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ORIGINAL RESEARCH PAPER



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The Roman and late antique site of Montessoro (Isola del Cantone – Genova): A case study of the wattle and daub construction technique

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ABSTRACT

Archaeological excavations at the site of Montessoro (660 m. a.s.l.), carried out between 2009 and 2013 by the Department of Christian and Medieval Archaeology (University of Turin – Department of the Historical Studies) and currently under publication, have led to the large-scale exploration of a rural Apennine site which was inhabited between the first century BC and the fifth century AD. The late antique phase, which is the best-preserved, consists of five farm buildings made using a masonry base bound with clay, with an elevation in lathwork and a roof made of cover and pan tiles. The systematic study of almost 600 clay fragments, some of them large and mainly from the collapse levels caused by the fire in the granary, with negative impressions of plant material, has enabled considerable information to be obtained about the technique of wattle and daub used to construct the elevations: the morphology and arrangement of the wooden parts (horizontal and vertical), related to the woven lattice of the lathwork and the load-bearing structure, and the mixing and application of clay and plaster. This work, associated with a thorough analysis of the plentiful wood charcoal remains (carried out by Prof. Lanfredo Castelletti and Dr. Sila Motella – Museo Civico P. Giovio di Como), has yielded data about the choice and working of the plants and trees used for the construction of elevations and all the structural parts, enabling a fairly precise reconstruction of the buildings and the socio-economic and cultural context of the site.

KEYWORDS

Montessoro, concotto clay, wattle and daub construction, macroscopic analysis, flat surface

ARCHAEOLOGICAL EXCAVATIONS AT MONTESSORO

The area of Montessoro is situated on the north-eastern edge of the municipality of Isola del Cantone (province of Genoa) in the Ligurian Apennines (Fig. 1). The archaeological site stands to the north of the present-day settlement on one of the large terraces halfway (660 m. a.s.l.) up the right slope of the upper valley of the Spinti, a short stream that flows into the river Scrivia at Arquata Scrivia (province of Alessandria), a few kilometres to the south of the ruins of the Roman city of *Libarna*. It was identified on privately owned land sowed with alfalfa (1,200 sq. m.), and has been known since the 1990s when, during ploughing, fragments of Roman tiles were discovered.¹

The work was carried out as part of the project “Archeologia medievale in alta Valle Scrivia”, which began in 2009 and was aimed at studying the population and the structures of the territory of the rural areas of the upper Scrivia valley (province of Genoa) between Late Antiquity and the Late Middle Ages.² The excavation was conducted with ministerial

¹Pastorino and Pedemonte (1999) 121.

²de Vingo and Parodi (2015b).



Fig. 1. Location of Montessoro (data processing by Rossana Managlia)

authorisation and was directed by the professor of Medieval Archeology of the University of Turin (SAAST Department) and, subsequently, by the professor of Christian and Medieval Archeology (Department of Historical Studies). The project, which was organised in five excavation campaigns (2009–2013),³ has led to extensive exploration over an area of 800 sq. m. of a rural settlement dating to between the first century and the fifth century AD. The settlement was probably part of the *municipium* of Libarna and was closely linked to the road network along the ridges and hillsides – an alternative support road for *via Postumia*, passing a few kilometres to the west of Isola del Cantone, which led from Genoa to Libarna and other settlements in the plain (Dertona, Iria and Ticinum), passing through the Upper Scrivia valley, the Spinti valley and Val Borbera.

The site has been heavily damaged by agricultural activity, such as ploughing, in the modern era, and consists of ten buildings constructed in two distinct phases: the first phase, dating to the imperial period (first–second century AD), is hard to interpret because it is represented by fragments of masonry linked to three distinct structures (Buildings 1, 6 and 10), while the late antique phase (fourth–fifth century AD) is represented by farm buildings (plate I).

They consist of seven structures, of which virtually the only surviving parts are the foundation levels: a main residential building (Building 3, restructured during the fourth century, when a room used for blacksmithing was added), a pantry with an adjoining pigsty and ancillary buildings (Building 2, which underwent two phases of renovation), a barn (Building 8, abandoned during the fourth century), a stable (Building 7, reconstructed on two different occasions in different positions with respect to the original location: Buildings 4 and 1) and another residential structure built during the last phase of life of the farm (Building 9). In Late Antiquity the site had an outer courtyard, situated to the west of the settlement area, used for waste disposal, stabling animals and storing foodstuffs in ditches or underground structures, made of stone or brick. Following a fire, the settlement was abandoned in the early fifth century.

The excavation data for the late antique phase, currently being studied for the final excavation report, suggests the presence of a socioeconomic context that was heavily conditioned by the geomorphology of the territory. It was probably marked mainly by stockbreeding and pastoralism for trading purposes, rather than agricultural activity destined solely for self-consumption; craft activities, such as metallurgy and weaving, seem to have been conducted in a strictly domestic context. The pottery was made locally or sub-regionally but the imported transport vessels and containers show that the site was an integral part of a wider-ranging trade network.

During this phase, the buildings had a square plan (divided into adjoining rooms or a single room), a masonry base made of rough-hewn limestone and sandstone blocks, arranged in regular courses and bound with clay, upper levels made of wattle-and-daub and a roof made of clay tiles (flat and curved tiles). The structures used as stables represent an exception: they were built, one over the other, after the collapse of the original building (Building 7): Building 4 (which has a tile roof but made entirely of wooden cross-beams and poles) and building 1 (its masonry base consists of unworked or re-used stone material).

This study analyses the wattle-and-daub construction technique which is well-documented by the excavation data and illustrated below (Fig. 2).

WATTLE-AND-DAUB CONSTRUCTION TECHNIQUE: THE METHOD OF INVESTIGATION

The site of Montessoro has produced a significant quantity of fragments of *concocto* clay (clay hardened by firing), referable to the upper levels of the structures in which they were found (Buildings 2, 3 and 7), and to residual elements from fill layers of various kinds (post holes, foundations and robber trenches). The analysis of the finds was carried out on all the fragments and consisted of various steps, valid for all the finds from the site, which are described below. The description and interpretation of the data presented here (see *infra* 3) refer only to Room B of Building 2, the context

³Negro Ponzi et al. (2012); de Vingo et al. (2013); Negro Ponzi et al. (2013); de Vingo and Parodi (2015a, 2015b); Parodi (2018).

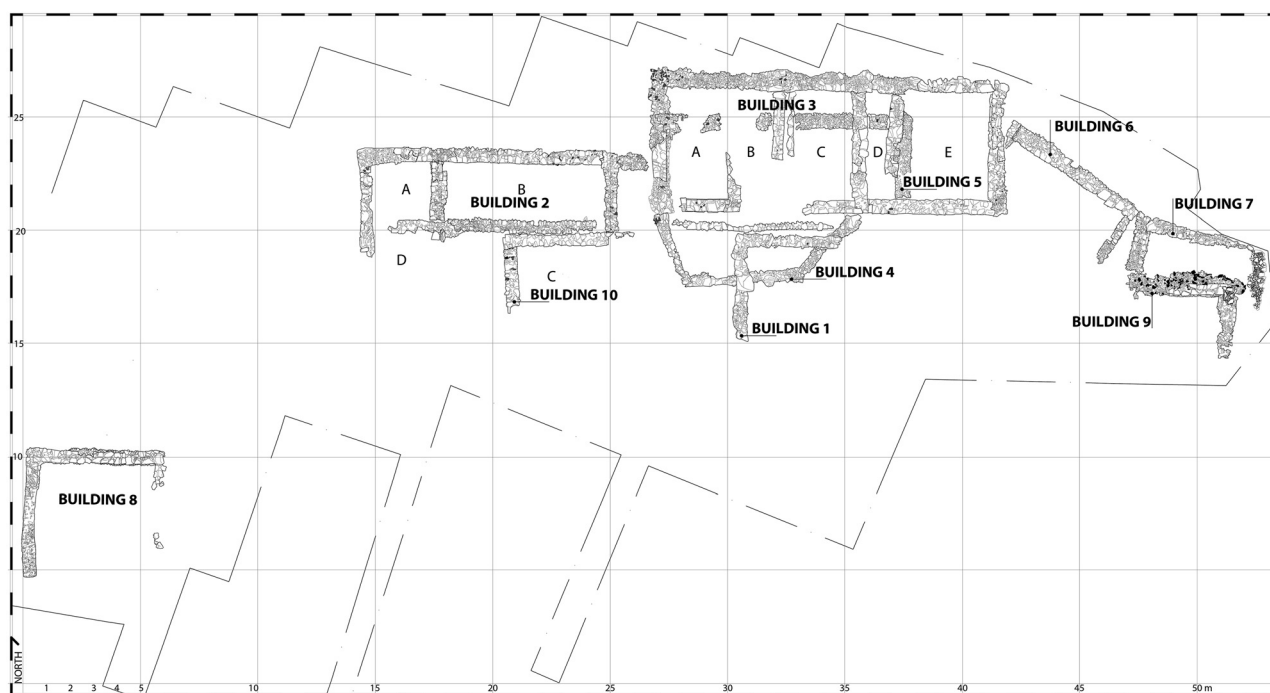


Fig. 2. General plan of the excavation area with the identified structures (surveying by D. De Conca, V. Fravega; data processing by Rossana Managlia)

that provided the greatest amount of information. The data is more reliable here than elsewhere because it is a “sealed” context since it was sealed by the collapse of the tile roof and was not modified by subsequent activities during the modern era, such as ploughing, which has affected other parts of the site.⁴

Cataloguing

All the fragments were measured, weighed and counted, regardless of their size (only lumps smaller than 1 cm were excluded from cataloguing because they lack distinctive signs and are uninterpretable). The measurements do not exceed 20×15 cm in the case of larger fragments, and generally measure about 12×8 cm for diagnostic fragments. The average thickness is about 4–5 cm.

At the end of the excavation, 582 fragments were recorded, of which 324 are diagnostic, making a total of about 75 kg of *concotto* clay.⁵ As much as 63 kg of the clay came from the collapse level from Room B of Building 2.

Macroscopic analysis

The analysis of the finds was conducted primarily at a macroscopic level through close visual inspection of the

fragments with the naked eye and using magnifying glasses of various strengths ($2\times$ and $8\times$).

The finds consist of fragments of *concotto* clay (fire-hardened clay) of variable shape and levels of cohesive bond. The colour of the fabrics (red, orange, grey or black) generally changes according to the layers in which the ceramic fragments were found and indicates the times and ways in which they were exposed to heat: there are also finds that vary in colour on the same surface. In the specific case of Room B of Building 2, the preponderance of orange and brick red hues suggests that the fire that baked the clay was fuelled by a large amount of oxygen.

The finds were initially sub-divided into diagnostic and non-diagnostic fragments. In order to qualify for inclusion in the first group, the fragment needed to have at least one characteristic that allowed it to be interpreted and traced to a part of the masonry structure (facing, inner core, part adjoining the wooden structure). These characteristics have been classified into the following categories:

- *flat surfaces* – these are the parts of the fragment where intentional smoothing of the surface can be recognised, and almost certainly indicate parts of the masonry facing. There may have traces of the finishing plaster;
- *finishing plaster* – reasonably well-preserved traces of a thin layer of plaster have been identified on some flat surfaces. In some cases, there are visible signs of applying the plaster in one direction, in other cases of dripping, which is particularly useful because, when present, it indicates the orientation of the fragment. Obviously, if the flat surface of a fragment has traces of plaster, then it is clearly related to the masonry facing;

⁴For further details on the topic and an analysis of the complete set of data related to the rest of the site, see the final excavation report.

⁵In further detail: in Building 2, out of a total of 472 fragments, there are 278 diagnostic pieces; in Building 3, the total number of fragments is 42 with 21 diagnostic fragments; in Building 7, the total number of fragments is 68 with 25 diagnostic fragments.

- *traces of branches* – grooves with a curved profile, located on the opposite side of the flat surface (if present), interpreted as negative impressions of horizontal branches. They are not arranged perfectly parallel to each other but have an irregular pattern, a distinctive sign of wattle-and-daub construction. An analysis of the impression left by the branches on the clay shows whether or not they were stripped of their bark;
- *traces of slats* – grooves with a flat profile, located on the opposite side of the flat surface (if present), arranged horizontally in a similar way to the traces of the branches, but more parallel to the flat surface than to the branches, interpreted as signs of negative impressions of slats. The traces display parallel veining lengthwise, corresponding to the wood fibres;
- *traces of vertical elements* – grooves with a curved profile, located on the opposite side of the flat surface (if present), arranged at right angles to the traces of branches. The diameter varies to a greater extent with regard to the traces of horizontal branches: they have been interpreted as small timbers or wooden poles, used as vertical elements in the woven wattle panel;
- *traces of supporting beams* – grooves with a flat profile, located on the same side as the flat surface, which “cut” the surface itself. They have been interpreted as traces of moulded wooden joists, presumably arranged vertically or obliquely, designed to prop up or reinforce the main wooden structure.⁶ They were not completely covered by clay cladding but were left partly visible;
- *traces of struts/crossbeams* – these are surfaces of fragments without plaster, located on a side adjacent to the traces of branches (not on the opposite side), which have signs of wooden fibres. They have been interpreted as traces of the main wooden structure of the building (or frame). The distinction between vertical struts and horizontal beams (*arrectarii* and *transversarii*)⁷ was problematic and, where no reference could be made to the arrangement of the traces of the branches on the same fragment, it proved impossible. In the case of a putative beam, the level of cohesion of the clay may indicate the position of the fragment with respect to the crossbeam (above or below).

The coexistence on the same fragment of two or more of the aforementioned categories, when recorded, proved invaluable for an improved interpretation and reconstruction of the wood and plant structure of the walls. As a result of the links between negative impressions, two categories were created:

- *intertwining points* – fragments in which one or more traces of branches or slats have a direct visible relationship with a trace of a vertical element, providing negative evidence of the overlap of two elements (intertwining);
- *grafting points* – fragments where there is a visible sign of the point in which a trace of the vertical element of the

intertwined structure or joist/strut meets the trace of a horizontal crossbeam perpendicularly, indicating the grafting point between the two elements along the frame of the latticework.

The traces were measured wherever possible; in other words, where the diameter of the curved traces could be reconstructed or where the width of the flat traces was preserved (an extremely rare occurrence). It should be emphasised that no complete negative impressions (i.e., complete on each side) have been preserved.

A table summarising the categories of the fragments found inside Buildings 2, 3 and 7 is included in this article (Table 1).

Microscopic analysis

Some of the smaller diagnostic fragments were examined with a microscope (10× e 20×) in order to carry out more detailed observation of the fabrics, the use of grog to temper them and the presence of traces of inclusions that are hard to spot with the naked eye. The fabric is similar for all three buildings, even though with slightly varying percentages of inclusions. More specifically, in the case of Room B in Building 2, the fabric is lumpy, with uneven grain size distribution, full of cavities and vacuoles and pockets of uncompacted material; the skeleton is heterogeneous. The sediment has a limey, sandy component which did not set well when used. This would explain the conformation of the fragments: the linear fracture that occurred during the collapse followed the moulding line of the clay on the branches (with a low level of adhesion).⁸

Shredded straw (possible to be mixed with manure) and, occasionally, chaff were used for tempering, both for the daub and sometimes for the finishing plaster.⁹ There are numerous millimetric lithoid fragments while grog (*chamotte*) is rare. The occasional, unintentional inclusions include stems, stalks of grasses and charred seeds, imprints of leaves (*Corylus Avellana*, hazel) and micro-molluscs.

This generalised type of microscopic analysis was followed by more in-depth analysis in order to make detailed observations of the structure of several samples and to identify the composition of the finishing plaster (see *infra* 3.1.1). However, it was not possible to make verifiable smooth, polished sections¹⁰ (also useful for investigating the way the clay was applied), due to the highly fragmentary nature of the finds.

BUILDING 2, ROOM B: PRESENTATION OF THE DATA

Building 2, which has been interpreted as a multi-functional structure within the farm complex, was modified and

⁶Pefau (2018) 193.

⁷Vitr. De arch. 2.8.20; 7.3.11.

⁸De Chazelles (2011) 582.

⁹For further information about intentional and unintentional inclusions for clay infill, see Tasca (1998) 81; Bonnaire and Tengberg (2007).

¹⁰Peinetti (2014) 314–317.



Table 1. Main categories of traces identified on fragments of *concolato* clay, divided according to the building to which they belonged (data processing by A. Bruna)

	Diagnostic fragments	Flat surfaces	Final coat of plaster	Branches	Battens	Small logs	Struts, jambs, cross-beams
Building 2	278	169	109	150	25	14	23
Building 3	21	9	-	7	1	2	2
Building 7	25	22	-	2	1	1	2

enlarged several times during its life. This building has provided the highest absolute number of fragments of *concolato* clay (fire-hardened clay) at the site. In particular, Room B (Fig. 3), interpreted as a pantry, is the part of the building that revealed the highest number of fragments in an excellent stratigraphic situation (intact collapse layer). It is a rectangular room (2.6 × 6.4 m), possibly with two entrances on the eastern and southern sides, with perimeter walls consisting of a masonry base (marly limestone ashlar) bound by clay, 60 cm wide; the roof is made of flat and curved roof tiles on a trussed wooden frame.

The excavations led to the identification of the internal structure of the room which was made mainly of wood (partition wall, poles and a loft). The analysed finds come from six distinct collapse levels (US 331, 503, 723, 724, 739, 750), with a total of 393 fragments, 242 of which are diagnostic.

Flat surfaces and finishing plaster

160 flat surfaces (the facing of the wall) were found, of which 105 fragments had traces of the finishing plaster (Fig. 4). This consists of extremely fine clay with a colour varying from white to beige, applied with a thickness of 1–2 mm,

**Fig. 3.** Room B of the Building 2 with some of the collapse levels of the wattle walls (photo M. Ippolito)

probably using a putty knife, as can be seen from the straight parallel lines, running diagonally, identified on the surface. In a few rare cases, it proved possible to recognise several overlapping layers of plaster, marked by application in a different direction; superficial traces of shredded straw, in varying quantities, could often be identified.

Analysis of the finishing plaster. Several samples of *concolato* clay with traces of well-preserved finishing plaster were also analysed in the DISTAV laboratory of the University of Genoa.

A detailed examination of the morphology of the plaster revealed the natural drying of the surfaces (the “scalding” of the plaster, as in other contexts, is therefore absent here¹¹).

The Scanning Electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDS) conducted on polished cross-sections of the plaster revealed an abundance of aluminium and silicon, while phosphorus, calcium and iron emerged in much more limited quantities.

The absence of sulphate excludes the presence of chalk, while the absence of carbonate, besides eliminating the possibility that lime was one of the materials employed (a hypothesis put forward during the excavation due to the complete lack of traces of this binder in the stone walls and in the stratigraphy), would exclude the use of lake sediment. No hypothesis can therefore currently be made about the source of the clay.

Branches

In total, 126 traces of branches were identified, always on the opposite surface with respect to the flat surface (when present) (Fig. 5a). The diameter varies from 12 to 30 mm, with the most common measurement being 22 mm. They were found between 18 and 70 mm away from the flat surface of the wall, with the most common measurement being 40 mm and the distance between the branches varying from 0 to 40 mm.

The traces of the branches sometimes display signs of the bark being stripped off but there are more frequent traces of branches with the bark still on. There does not seem to be a

¹¹Croce et al. (2014) 154.



Fig. 4. Fragment of *concotto* clay (from US 503) with traces of finishing plaster (photo A. Bruna)

correlation between the signs of bark being removed and the dimensions of the traces. In two cases, traces of plant fibres have been recognised along the circumferences of the branches and have been identified as cords designed to hold the branches together.

Slats

21 traces of horizontal slats have been recognised. The few slats that could be measured were about 22 mm wide with only one trace measuring 35 mm. A trace left impressed on the *concotto* clay displays a frequently obtuse angle which is rarely acute and never straight; the preserved thickness never exceeds 10 mm (Fig. 5b).

Vertical elements

In terms of the vertical elements of the structure, 14 traces of timbers have been identified: in 6 cases, they show signs of being intertwined at right angles with horizontal elements. Their diameter is fairly variable (60–90 mm). A sample of charred wood, found in US 739, which displays signs of bark being removed and being shaped at one end, belongs to this category of find (Fig. 6a).

Supporting beams

Two finds belong to the category of support joists: one comes from a fragment found in US 503, where there is

also evidence for a crossbeam (Fig. 6b). The joist is represented by a sub-rectangular groove on the flat surface of the (unplastered) fragment which is grafted onto a horizontal trace of a large wooden element. The angle that can be inferred between the two traces is about 82° , indicating a supporting beam that was placed at a slightly oblique angle. Fingerprints on the flat surface have also been identified. They were left while pressure was applied to the clay on the part where the two elements were intertwined.

Struts and crossbeams

With regard to the roof frame of the structure, 16 traces of struts and crossbeams were discovered on the sides of several fragments which display signs of the pith of the wood. These surfaces show direct contact between the clay and the beams (not measurable) which were made by sawing. Distinguishing between the two elements proved extremely difficult. Indeed, no clear examples of struts were identified, and only a few crossbeams. In these cases, the cohesiveness of the surface itself suggests the position of the fragment with respect to the beam. In the case of a compressed, compact surface, it is likely that the beam lay above it; in the presence of voids and gravity-driven forms, due to the detachment of material still in its plastic state, the beam was probably placed below it.



Fig. 5. a: Fragment of *concotto* clay (from US 503) with signs of interwoven horizontal branches (photo A. Bruna); b: fragment of *concotto* clay (from US 503) with negative impression of a horizontal slat (photo A. Bruna)

BUILDING 2, ROOM B: INTERPRETATION OF THE DATA

Although over 40 m³ of *concotto* clay related to Room B of Building 2 were discovered, the fragmentary nature of the finds and the way they were scattered within the collapse levels made it impossible to establish the position and form of the openings (doors or windows), the height and frequency of the intermediate roof beams, the height of the struts, the form of attachment of the roofing structure: this may only become possible if and when large blocks of *concotto* clay, ideally with parts of the upper levels still preserved, are discovered.

However, the amount of data gathered about individual fragments has made it possible to reconstruct the general structure of the masonry, its measurements, the wooden and plant components and suggest, in broad terms, what its outer appearance must have looked like.

Reconstruction of the structure

With regard to the positioning of the wooden structure on the stone base of the perimeter walls, the vertical struts

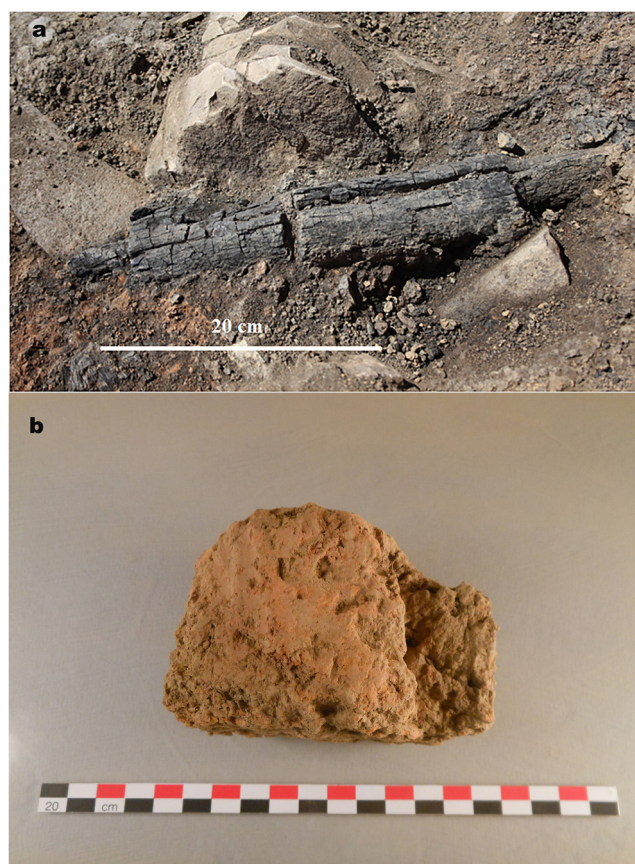


Fig. 6. a: Portion of charred timber (from US 739), with signs of working along the right edge (photo M. Ippolito); b: fragment of *concotto* clay (from US 503) with frontal impression of an oblique supporting beam and a trace of a cross-beam along the lower side (photo A. Bruna)

cannot have been inserted directly because no postholes were found within the walls. The most plausible system involves a low stringcourse (also known as a cordon) on which the struts were inserted using slots.¹² The height of the struts is unknown but, given the fairly small size of the structure, they may have reached the roof beam.

The appropriately shaped vertical elements inside the panels of the framework were inserted into the beams by means of holes or notches made in them. Generally, they were stripped of bark and were of a larger diameter than that of the branches (6–9 cm). Bark-stripping was designed to prevent rotting and attacks by woodworm and other wood-boring insects.¹³

The branches represent the horizontal weft of the woven lattice. The sizes vary considerably with a mean size ranging from 1.8 to 2.6 cm in diameter; they do not always display signs of bark-stripping, an indicator of more hurried, rapid working. There is no evidence for “mixed” traces of branches, in other words with a curved-flat groove, seen in

¹²Adam (1989) 132–135.

¹³Graham (2003) 23–24.

other contexts,¹⁴ associated with the use of half-branches in the structure of the latticework.

The woven branches, which cannot have been particularly close together nor regularly spaced (the distances between the traces are extremely variable), lie at a minimum distance of 2 cm from each other and a maximum of 7 cm from the facing, with an average of 4–5 cm (Fig. 7a).

The horizontal slats (2–3.5 cm) are situated within the fragments in a similar position to that of the branches, along the same axis, but positioned slightly further back, and parallel to the flat surface. These elements were made by splitting a small log or a branch vertically using a tool with a smooth blade: used more sporadically (they occur at a ratio of 1:6 compared to the branches), they may have been fixed between vertical elements to give more stability to the framework during construction.¹⁵

The daub infill was then applied on both sides in no more than two coats, as seems to be indicated by several lines visible in section on some of the finds, which show the addition of several coats. The thickness for each side is on average 4–5 cm which, when doubled and added to the traces of intertwined plant fibres, creates walls with an average thickness ranging from about 12 to 18 cm; it was not supposed to be perfectly uniform but followed and

conformed to the latticework wattle and the thickness of the load-bearing beams of the structure (Fig. 7b).

The low quality of the daub infill (a high component of sandy lime) suggests that the sediment was found in situ or in the immediate vicinity.

The plaster (thickness of 1–2 mm) consists of a finer, purified clay with a colour varying from white to beige. It was applied using putty knives, for which there are clear signs from the top downwards moving diagonally, and would have been redone every so often, as can be seen from the presence of several overlapping layers. Just over half of the flat surfaces that were examined display traces of plaster: this could imply that only one side of the wall was plastered (in this case, probably the outer face, to protect the wall from bad weather).

The contribution of anthracological analysis

An anthracological analysis of the charcoal found in the collapse levels of Room B was conducted at the Archaeobiological laboratories of the Civic Museum of Como. The results showed an overwhelming percentage of common oak (*Quercus* sez. *Robur*), especially for the wooden beams that formed the main framework of the load-bearing structures, but also for the smaller timbers (US 331 and 739), in other words the vertical elements of the latticework wattle. Other types of wood used in the structure include ash (*Fagus Sylvatica*) and dogwood (*Cornus* sp.).¹⁶

The branches come from many different trees, in particular the three above-mentioned species, together with hazel (*Corylus Avellana*), several species of fruit tree (*Pomoideae*), elm (*Ulmus* sp.), and maple (*Acer* sp.).

There are numerous charred fragments of dogwood, in the form of half-branches (branches split lengthways), found in US 739 (interpreted as the collapse of the open loft within the room), which could have been used in the intertwined plant fibres,¹⁷ or more probably in the actual structure of the loft: it is a tree species with long, flexible shoots which are also extremely tough. Whatever the case, it is worth emphasising the lack of curved-flat grooves in the *con-cotto* clay.

CONCLUSIONS

The analysis of the finds of *con-cotto* clay from Room B of Building 2 made it possible to classify the structure as belonging to the category of *opus craticium*, a building technique with a wooden load-bearing structure of struts and beams, attached to the ground in various ways,¹⁸ with posts inserted directly in the soil or attached to a solid masonry base: structures of this kind are defined as “case a

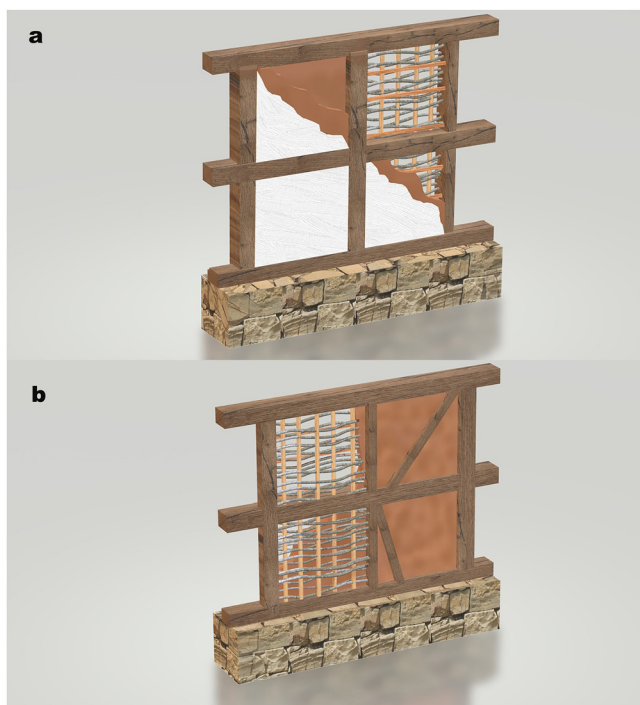


Fig. 7. 3D reconstruction of a hypothetical cross-section of the wall of Room B of Building 2. a: plastered outer face of the wall; b: inner non-plastered face (data processing by A. Bruna)

¹⁴De Chazelles (2011) 578; Tasca (2019) 242–243.

¹⁵Peinetti (2016) 276–277 and fig. 22.1.

¹⁶In general, research on the structural parts made of perishable materials of all the buildings was made possible by the analysis carried out on 750 anthracological samples.

¹⁷For a similar case, see Roux and Chabal (1996) 343–349.

¹⁸Antonini (2014) 63–83.

ossatura” (half-timbered houses),¹⁹ *colombages* in French-speaking areas, *Fachwerkhaus* in German-speaking areas.²⁰

The spaces within the frames of the structure are then filled, and may involve latticework made of long, flexible plant elements (branches, reeds, slats, thin timbers, poles, planks, according to the adopted variant and the availability of raw material). The framework was then filled in on both sides by abundant coats of clay mixed with water and temper (straw, sand, slurry), to provide fairly uniform covering of the wattle.²¹

The latter structure, which has no single, clear cultural origin but has its roots in prehistoric and protohistoric building techniques,²² has different names according to the geographical area where it is studied: *wattle and daub* in English, *torchis* in French, *strohlehm* in German and *mantado* in Spanish or Portuguese. The technique is known by a variety of names in Italy (“incannucciato”, “canniccio”, “graticcio” and “intreccio”). However, the lack of a uniform terminology for the building technique is not restricted to Italy,²³ and the existence of numerous technological variants, linked to specific historical contexts and the materials employed, has complicated the issue; the term used in this paper is “intreccio vegetale” (wattle), given the lack of reeds at the site.

The analyses carried out on fragments of *concotto* clay during the excavation of Montessoro provide a contribution to the study of wattle-and-daub construction techniques during Late Antiquity, a period for which there is still insufficient archaeological data.²⁴ Most of the systematic research on *concotto* clay concerns Neolithic or Iron Age contexts, and has been carried out chiefly in France where this type of construction technology has been carefully studied. The variability in the *torchis* technique, which used a variety of wood and plant materials, with forms, styles and the end results that differ considerably according to the available raw material, function and historical period, makes it difficult to find close analogies or similarities between sites.

In the Ligurian Apennines, the only late antique sites where the presence of *concotto* clays with a structural function is documented are Refondou (Savignone, Genoa)²⁵ and Statale (Ne, Genoa),²⁶ but no specific studies have been done at either site.

Outside Liguria, other sites worth mentioning include Filattiera (Massa Carrara)²⁷ and Brignano Frascata (Alesandria),²⁸ both marked by significant finds of *concotto* clay with traces of reeds related to late antique structures. A structure (barn or underground barn) excavated at Mantua belongs to the late antique-early medieval period; part of an earthen wall was found still *in situ*, with traces of branches and vertical joists of the wattle.²⁹

As regards the Roman period, one of the sites with interesting evidence for wattle construction is *Bedriacum-Calvatone* (Cremona), where a large number of fragments of lathwork with *concotto* clays were found and systematically studied, as well as a part of the preserved portion of a vertical wattle panel.³⁰ At the site of a Roman villa in Isera (Trento),³¹ a large part of a collapsed wattle-and-daub wall was discovered with negative impressions of horizontal branches.

In France, besides the numerous Roman sites that have yielded traces of *torchis* construction,³² a preliminary study has been published of the late antique site of Fontaine-aux-Moines (Toquin, Seine-et-Marne).³³ About seven kilos of fragments from a residential structure of the fourth-fifth century were found, with traces of branches and the wooden elements of the latticework wattle.

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²⁰Cagnana (2000) 223–225; Bacchetta (2003) 123–127.
²¹Adam (1989) 132–135; Cagnana (2000) 222–224; Bacchetta (2003) 123–127.
²²Houben and Guillaud (1989) 20–21; Bacchetta (2003) 134–135.
²³Sánchez García (1999) 162–167; Bacchetta (2003) 126–127.
²⁴Among the various attempts to catalogue sites that have provided evidence for structures made of perishable material between the Roman and medieval periods, and the inherent problems, see Fronza (2005); Santangeli Valenzani (2011); Antonini (2014). With regard to the recognition of structures made from perishable materials during excavations, see Cagnana (2000) 230; Bacchetta (2003) 120; Quiros Castillo (2012) 134.
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³⁰Sena Chiesa (1998) 351–354.
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