux coleurs 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 irradieranno la piú 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 brillantly 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 marble in context with shiny wall surfaces the interpretation of the sentence leads to completely diverse meanings. On the 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 completely different working processes not to forget the different associations concerning the used tools.

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

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

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

3. In 1984 Mora and Philippot [8] brought a new aspect to the discussion which presumes the addition of clay minerals into the upper mortar painting layers in order to relieve the smoothing process. Proven 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 used in painting- and plastering layers, supported by the fact that Vitruvius himself describes the use of yellow ochre in order to smooth surfaces of wall paintings, are confirming this theory (book VII, 7).

All attempted explanations have in common being 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 every one of them new evidences could be found in the recent past. For example the encaustic theory, which seemed to be disproved on since the final publication of Eibner in 1926, has again been picked up by Augusti during the 1960ies [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 approaches on the problems, which arise in the 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 contents. 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 definitely verify the on-site findings.

Besides the better knowledge of antique working progresses 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 authors life. What we know is that Vitruvius did only rarely supervise building measures as an architect himself. Therefore, the bigger part of his opus is not based on his own experience, but on other sources. For example, 1. his education by different masters, 2. own observations and 3. the profound knowledge of various writings from primarily Greek authors.

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

2 Project status

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

In this first stage of the project Augustean wall paintings on the Palatine are 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. Researches on these archaeological sites may provide new information to solve linguistic problems of the Latin standard text and in addition 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 one took place during May 2010 for one month. Besides the comprehensive studies at the libraries of Istituto Superiore per la Conservazione ed il Restauro (IsCR) and International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) we had the opportuniy, with the kind permission of the Soprintendenza Speciale per i Beni Archeologici di Roma, to visit buildings with wall paintings of the augustean period on the palatine (Casa di Augusto, Casa di Livia, Aula Isiaca) and other archeological 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 about the reception of Vitruvius' descriptions in the Renaissance the focus is laid on specific buildings in Munich (St. Michael 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 stylistic but also technical developments.

Workshops for 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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