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Building Rome in a Couple Days: Erecting a Painted Portico in Alésia

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Roman construction is a recurring theme in archaeology, having been studied through many lenses: architecture, materials, urbanism, ornamentation, economics, religion, and so forth. Nevertheless, many aspects of the building process have seldom been the focus of these analyses, especially the specific actions and craftsmen involved in the chaîne opératoire. It is the aim of the Fabri Tignuarii – the roman college of building craftsmen – to delve into the specifics of roman construction. Most of our members are professional masons, stonecutters,

or carpenters, in league with archaeologists who specialise in construction history and archaeology. We want to better understand the workers, the tools, the machinery, the materials, and the worksite itself, through experimentation and studying archaeological remains.

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The project

The archaeological site of Alésia, famous for its decisive siege, which saw the defeat of Vercingetorix and the end of the Gallic Wars, boasts an impressive *oppidum* (hilltop settlement). Most of the archaeological features that can be discovered by visitors pertain to the roman period, as the site was transformed into a secondary city. The MuséoParc of Alésia organised a week-end event around the theme of roman crafts in August 2023, and the Fabri Tignuarii were very grateful for their generous welcome. Like other historical events, we only employed copies of roman tools, dressed in the manner of craftsmen of this period, with materials that would have been in use.

As part of our participation at the event, we wanted to create an experimental novelty around the project. This time, we would have to build an entryway and a small portion of a roman portico, such as can be found along the main road of the hilltop settlement. The portico needed to include two finished columns, supporting a full-scale carpentry, i.e. a semi-truss frame. The latter would receive a row of roman tiles, which would have to stay into place without any means of fixation, as was generally the case during the period. The entire building would then be plastered and painted, including minute geometrical decorations inserted in the walls. While it is possible that these porticoes would constitute roofed galleries, they would also have supported the upper levels of houses (see (Olivier 2021, 260-61).

On top of the very short timescale available for this project, notwithstanding logistics of setting up the camp, transporting the materials, dressing up and cooking, we had many experimental challenges on the way. Indeed, we had never built such as large construction in a couple days, which raised questions about its stability, especially as we could not set up foundations. We also had doubts whether the roofing could be supported by only two columns, and if the tiles would slide off the roof or not. Last, but certainly not least, how could the wall painter complete their tasks when the walls and columns would take at least a day to be erected?

Building the walls

Being located inside an archaeological site, it was impossible to dig trenches for the foundations. The ground was simply levelled with some wet sand, creating enough support for the temporary construction. The horizontality of the sand strata was checked with a plank and a *libella*, the roman *archipendulum* which employs a plumb line (See Figure 1). Then, the threshold - a large slab of limestone - was set into place, and levelled as well, using mallets to correct its slope. Following this, two pieces of string were fixed to simple wooden sticks, inserted into the ground, which allowed for the construction of the 2.50 m long portion of the wall and its width of 0.45 m. The walls had to be 2.70 m high, exceeding the height of the columns, to accommodate and envelop the tie beams of the semi-truss frame. The wall was only interrupted where the 2 m tall doorway was located.

The wall was built with 2 m3 of limestone rubble, which amounted to around 2.5 tons, set in *opus vittatum*, i.e. horizontal and parallel courses, the most common construction type in roman Alésia. These stones were not extracted in the region, as the roman quarries are not exploited anymore. They come from much further away, from the Saintonge area of south-western France. They were chosen for their geographical proximity to the Fabri Tignuarii's craftsmen, as well as their analogous characteristics to Alésia's rubblestone: a relatively firm and greyish limestone, only applicable in masonry. These 2 tons of material were extracted as irregular rubblestone. The rubblestone was coarsely dressed by our masons using boaster chisels, face hammers, or polka hammers, directly before being set into the wall. They include faces measuring approximately 0.20 m long by 0.12 m wide. The tail was 0.25 m long on average, with a narrower section in the back, as roman rubblestone nearly always display this morphology.

The mortar used for joints and the wall backing and infilling included 1.5 m3 or around 2.25 tons of sand from Burgundy, suitable for construction as it comprises a very diverse granulometry and a small part of silt. The coarse elements of the mortar only included limestone chips created during the dressing process. The same can be said about archaeological mortars documented in Alésia, where there are also a few tile fragments preserved. For any mortar, there is a binding agent, usually lime. This is where our construction fundamentally diverges from archaeological walls in Alésia. Indeed, lime mortar can take several days, sometimes weeks, to stiffen, which makes it impossible to build a 2.70 m high wall without it collapsing because of its malleability.

Therefore, another binder was employed, which was not unknown to the Romans, but certainly very rare in masonry: gypsum plaster (Coutelas 2003; Lafarge 2020). It dries and sets much more quickly - in less than half an hour - but is completely improper for outside spaces, as it retains dampness and softens again with rain. A thunderstorm indeed occurred, but this did not suffice for the wall to collapse. The average mixture applied for the mortar batches was: 2 buckets of sand mixed with two handfuls of gypsum plaster, and half a bucket of water, depending on the current dampness. A large wooden basin and a spade served for the mixing process, occurring right next to the masons, as the mortar needed to be used as quickly as possible. This factor also explains the small quantity of each batch, as leaving aside the mortar for only five minutes stiffened it too much to fill in all gaps of the masonry. A very small amount of plaster was used in total: around 20 litres or 50 kg. In this project, the quantity of mortar is therefore equivalent to the quantity of facing stone. The rubblestone we employed was of a slightly too large module, close to ashlar blocks, so this proportion is different in the archaeological walls of Alésia, where mortar is prevalent.

The levelling of each course was constantly checked with a plank and a *libella*, while the verticality of the wall was verified with a square level, the combination of a square with a plumb line and half an *archipendulum*. Two rows of putlog holes were arranged in the wall. The first one served to support the simplest scaffolding: two planks supported by two wooden poles. It was set as square holes on each side of the door, at 1.20 m of height. This rudimentary mode of scaffolding was entirely sufficient for such a simple wall, but the dampness of the gypsum mortar meant that we had to create through-holes, where the whole thickness of the wall could support the beams. The second row of holes served to insert the tie beams. They are meant to be through-holes, as the continuation of the truss beams inside the building would serve as joists for its upper floor.

Turned and carved columns

Two meters away from the wall, two columns were put into place, using the same rudimentary footing of wet sand as for the walls. These columns were carved from a finer grained limestone, also from the Saintonge area, specifically from the Thénac quarries, in operation since the roman period (Gaillard 2004). They comprise four slender drums, each 0.50 m high, varying from 0.18 to 0.20 m in thickness. They support two capitals, one of the provincial Tuscan order and the other one of the doric order (See Figure 2), which are prevalent at Alésia (Olivier 2021). These blocks were all carved with chisels and facing hammers, as well as turned on the lathe, except for the capitals. The stone-turning technology, well documented throughout the Roman Empire, is extremely frequent in Alésia. Indeed, nearly all the archaeological capitals and shafts display characteristic marks on the stone: circular grooves and ridges, as well as square mortises in the upper and lower ends of the blocks, used for inserting the lathe's mechanism (Gaillard *et al.* 2019; Revert & Brigaud 2022). On the topic of this specific technology, a paper was presented during the 13th Experimental Archaeology Conference in Torun, Poland (Revert & Brigaud 2023). Using the lifting crane, we could hoist the blocks and assemble the columns. Because of the added weight on such small bases of wet sand, the right-hand column leaned on the right, where the slope was the most noticeable. While this did not end in utter failure, it is certain that a more stable footing, or even foundations, are necessary for the stability of such supporting architectures.

Assembling the timber frame

The different parts of the timber frame were already produced by the carpenter beforehand, as it is a very time-consuming process. Only the assembly and a few minute adjustments had to be carried out on the building site. First, the two tie beams were inserted into the holes left open in the wall and were supported at the other end by the columns (See Figure 3). Notches on the upper part of the tie beams were cut to receive the heavy high wall plate, also bearing identical notches. This assembly is called a halved joint. The tie beams also support two crossbeams, sitting directly on the wall in one end, and assembled with the beams with a front tie-backs joint, coupled with a mortise and tenon joint, secured with wooden pegs. The ends of the crossbeams were not cut off, as it would have prevented the disassembly of the whole timber frame. This robust foundation could support a wall plate, which simply sat on the crossbeams and was kept in place with a nailed wedge. The five rafters were also nailed to the high wall plate and the wall plate. Lastly, the plank battens simply sat on the rafters, as the structure was temporary, and the roof's slope only had a slight incline.

Roofing with roman tiles

The roof was tiled with replicas of seven *tegulae* and eight *imbrices*. Our tilemaker was diligently shaping more tiles and moulding antefixes, but the drying and firing of these elements could only take place weeks after the event. Therefore, we employed pre-made tiles. On a table, the tilemaker threw clumps of clay into the sanded wooden frame that is used to shape the *tegula*. Then they shaped the edges with their hands and wooden sticks. After removing the frame, they cut the notches on both ends of the tile, which are necessary to allow the secure overlap of the *tegulae*. The *imbrices* are simple slabs of clay shaped on wooden moulds. The tile replicas were assembled on the rafters without any joint or nail, as was the custom in the Roman Empire. The weight of the tiles and the slight slope of the roof meant that the tiles did not require the need to attach them by other means. This partial roofing was merely an evocation of what ancient buildings might have looked like, because we lacked the necessary materials for the fabrication of the dozen more tiles needed to complete the roof. For disassembly reasons, the *imbrices* were not set into mortar strips on the *tegulae* joints, which was often the case in ancient times. Finally, the lower-end tiles would usually be fixed to the timber roof with large nails or even terracotta antefixes, which were also not applied for this project.

Plastering and painting

Before plastering, the wall of the portico had to be dampened with water, as it is needed for the plaster to adhere securely to the wall. The plaster is a simple sand and lime mortar, of a finer grain than previously employed for the construction of the wall. Using a float and a trowel, the masons sprayed the mortar on the wall, ensuring that all grooves and holes are filled in a swift and efficient movement (See Figure 4). The columns were plastered similarly, before being smoothened with trowels and planks. The latter also serve to measure the regularity of the plaster surfaces. Square recesses were left partially plastered, as they would receive the two paintings (See Figure 5).

Indeed, while all the previous building steps were carried out, the *pictor*/painter was making two *pinakes*, i.e. painted plasters in a wooden frame (See Figure 6). These delicate elements require several coats of mortar, from a coarse-grained plaster like the one used to plaster the wall and columns, to a finer mortar containing sieved sand, and finally a very thin coat of "marble" plaster, containing sieved lime and finely ground limestone. This last coat is polished finely with small trowels and spatulas to create a smooth surface for the final painting. This up-to-six-coats process can be seen in most archaeological painted plasters, especially when displaying intricate motifs. After being etched into the final coat of the plaster, the painting is carried out with brushes and a wooden plate. The pigments do not need a binder, as the fresh plaster coats will allow for adhesion with the minerals and set permanently after drying. The pigments are mixtures of fired ochres, coal, malachite or other minerals, depending on the colours needed. As there was a lot of wind during the event, the plaster dried very quickly, which prevented the pigments to adhere as well as would have been necessary to recreate an authentic *pinax*. Nonetheless, the whole process was deemed satisfactory, with very few details having to be corrected during later experiments.

After being inserted into the wall recesses, the wooden frame of the *pinakes* was also covered in plaster (See Figure 7), as has been found in some of the best-preserved wall paintings in Pompei (Allag & Barbet 1972, 981-83; Mora *et al.* 1977, 122-23; Adam 2017, 240). The last task of the entire construction was the painting of the entire wall and the columns, whose lower parts were painted in red ochre while the upper columns were painted in white, and the upper walls in yellow. These simple motifs were painted swiftly with wide brush strokes, adequate for exteriors. Thus, the construction was finished (See Figure 8).

Preliminary conclusions

The construction of this Roman portico in Alésia was set as a challenge, both to our conception of working time in the ancient building industry, but also to our association's members, who wanted to experience the process of building a structural element as the Romans did. Regarding the stability of such a quickly erected Roman portico, apart from the columns leaning slightly due to a lack of proper foundation or footings, the portico seemed very sturdy. Of course, the actual Roman time frames for construction would be much different, with foundation trenches and many other aspects having to be carried out before raising the walls. Similarly, the painting of *pinakes*, while efficient enough to be called a success, would have benefited from an enclosed workshop, necessary for a slower drying of the plaster coats. Nonetheless, the Fabri Tignuarii hope that this paper helps display the ingenuity and efficiency of an ancient Roman construction, while showcasing an entertaining reenactment event.

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FIG 1. THE LIBELLA BEING USED TO CHECK THE HORIZONTALITY OF THE GROUND ON WHICH COLUMNS ARE BUILT. PHOTO BY ALEXANDRE BOULOUMOU.

FIG 2. THE TWO CAPITALS BEING MADE BY THE STONECUTTER, WITH THE PORTICO ENTRYWAY IN THE BACK. PHOTO BY ALEXANDRE BOULOUMOU.

FIG 3. THE COMPLETE TIMBER FRAME, SITTING ON TOP OF THE COLUMNS AND THE FINISHED WALL. PHOTO BY ALEXANDRE BOULOUMOU.

FIG 4. THE MASONS ARE PROJECTING MORTAR PLASTER ON THE WET SURFACE OF THE WALL. PHOTO BY ALEXANDRE BOULOUMOU.

FIG 5. THE MASON IS REMOVING PROTRUDING PARTS OF THE STONES, SO THAT THE PAINTINGS CAN BE INSERTED CORRECTLY. PHOTO BY ALEXANDRE BOULOUMOU.


FIG 6. BOTH PINAKES DRYING AFTER HAVING BEEN PAINTED. PHOTO BY ALEXANDRE BOULOUMOU.

FIG 7. THE PAINTER SMOOTHES THE SURFACE OF THE FINAL PLASTER COAT, TO COVER UP THE WOODEN FRAME OF THE PAINTED PINAKES. PHOTO BY ALEXANDRE BOULOUMOU.

FIG 8. THE FINAL PORTICOED ENTRYWAY. PHOTO BY ALEXANDRE BOULOUMOU.