

Modeling Hypotheses in Pompeian Archaeology: The House of the Faun

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The archaeologically accepted plan of the House of the Faun at Pompeii serves as the basis for an initial 3D computer model that employs a simulated lighting script to render the lighting conditions of interior spaces at different times of the year. The model reveals that the Alexander Mosaic, lifted in 1843 and moved to the Museo Nazionale in Naples, was apparently never seen under optimum lighting conditions in its original setting. The problem is solved by providing a new interpretation of modifications made to the colonnades associated with the mosaic and then re-configuring the model accordingly. The result is a new reconstruction of the architectural setting of the Alexander Mosaic and a new understanding of its original lighting conditions.

Keywords: Pompeii, House of the Faun, 3D Reconstruction.

1. Introduction

The collaborative investigations of Classical Archaeologist, John Dobbins, and modeler, Ethan Gruber, apply 3D computer models and new archaeological observations to research issues at Pompeii. Using the House of the Faun as a case study, this paper affirms that computer renderings are powerful tools in presenting and evaluating hypotheses because they create 3D virtual realities, including lighting scenarios, allowing archaeologists to actually *see* the implications of their own and/or competing hypotheses of other scholars. In this case study, the 3D model paved the way for on-site analyses that allowed us to transcend the conventional interpretation of a set of architectural modifications to the House of the Faun and as a result shed new light (metaphorical and literal) on the Alexander Mosaic.

The House of the Faun is one of the best-known houses in the Roman world as it is illustrated in many art history and Roman art textbooks and visited by more than a million people per year. Figure 1, the conventional plan of the house, is the basis for the model, Figure 2. A measure of the house's fame derives from the Alexander Mosaic that depicts in dramatic Hellenistic style the military confrontation between Alexander the Great and his adversary, the Persian king, Darius III. The mosaic was discovered in an exedra (large room; no. 11 in Figure 1) opening onto the first of

two peristyles in the house. The mosaic was lifted in 1843 and moved to the Museo Nazionale in Naples where it is on display today (Figure 3). In 2005 a newly-made copy was set into the floor of the exedra.

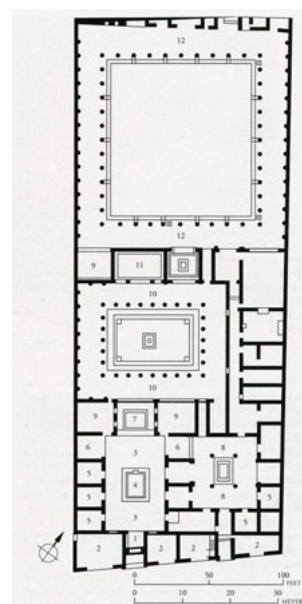


Figure 1: House of the Faun. Plan. The Alexander exedra is space 11 opening onto the first peristyle, space 10.



Figure 2: House of the Faun. Model by Ethan Gruber.



Figure 3: Alexander Mosaic. Partial view. Photograph by John Dobbins.

2. Methodology

We combine on-site archaeological analysis with 3D modeling to understand the architectural and lighting contexts of the Alexander Mosaic. The models are produced in Autodesk Maya. Using a Maya script developed by Thijs Welman, lecturer at Technische Universiteit Delft, artificial sunlight is calibrated to the latitude and longitude of Pompeii. The sun's astronomical position is calibrated to 100 B.C. for the House of the Faun (the traditional approximate date for the Alexander Mosaic). The script enables the user to calibrate the light to any minute in history back to 2000 B.C., and therefore has many uses outside the scope of this particular visualization project. The script can also animate the light in a sequence throughout a particular day or year. Consequently, time-lapse image sequences have been rendered into videos and were presented at the CAA Conference in April, 2010. The lighting package is an important methodological tool for investigating the implications of light in ancient contexts, while the 3D model itself is a useful methodological tool for allowing us to visualize architectural spaces and spatial relationships.

3. Research Issues: House of the Faun

We begin with several fundamental questions in order to explore the multiple contexts in which the House of the Faun owner and guests experienced the Alexander Mosaic. What were the original viewing conditions of the Alexander Mosaic and of the Alexander exedra? In other words, what role did the surrounding architecture play in viewing the mosaic? What were the lighting conditions? How did one approach the mosaic? Was there a preferred approach? What is the significance of certain modifications made to the colonnade in the area of the Alexander Mosaic? We address these questions by means of a 3D model that reconstructs the architectural setting of the mosaic and introduces a lighting scenario for various seasons in the year 100 B.C., and also by introducing new archaeological observations that we made on site in June 2009. We then proceed to questions that the model can't address: When was the Alexander Mosaic installed? Who was the patron? Did the mosaic have a special meaning at the time it was installed?

Prior to our on-site analysis, Ethan Gruber had created a model of the House of the Faun that revealed rather dim lightening conditions for the Alexander Mosaic (Figure 4). Only when the winter sun was low in the southern sky would any direct light shine under the colonnade roof and into the exedra to illuminate the Alexander Mosaic (Figure 5). On the one hand, this observation is not surprising because ancient interiors were dark, and the house plan reveals that the Alexander exedra was a recessed space behind a colonnade and consequently did not receive much direct light (Figure 1, no. 11). On the other hand, it was a revelation to actually *see* the lighting results in a model calibrated to various seasons in 100 B.C. The winter conditions that admitted light directly into the exedra were surprisingly unsatisfactory because four adjacent columns of the peristyle and the two columns of the Alexander exedra itself cast long shadows on the mosaic (Figures 5, 6).



Figure 4: House of the Faun. Alexander Mosaic, June 21, 100 B.C., 2:00 p.m. Ground-level view presenting the mosaic in deep shade. Model by Ethan Gruber.

To the best of our knowledge, no scholar has recognized, or at least discussed, the visual problem caused by the shadows. Our computer model played a key role in identifying this problem that appears not to have been noticed previously. How did the ancients

respond to this situation? Was the uniform dimness of summer preferable to the shadow-streaked mosaic of winter? Of course, we cannot answer for the ancients. All in all, however, it appeared that there was no season in which this highly-detailed, tour de force of a mosaic was visible under optimum lighting conditions.

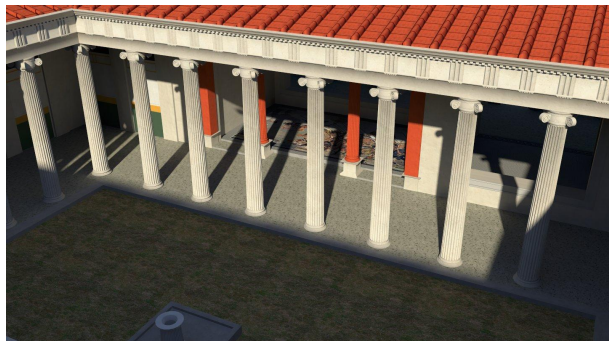


Figure 5: House of the Faun. Alexander exedra, December 21, 100 B.C., 2:00 p.m. View through northern colonnade. Model by Ethan Gruber.

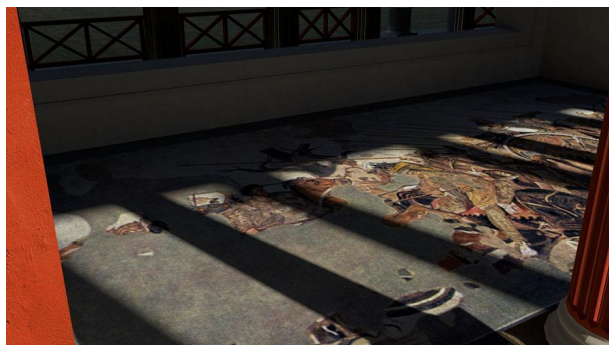


Figure 6: House of the Faun. Alexander Mosaic, December 21, 100 B.C., 2:00 p.m. Ground-level view documenting six intrusive shadows. Model by Ethan Gruber.

How visible was the Alexander exedra itself? The current conditions in the House of the Faun are deceptive. Only a few column drums of the first peristyle remain; the others were apparently salvaged after the eruption. The result is that from any point within the peristyle the Alexander exedra is a prominent feature. Even from the atrium the modern viewer enjoys a clear view to the exedra (Figure 7). The model provides a sobering corrective. A northward view from the south branch of the first peristyle reveals that the Alexander exedra is essentially invisible; only the right pilaster can be seen (Figure 8). This is a problem.

In Roman architecture important spaces are “announced” by being made visually prominent. For example, within the Templum Pacis in Rome the temple proper projects from the flanking colonnades and employs taller columns. The same solutions announce the façade of the Imperial Cult Building in the forum at Pompeii (DOBBINS, 2007: 162). Within the House of the Faun itself, the tablinum is announced by its axial position, wide opening, raised elevation, flanking pilasters, and elaborate pavement (Figure 7). We appear to face a double conundrum: lighting conditions for the

Alexander Mosaic were *never optimum* and the Alexander exedra was *invisible!*

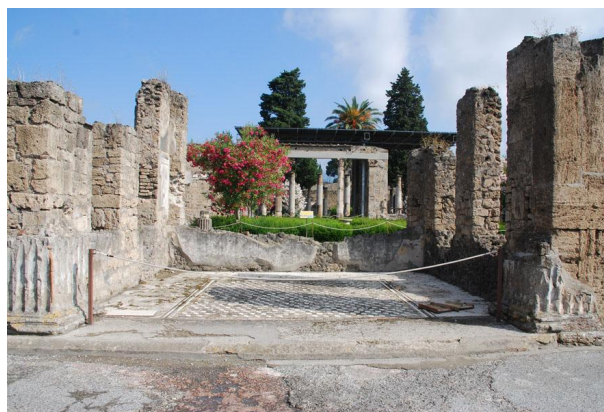


Figure 7: House of Faun. Alexander exedra, in the distance, viewed from the south through the tablinum. Photograph by John Dobbins.



Figure 8: House of the Faun. View toward the Alexander exedra from the south branch of the first peristyle. Model by Ethan Gruber.

4. Breakthrough: From Conundrum to Archaeological discovery

Our model identified serious problems, but it appears to have reconstructed a “worst case scenario” that may never have existed. The *model* made *us* sensitive to the problem. Architectural details preserved on site indicate, however, that someone remedied the lighting and visibility problems in antiquity. This is a new discovery that leads to a new understanding of the architectural context and lighting conditions of the most famous of all ancient mosaics. The discovery invites a related design question: Did the solution to the lighting and shadow problems occur as a retrofit *after* the construction of the exedra and the laying of the mosaic; was the problem recognized by the ancient architect/mosaicist/owner *before* construction, and therefore solved during the design phase of the project; might the modifications have taken place *during* the construction process? Our question may not be fully answerable, and in the end, it may not matter because after the modification of the colonnade the mosaic was seen under optimal lighting conditions and the Alexander exedra was visible.

The importance of the model in advancing this archaeological discovery cannot be overly emphasized. Our detailed knowledge of the ostensibly poor ancient lighting conditions, including the problem of the winter shadows, and the problem of the exedra's visibility derived from the model. That knowledge, in turn, prepared us to make a series of significant on-site architectural observations revealing that the architect/mosaicist/owner appears to have solved the lighting and visibility problems. In short, *someone's* solution in antiquity was to dismantle part of the colonnade in order to emphasize the Alexander exedra and to allow light to enter the room directly and illuminate the mosaic in a properly dramatic fashion.



Figure 9: House of the Faun. Alexander exedra; column footings with mortise cuttings along the northern branch of the peristyle. Photograph by John Dobbins.

The five columns directly in front of the Alexander exedra and the second from the north in the colonnade's western branch were eliminated. The four column footings aligned with the exedra's central columns and flanking pilasters, and the second column from the North in the West branch of the colonnade were modified for another function. Into the top of each of the five footings a square mortiselike cutting was made, each being approximately 27.5 cm square (Figures 9, 10). We did not excavate these dirt-filled cuttings and therefore cannot comment on their depth. The cuttings definitively establish that the footings no longer served as beddings for the lowest column drum. They did, however, accommodate something, presumably items shorter than columns that would not cast shadows on the mosaic. Perhaps they anchored statue bases or contained piping for statues that spurted water into the garden, in a manner similar to the garden sculptures in the House of the Vettii at Pompeii.

The footing aligned with the central axis of the exedra does not bear a cutting, but we must assume that its column was also eliminated because it would be architectonically impossible for a lone column in this position to support an entablature without the structural assistance of its flanking columns. The explanation for this ostensible anomaly is simple. The other four

footings in front of the exedra are aligned with columnar elements of the exedra, i.e., two central columns and two flanking pilasters. The features that they supported responded architecturally to the columnar elements of the exedra and maintained the rhythm of the northern colonnade. The exedra offered no element to which the central footing could respond. Consequently, it lacked whatever feature the other footings supported. The removed column in the western colonnade does not participate in the scheme just discussed. It was not problematical in terms of casting a shadow, yet it was removed and replaced with the same kind of feature employed in front of the exedra. This column plays a role in the approach to the Alexander exedra and is discussed in section 5.



Figure 10: House of Faun. Mortise cut into one of the column footings in front of the Alexander exedra. Photograph by John Dobbins.

Why had the modification of the colonnade not been noticed previously? It had been noticed, but the interpretation—offered in two publications as established fact—should have been presented as an hypothesis, just as our interpretation is offered here as an hypothesis. The traditional hypothesis (RICHARDSON, 1988: 124; FABER and HOFFMANN, 2009: 53) holds that after the devastating earthquake of A.D. 62 a temporary wooden shed roof was erected over the Alexander Mosaic by cutting mortises into several column footings for the insertion of wooden posts. That hypothesis is flawed for three reasons: (1) the cutting of such consistently-sized square mortises appears to be too precise for the kind of temporary shed roof hypothesized; (2) the omission of a cutting in the central footing in the sequence of footings in front of the exedra is anomalous and would result in a long span for a shed roof's horizontal support beam (why not cut another mortise?); this suggests a reason other than roof construction for the cutting of mortises; (3) four of the mortises are located in the north branch of the colonnade directly in front of the Alexander exedra; the additional fifth one is located in the west branch in a location that could not have served in roof construction; consequently, this anomalous fifth mortise also argues against roof construction.

5. The “New” Presentation and Lighting Arrangement for the Alexander Exedra and Mosaic

In contrast to the opinion that assigns the modifications to the post-62 period, we hypothesize that six columns were eliminated in order to allow the Alexander exedra and the Alexander Mosaic to be appropriately visible—five in front of the Alexander exedra and one in the peristyle’s west branch. If these observations are correct, they will revolutionize the study of the Alexander Mosaic by presenting it in its original setting for the first time since antiquity. We hope that our arrangement is “new” only in terms of scholarship and that the model actually recreates both the ancient architectural conditions under which the Alexander exedra announced itself within the house and the ancient lighting conditions under which the Alexander Mosaic was seen throughout the year.



Figure 11: House of the Faun. Alexander exedra, December 21, 100 B.C., 2:00 p.m. After the removal of six columns. Model by Ethan Gruber.

Figure 11 presents an overview of the new arrangement. The colonnade has been modified as described with generic bollardlike features occupying the footings with mortise cuttings. (The model may appear minimalist in its details, such as no entablature over the exedra, or pilasters without capitals. At this writing the model is not finished. It presents the major findings of our research, but not all details of reconstruction.) The winter solstice lighting simulation bathes the exedra in



Figure 12: House of the Faun. Alexander Mosaic, June 21, 100 B.C., 2:00 p.m. Ground-level view with the portico removed. Model by Ethan Gruber.

warm winter sunlight. The two columnar shadows contrast dramatically with the six shadows of Figures 5 and 6 and appear not to create a serious visual problem.

A summer solstice simulation that modifies the view presented in Figure 4 admits much more light because the portico roof has been eliminated (Figure 12).

Our analysis and the model reveal that the Alexander exedra was not invisible. It announced itself prominently and drew viewers toward it. The broad intercolumniation in the north portico provided many clear views to the architectural features of the exedra. A comparison between Figures 13 and 8 reveals that the Alexander exedra belongs in the ranks of important architectural presentations that were intended to be seen.



Figure 13: House of the Faun. View toward the Alexander exedra from the south branch of the first peristyle after modifications to the north and west branches. Model by Ethan Gruber.

Wide intercolumniations, such as those now associated with the Alexander exedra, are used in other situations to provide clear views to prominent spaces. In the House of the Menander at Pompeii a wide intercolumniation on the north side of the peristyle aligns with the tablinum (Figure 14) and a second near the southeast corner aligns with the large room 18 (Ling, Plates 28-29, Figures 18, 22, 26). Vitruvius accommodates the view to the pronaos of the Temple of Augustus in his basilica at Fanum by eliminating two columns from the nave colonnade (Vitr. *De Arch.*, V.1.7). The same solution



Figure 14: House of the Menander, Pompeii. View from peristyle showing a wide intercolumniation centered on the tablinum. Photograph by John Dobbins.

appears to have been employed in the House of the Faun.

The house plan (Figure 1) makes it clear that an approach to the Alexander exedra from the west was more likely than one from the east. One passed from the atrium (3) to the first peristyle (10) via a room (9) to the west of the tablinum (7). One then emerged at the southwest corner of the peristyle and proceeded along the West branch, as the modern tourist inevitably does today. Nothing would have precluded a counter-clockwise circumambulation of the garden. The elimination of the second column from the north in the west branch of the colonnade, however, was a special accommodation to the person who took the clockwise route. The gap in the colonnade provided the viewer with a superb, close-up view of the exedra (Figure 15). Thus, it appears that the architect reconfigured the western branch of the colonnade in order to enhance the visual presentation of the Alexander exedra because the intended approach to the exedra and its mosaic was from the west. This interpretation both recognizes that the west-branch modification functions in harmony with the north branch modifications in emphasizing the Alexander exedra, and undermines the hypothesis that the column modifications served to support a shed roof.



Figure 15: House of the Faun. View toward the Alexander exedra from the modified West branch of the first peristyle. Model by Ethan Gruber.

6. Broadening the Context

According to Faber and Hoffmann, who have studied the house thoroughly, the Alexander exedra was not part of the original plan of the house, which dates to the second quarter of the second century B.C. (FABER and HOFFMANN, 2009: 50). The Alexander exedra and its mosaic, its two flanking rooms, and the second, large peristyle, belong to a second phase in the development of the house that is dated by archaeological finds to the first quarter of the first century B.C. (FABER and HOFFMANN, 2009; 52, 87 and Beilagen 9, 10; our Figure 16). Three additional modifications to the first peristyle appear to be contemporary with the Alexander exedra: (1) the laying of the third and final pavement in the peristyle (not treated by Faber and Hoffmann); (2) the edging of the first peristyle in fine white limestone (FABER and HOFFMANN, 2009: Beilage 10; our

Figures 16, 17); and (3) the transformation of the colonnade from the Doric order to the Ionic order (FABER and HOFFMANN, 2009: 50). New additions to the atrium, not treated due to space limitations, also appear to be contemporary. Taken together, these changes constitute a major construction and decoration effort within the house and could have been components of a single, grand project to transform the core of the house and also add a second peristyle with rooms opening onto it.



Figure 16: House of the Faun. Plan of the original house (left) and second-phase house (right). After Faber and Hoffmann, Beilagen 9, 10.

The north branch of the first peristyle is so torn up that portions of three successive pavements are clearly visible. The lowest, and earliest, is a poorly preserved cement pavement containing pebbles, other stones (black, white, yellow), white tesserae (irregularly placed and widely spaced), and terracotta. Pavement one is commensurate with the stylobate level of the Doric colonnade. The surface of pavement two is about 6 cm above pavement one. It consists of randomly placed pieces of densely-packed terracotta and a smaller percentage of black pebbles. Pavement two comes up to about the middle of the column footings. Pavement three consists of blue-gray stones, randomly-placed white tesserae, and pieces of red, white, green and yellow stone set in cement. Pavement three is commensurate with the top of the column footings, although it does not abut those footings. An empty ring around the footings separates them from the pavement (Figure 17); the genesis of these rings is explained below. The third pavement is also equal in elevation to the threshold of the Alexander exedra, however, it does not abut the threshold because a trough runs along the front of the exedra (Figure 18). It is likely that the trough was dug through the pavement to facilitate the removal of the



Figure 17: House of Faun. Column drums in southwest corner of first peristyle. Visible are third pavement, ring around column bottoms, and white limestone edging. Photograph by John Dobbins.

threshold mosaics when they and the Alexander Mosaic were lifted and transferred to Naples.

The fine white limestone edging on the garden-side of the peristyle (Figure 17) is another element that belongs to the period when the third pavement was installed. The third pavement abuts the edging proving that the edging was in place when the third pavement was laid. Richardson's assertion that the edging belongs to the post-62 period and was incomplete in 79 is untenable (RICHARDSON, 1988: 124-125).

The transformation of the first peristyle's Doric order into the Ionic order was achieved by replacing the Doric capitals with Ionic capitals, trimming off the lowest flutes of the Doric shafts, and installing Ionic base moldings, in segments of circles, around the bottom of the trimmed Doric shaft. Full bases on which the lowest column drums would sit were not created. Figure 19, a view of the northeast column in the peristyle, displays the way in which the Attic base moldings wrap around the trimmed Doric column shaft. Figure 17 shows the rings more clearly than does Figure 19. These are the circular spaces once occupied by the applied Attic base moldings. They prove that the bases were in place when the third pavement was laid. It is clear that the column transformation did not take place when the second pavement was still in use because if that had been done,



Figure 18: House of the Faun. Alexander exedra on right; trough between third pavement and threshold. Photograph by John Dobbins.

the column bases would have been elevated several centimeters above the second pavement!

The term "Pompeian Ionic" is sometimes used as if the Pompeians preferred an Ionic colonnade with a Doric entablature (RICHARDSON, 1988:124). The modifications to the first peristyle of the House of the Faun reveal that the "Pompeian Ionic" was not necessarily a design choice made *ex novo*, but rather a byproduct of a compromise that involved altering the columns with minor adjustments and retaining the entablature, versus altering the columns and completely replacing the Doric entablature with an Ionic one.



Figure 19: House of Faun. Column at northwest corner of first peristyle preserving part of its base molding. Photograph by John Dobbins.

The connections among the third pavement, the column footings, the Alexander exedra, and the limestone edging are important because these relationships associate the Alexander exedra and its mosaics with the laying of the third pavement and the transformation of the Doric order into the Ionic, all major developments that by means of these associations can be recognized as contemporaneous events.

From a technical point of view, the changing of the capitals must have entailed the removal of the entablature and that, in turn, would have entailed the removal of the roof of the peristyle, unless an elaborate system of wooden supports was used. Even if such supports were used in the west, south, and east colonnades, the complete reconfiguration of the north-branch rooms must have entailed a removal of the north-branch roof. The Alexander exedra and its adjacent rooms would have been constructed before the roof of the north branch was in place. Presumably, the columns remained standing because the conversion to the Ionic order did not require that they be disassembled. This means that the architect, owner, and possibly mosaicist would have been able to assess the light entering the Alexander exedra without a portico roof, but with columns still standing in front of it. This observation does not prove that the decision to modify the colonnade in front of the Alexander exedra was taken at this time, but it does identify the conditions that may have inspired such a decision. It is clear archaeologically that the

decision to modify the colonnade was made at some point. If it was not made at *this* point in the design process, it was a missed opportunity!

The footing of the removed west-branch column contributes to the question of when, in relative terms, the modifications were made. The third pavement left the typical ring around the footing, indicating that the Ionic base had already been affixed to its shaft when the pavement was laid. Therefore, one can infer that the full column was in place. One cannot infer that the entablature and roof were in place, although they may have been. Similarly, one cannot infer from this column that the columns in front of the Alexander exedra were still in place. The damage to the north branch of the colonnade has destroyed the relationship between the third pavement and the footings. One can only speculate. The hypothesis was advanced above that the decision to eliminate the columns in front of the exedra was probably taken during the design phase. The modification of the western colonnade appears to be a retrofit or was accomplished during the construction process.

Chronology and Patronage

The above analysis brings us to chronological and patronage issues. If Faber and Hoffmann are correct in dating the Alexander exedra and its mosaic to the first quarter of the first century B.C. their findings initiate a new direction in the discussion of the House of the Faun and the Alexander Mosaic because that quarter century was a critical period in the history of Pompeii. The year 89 B.C.—a watershed in Pompeian history—falls within that quarter century. In 89 B.C. Pompeii was conquered by the Romans in the Social War. It is the year in which the pre-Roman city became Roman. The introduction of new settlers and new wealth into the city after 89 B.C. created the conditions for new architectural and decorative developments. This is the period when the amphitheater, the roofed theater, and the Forum Baths were built and the forum experienced a major monumentalization. Might a new *Roman* owner of the House of the Faun have been the patron of the extensive renovations, including the Alexander Mosaic? Our analysis cannot answer this interesting question definitively, but the archaeological evidence is consistent with such hypothesizing. Ceramic evidence places the Alexander Mosaic in the quarter century in which Pompeii became Roman. The installation of the mosaic appears to have been accompanied by major renovations throughout house.

Our analysis, begun because a computer model identified viewing problems, leads us to offer the hypothesis that the installation of the Alexander Mosaic was accompanied by significant modifications not previously recognized that enhanced its presentation to its ancient, and now its modern, audience.

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