Volume 13
2023

pca

european journal of
postclassicalarchaeologies

SAP
Società
Archeologica

pca

european journal of
postclassicalarchaeologies

volume 13/2023

SAP Società Archeologica s.r.l.

Mantova 2023

pca

Post-Classical Archaeologies (PCA) is an independent, international, peer-reviewed journal devoted to the communication of post-classical research. PCA publishes a variety of manuscript types, including original research, discussions and review articles. Topics of interest include all subjects that relate to the science and practice of archaeology, particularly multidisciplinary research which use specialist methodologies, such as zooarchaeology, paleobotany, archaeometallurgy, archaeometry, spatial analysis, as well as other experimental methodologies applied to the archaeology of post-classical Europe.

Submission of a manuscript implies that the work has not been published before, that it is not under consideration for publication elsewhere and that it has been approved by all co-authors. Authors must clear reproduction rights for any photos or illustration, credited to a third party that they wishe to use (including content found on the Internet). For more information about **ethics** (including plagiarism), copyright practices and guidelines please visit the website www.postclassical.it.

PCA is published once a year in May. Manuscripts should be submitted to **editor@postclassical.it** in accordance to the guidelines for contributors in the webpage http://www.postclassical.it.

Post-Classical Archaeologies' manuscript **review process** is rigorous and is intended to identify the strengths and weaknesses in each submitted manuscript, to determine which manuscripts are suitable for publication, and to work with the authors to improve their manuscript prior to publication.

This journal has the option to publish in **open access**. For more information on our open access policy please visit the website www.postclassical.it.

How to **quote**: please use "PCA" as abbreviation and "European Journal of Post-Classical Archaeologies" as full title.

Cover image: Artistic representation of the animal burial found in Santa Maria delle Lacrime a Treviglio (BG), by Binoli Navodya Nimnadi Kankanige Don.

"Post-Classical Archaeologies" is indexed in Scopus and classified as Q3 by the Scimago Journal Rank (2022). It was approved on 2015-05-13 according to ERIH PLUS criteria for inclusion and indexed in Carhus+2018. Classified A by ANVUR (Agenzia Nazionale di Valutazione del sistema Universitario e della Ricerca).

DESIGN:
Paolo Vedovetto

PUBLISHER:
SAP Società Archeologica s.r.l.
Strada Fienili 39/a, 46020 Quingentole, Mantua, Italy
www.saplibri.it

Authorised by Mantua court no. 4/2011 of April 8, 2011

ISSN 2039-7895

pca
european journal of
postclassicalarchaeologies

volume 13/2023

CONTENTS **PAGES**

Bastien Lefebvre*

Post-and-plank construction between the 12th and 13th centuries: examples from recent excavations in Moissac (France)

1. Introduction

Archaeologists are frequently confronted with the discovery of post holes or sole plate imprints, which reveal in negative the foundations of buildings made of wood. When the remains are sufficiently well preserved, it is possible to reconstruct the plan and organisation of the buildings, but only occasionally their elevations. This difficulty is well known to those interested in the houses of the Early Middle Ages, and due to lack of sufficient data our knowledge of their architecture remains often hypothetical. From the 11th-12th centuries onwards, houses built of stone or brick became more numerous and are better known. Together with timber-framed buildings with stone sill wall, they represent the architecture that was most used in the towns and countryside towards the end of the Middle Ages. More precise trends are emerging from studies that have been carried out for several years, allowing the identification of regional variants and chronological specificities about materials used and about the construction techniques implemented. In France, constructions with wooden foundations (posts or sole plates) are most often associated with wattle and daub elevations when it comes to characterising the early mediaeval habitations of the northern part of the country. In the absence of data, the use of planks to form the filling of elevations is a technique presented by historiography as relatively anecdotal, rather specific to the end of the Early Middle Ages and generally confined to Northern Europe (Germany, England, Scandinavia), despite a few known examples in Italy. However, recent excavations in the centre of Moissac, a small town in southwestern France, have documented several examples of this type of construction dating from between the 12th and 13th centuries. These discoveries, favoured by the damp subsoil, which allowed the preservation of the wooden parts, raise questions about the place that this kind of architecture may have had in the High Middle Ages.

* Université Toulouse - Jean Jaurès, Maison de la Recherche, Laboratoire TRACES, Toulouse, France, *bastien.lefebvre@univ-tlse2.fr*.

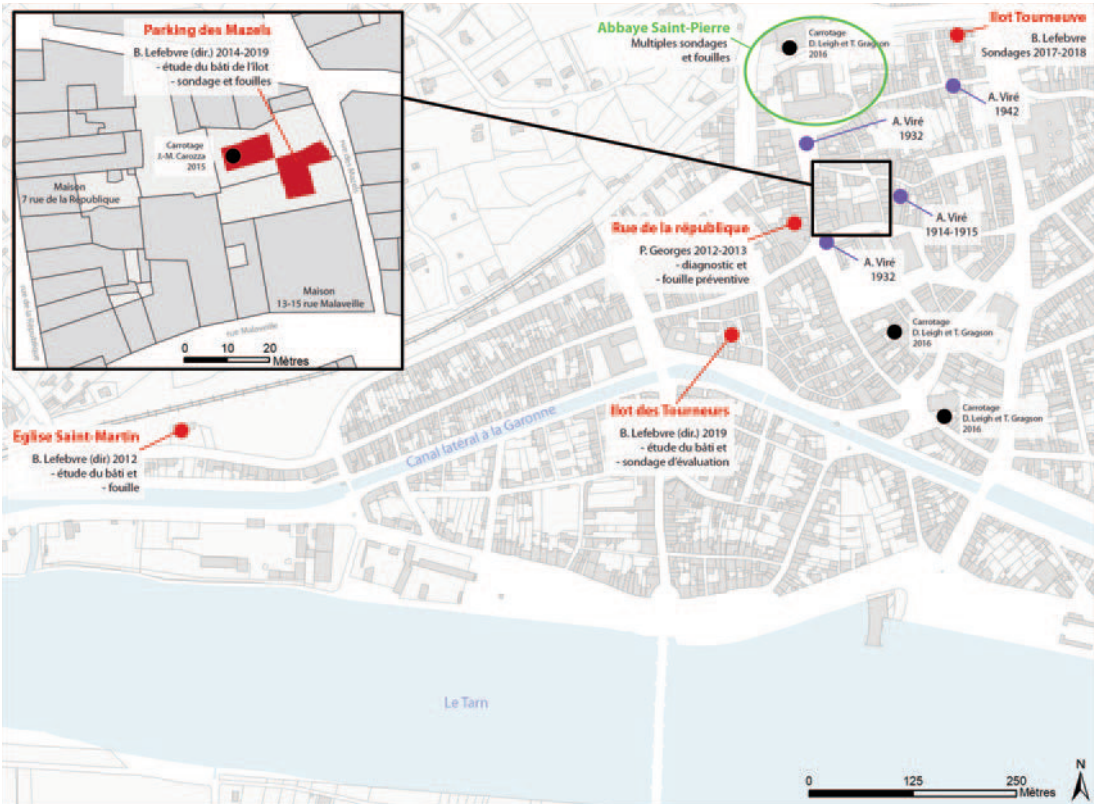

Fig. 1. Map of the archaeological interventions carried out in the city of Moissac.

2. The site of Moissac

Situated on the banks of the Tarn River, three kilometres upstream from its confluence with the Garonne, Moissac is a small town of mediaeval origin built around the abbey of Saint-Pierre. For a long time, archaeological excavations were relatively small and concerned only the monastery and its surroundings, while those carried out in the urban centre were limited to a few observations made by Armand Viré between 1910 and 1930 (fig. 1). It was not until 2013 that a first "modern" excavation was carried out in the city, in the Rue de la République (Georges 2020). At the same time, several excavations were carried out as part of a research programme by the University of Toulouse - Jean Jaurès, specifically aimed at studying the occupation of the town: i/ Rue Tourneuve, in a timber framed house built against the urban wall (2017-2018), ii/ Rue des Mazels, about a hundred metres to the south of the monastery (2015-2018), iii/ Rue des Tourneurs, in a block located near the former mediaeval castle (2019).

At these last two sites, the interventions have documented numerous domestic sequences between the 12th and 20th centuries. The data collected in Rue des Mazels show that the earliest settlements belong to a wetland area, filled in during the second half of the 12th century, before the construction of a building in a space delimited to the north by a palisade (Lefebvre 2020a). In the following century, the building was replaced by a new one built of brick, to the north of which a large winepress was installed in the last decades of the 13th century. These excavations, carried out in waterlogged sediments, uncovered numerous elements belonging to post-and-plank buildings, including a set of pieces that were reused during the construction of the winepress (Lefebvre 2020b). These discoveries were completed during the excavation carried out in Rue des Tourneurs in 2019, which was limited to a 30 m^2 area. Three metres of stratification were excavated, without reaching the limits of the archaeological sequence. However, the results are exceptional since two wooden building walls dating from the second half of the 12th century have been found, preserved over a height of several dozen centimetres in water-saturated levels (Lefebvre 2021).

3. A post-and-plank wall or "pièce-sur-pièce à coulisse" from the second half of the 12th century discovered Rue des Tourneurs

The excavation carried out in 2019 allowed the discovery and study of a wall made exclusively of assembled planks and posts of oak (STR138) (fig. 2, fig. 3). The wall has been excavated for approximately two metres and a 0.80 m height, but its position, in the western section of the excavation area, has limited the study. However, the excavation of the wall in plan can complete the observations both to the north and to the south. Because no return has been identified, it is possible to confirm that the wall extended over four metres. The excavation was interrupted before reaching the lower part of the structure, so neither the height of its elevation nor its foundation system is well known. However, the discovery of a soil level in a small test pit suggests that the base of the elevation could have been on this soil surface, i.e. 10 cm below the observation limit.

3.1. Architectural structure

The structure consists of rectangular posts (about 20x30 cm), with a groove on each short side (fig. 4). Only three posts were observed, from north to south: 1231, 1232 and 1243 (fig. 2). The posts are evenly distributed: they have a centre distance of 1.66 m, which corresponds to about five mediaeval feet (0.33 cm) (fig. 3). As it stands, it is difficult to know whether this very limited observation makes sense on the scale of the entire construction. However, the coincidence

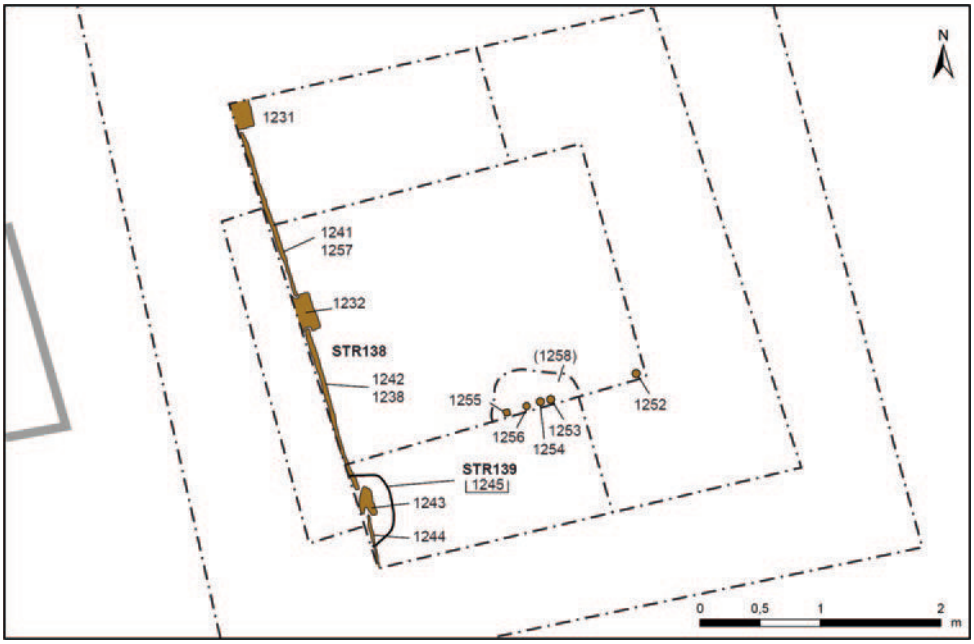

Fig. 2. Moissac, rue des Tourneurs plan of the wall STR138.

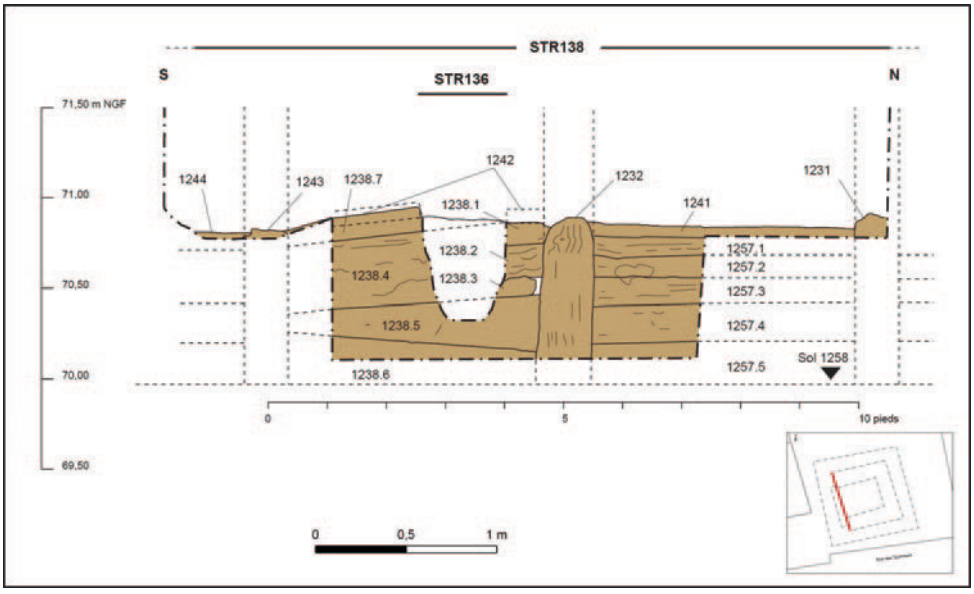

Fig. 3. Moissac, rue des Tourneurs, eastern face of the wooden wall STR138.

Fig. 4. Moissac, rue des Tourneurs, detail of the assembly (groove for embedding) between post 1243 and board 1244.

raises the question of the regularity and regulation of the distribution of these vertical pieces of wood[1]. Planks were placed horizontally in the grooves of the posts, according to a "*pièce-sur-pièce à coulisse*" construction system: the planks have been placed edge-to-edge, without linking (fig. 5). Two sets could be observed completely: 1241-1257 between posts 1232 and 1231, and 1242-1238 between posts 1243 and 1232. A third set is attested further south but was only observed in plan (1244). These sets are different and do not use planks of the same modules, but they are all characterised by their thinness, which can probably be explained in part by weathering, and by a significant compression of the sediments. Moreover, while the planks of the 1241-1257 group are horizontal, this is not the case of the 1242-1238 span where they are in different orientations, a situation that can probably be explained by a partial collapse, with the planks having slid one behind the other.

During the excavation and the disassembly of this structure, some technical aspects of its construction were documented. Indeed, one can see the thinning of the ends of the planks, a solution chosen to ensure a better connection with

[1] An identical remark has been made about the implementation of some wooden structures at the site of *La Mothe* in Pineuilh but using multiples of the mediaeval "cane" (Prodeo 2007, p.150).

Fig. 5. Moissac, rue des Tourneurs, view of the structure STR138 wall around post 1232. The gap in the center corresponds to the covering of the structure by a posterior excavation.

Sample	Length	Height	Thickness	
			min	max
1238.4	505	350	29	4
1238.5	900	148/285	27	17
1238.6	610	160/266	20	9
1257.3	540	135	24	11
1257.4	535	235	30	15
1257.5	535	230	21	18

Fig. 6. Moissac, rue des Tourneurs, table of the dimensions of the archaeologically complete planks of structure STR138 (in mm).

the posts, and the use of wooden wedges to block the planks in the grooves of the posts, as was observed between the planks of 1257 and post 1232. However, no dowels or nails were found. The weathering of the surfaces limits the possibility of gathering information on the cutting: with caution Vincent Labbas notes that planks 1257.3, .4 and .5 seem to show traces of drawknife (pers. comm.) (fig. 6).

Sample	Date of last ring	Max. felling date
1232	1104	TPQ
1238.4	1077	1091
1238.5	1107	1130
1242 A	1069	TPQ
1242 B	1068	1098
1257.3	1139	TPQ
1257.5	1142	TPQ
1196.1	1102	TPQ
1196.2	1123	1155
1196.3	1128	TPQ
1235.8	1113	1144

Fig. 7. Moissac, rue des Tourneurs, datations of the pieces of wood from the structure STR138 and set 1196.

3.2. A building built after AD 1142

Several timbers belonging to this structure have been sampled for dendrochronological dating (Labbas 2021). Although some of them had to be discarded because they were too badly preserved or because they did not have enough rings, several planks as well as post 1232 yielded usable results and allowed the structure to be dated. Thus, of the seven timbers analysed, three preserved sapwood and allowed us to estimate the felling dates of the trees (fig. 7).

However, the synthesis of these results leads to a selection of the lowest date as a *terminus post quem* for the construction of the wooden wall, i.e. the year 1142. The construction of the structure cannot therefore be earlier than this date, but it may be several years later. The heterogeneity of the results also shows that the wood used came from trees felled over a period of more than half a century, between AD 1068 and AD 1142 at the earliest. Thus, it is more than likely that some of the planks were reused or carved from salvaged wood.

The observations made of this structure allow us to recognise a wall entirely built of wood, at least 4 m long, constructed after the year 1142, and associated with a floor. While there is no direct evidence for the interpretation of this structure, the nature of the floor surface indicates that it was an interior circulation level. The presence of a covered space to the east of wall STR138 suggests the western side of a building, the extent of which is unknown. Although this hypothesis is not well supported, it is nevertheless reinforced by the regressive reading of the site's occupation. In fact, despite the later raising of the ground level, the structure STR138 was preserved and formed the western wall of a building, until the latter was burnt down after AD 1155 (*infra*). It can therefore be assumed that not only the wall was preserved after the raising of the ground level, but the entire building to which it belonged.

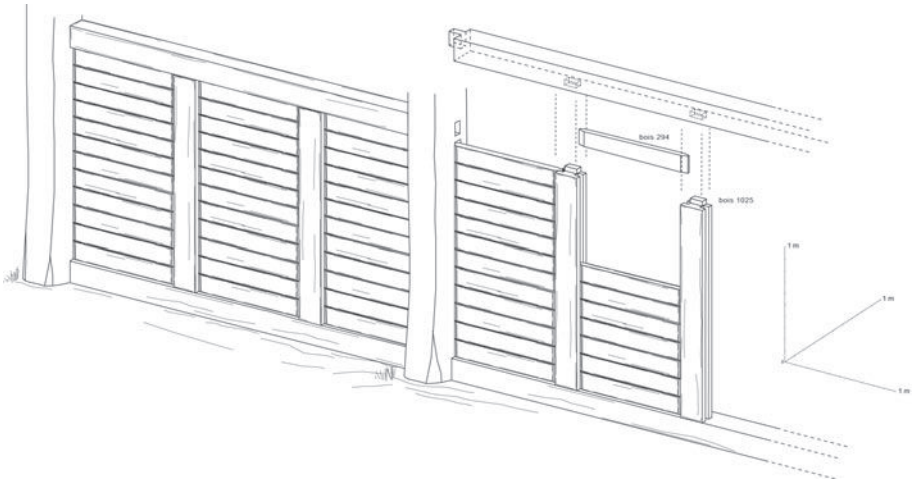

Fig. 8. Pineuilh, La Mothe, reconstruction of the timber frame from set 1000b (from Prodéo 2007, fig. 127).

However, it is not clear whether this building consisted entirely of *pièce-sur-pièce à coulisse* walls, like the STR138 structure. The very original, even exceptional, character of this layout makes any comparison difficult. Indeed, few sites have provided examples of such architecture, especially in southern France. The most similar structure known is the one reconstructed at the end of the excavations at the site of *La Mothe* in Pineuilh (Prodéo 2007) (fig. 8). In particular, the wooden pieces discovered in a secondary position within the "1000b" complex have been interpreted as belonging to a renovation of the central building ("700"), which took place in AD 995 (Prodéo 2007, p. 149). Despite the difference in context (rural and elite at Pineuilh, urban and *a priori* everyday in Moissac) and dating (AD 915 in Pineuilh, after AD 1142 in Moissac), the similarity between the two structures is quite clear.

3.3. The raising of the ground and the construction of a partition wall, before the building burned down

Despite a 0.85 cm rise in the ground, the wooden wall was maintained. Above this fill, various signs of activity were identified during the excavation, including two square stones probably related to an hearth structure, as well as a large concentration of stakes. Between these structures and the wooden wall already described, an alignment of wooden stakes and planks had been recognised (STR135) (fig. 9). The structure consists of nine pieces of wood driven a

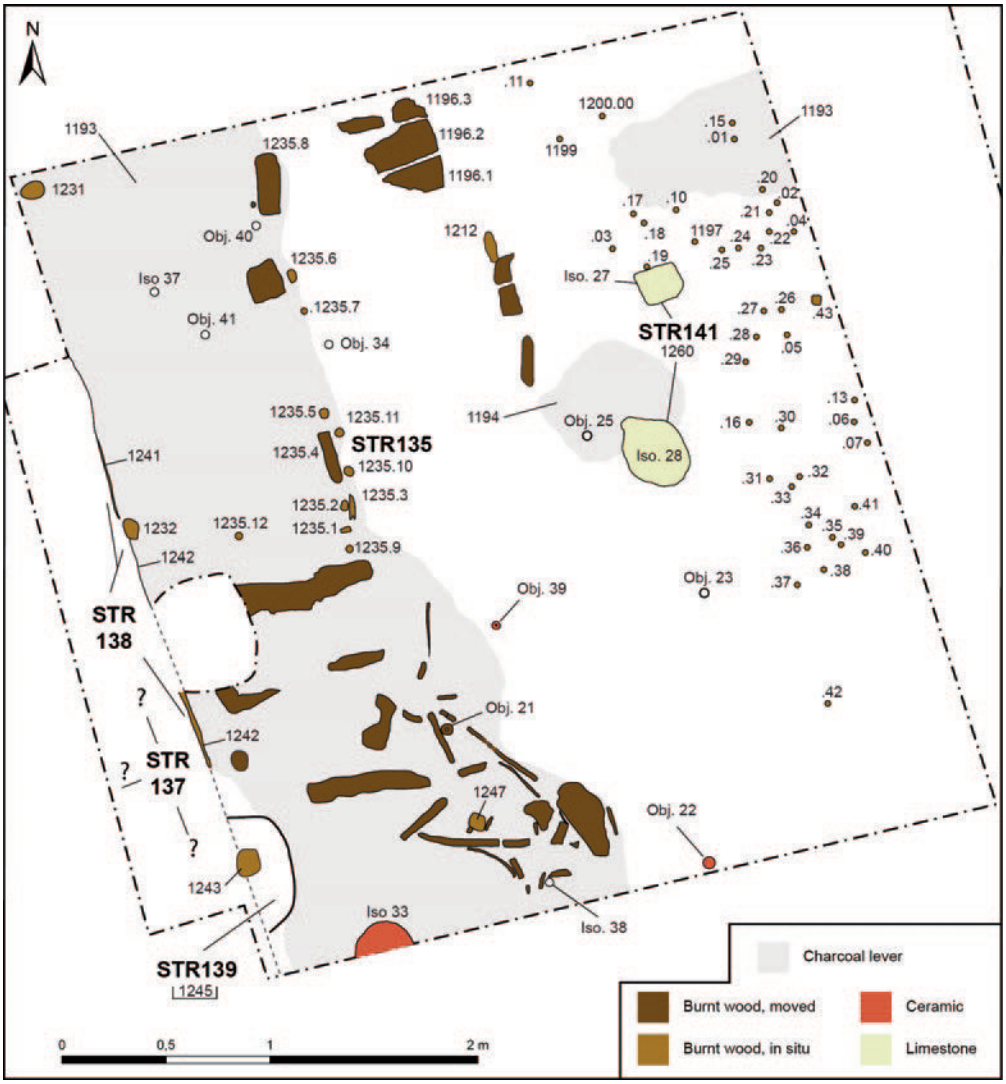

Fig. 9. Moissac, rue des Tourneurs, plan of burnt objects and remains.

maximum of ten centimetres into the ground (1235.1-3, 1235.5-7 and 1235.9-11). The alignment of the pieces of wood is quite clear, especially as the line thus formed is parallel to wall STR138, which is about one metre away. The irregular distribution of the stakes and planks seems difficult to explain, but the structure is not complete: it was certainly disturbed and partly destroyed by the fire, as the burnt ends of some pieces show it. Apart from the posts with pointed

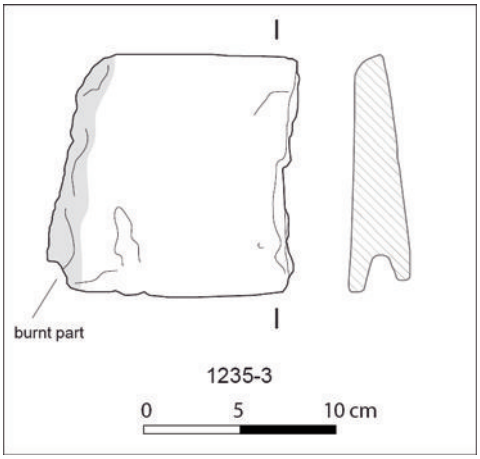

Fig. 10. Moissac, rue des Tourneurs, fragment of vee-edged and grooved plank 1235.3 belonging to the STR135.

ends (1235.9 and 10), the structure was composed of a vee-edged and grooved plank[2] in a reuse position (1235.3) (fig. 10), of cleats (1235.1 and 2), as well as a half roundel (1253.6).

This succession of heterogeneous elements, without any obvious assembly, belongs to a structure difficult to identify. However, one can note that its length and orientation, which is parallel to STR138, suggests that it could be an internal division with a function difficult to recognize (distribution of space, activity within the building, etc.). The use of a vee-edge plank reused in this structure indicates that there was previously, probably in a nearby environment, a post-and-plank wall built on a different model from structure STR138, which does not have this type of assembly, but which is attested elsewhere in Moissac (*infra*).

A fire destroyed the building to which structure STR138 belonged, and its interior fittings. The entire structure was burnt down to ground level, and only the underground part was preserved. Numerous burnt or partially burnt artefacts were uncovered (wooden combs, textiles, spindle whorls, etc.) (fig. 9) (Lefebvre 2020a). Remains of architectural timbers were also found, including a set of wooden planks laid flat (1196). These elements were not discovered joined together despite their proximity and the fact that they are vee-edged and grooved planks. The traces of fire visible on both sides suggest that these planks did not burn in place but came from a destroyed structure. One imagines that they could belong to wall STR138, or to a contemporary structure, a hypothesis that is supported by dendrochronological dating (Labbas 2021), although the thickness of the planks is greater here (fig. 7).

[2] A feather edge plank with groove on the thick edge, close to the current tongue-and-groove fitting system.

4. After a fire, the construction of a new building in post-and-plank construction attached to a sole plate, at the end of the 12th century

After the fire, which must be placed a few years or decades after AD 1155[3], the site was cleared and backfilled with rubble, and a new building was constructed in the same place (fig. 11). Part of the wooden elevation of this new building was preserved and studied (fig. 12).

4.1. Architectural structure

The data collected during the excavation allow us to understand some aspects of the construction of this building, which replaced the one destroyed by the fire. However, given the area explored, the observations are again limited since only one wall could be excavated. Discovered at the western limit of the

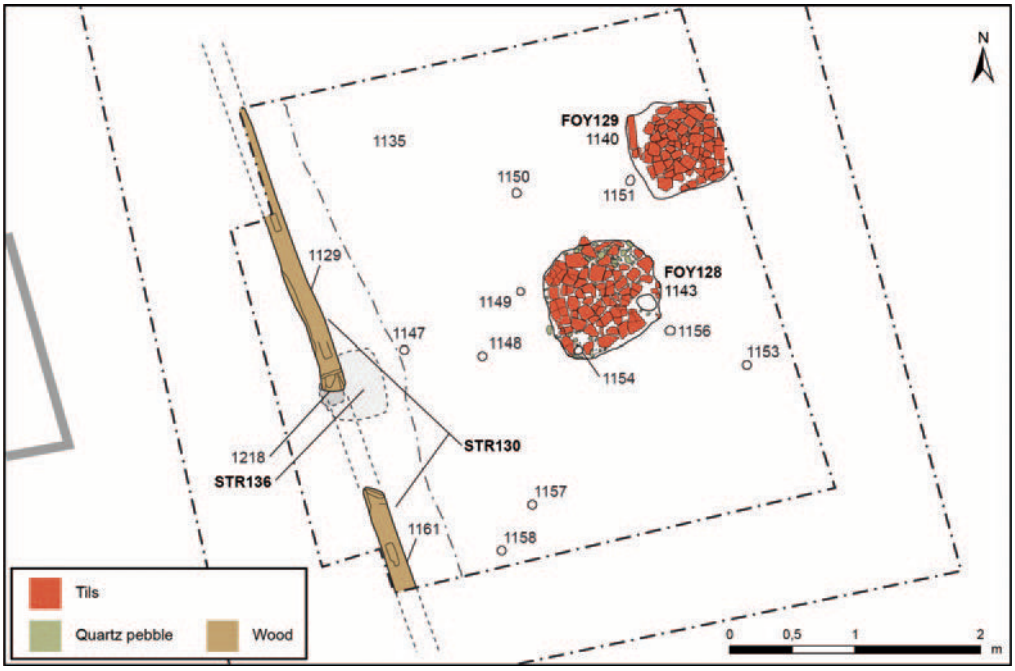

Fig. 11. Moissac, rue des Tourneurs, plan of the structure STR130 wooden wall and associated open fireplaces (FOY128 and FOY129).

[3] Most recent date (*terminus post quem*) given by dendrochronology for the cutting of the timber associated with this fire, and thus the fire itself.

Fig. 12. Moissac, rue des Tourneurs, northern part of the structure STR130 wooden wall, photographed from the east.

area, the structure was studied over a length of 4 m without any recognised extremity or a return (fig. 11). The observed part is composed of two disjointed sets, 1161 to the south and 1129 to the north. It was not possible to determine with certainty whether the gap between these two parts was the result of the original development or of a later partial destruction. However, the way the axe blows visible at the ends were made and the absence of evidence in the stratification suggest that this is an original arrangement. This lack of sole plate is not easy to interpret, except by supposing an opening at this location (fig. 11).

The southern part of the structure consists of a sole plate (1161.1) which, on its upper side, has an empty mortise whose configuration makes it possible to restore the connection with a post (figs. 13, 14). In addition, a wooden plank (1161.2) is placed horizontally on edge-grain, with no apparent joint. The northern part has a similar arrangement (fig. 12), with a sole plate (1129.1) with mortises on the upper side. One of them still has the start of a post (1129.3), while another still has the start of a bracing piece of small cross-section (1129.5). Two horizontal planks are placed on their edge: 1129.4 against post 1129.3 to the south, and 1129.2, in an identical configuration further north. The bracing piece 1129.5 is in front of the plank 1129.4, the two being supported against each other without joint. It should be noted that during the excavation of this structure, a post was discovered under the southern end of the sole plate 1129.1. The association

Fig. 13. Moissac, rue des Tourneurs, detail of plank 1161.2 placed edgewise on top plate 1161.1.

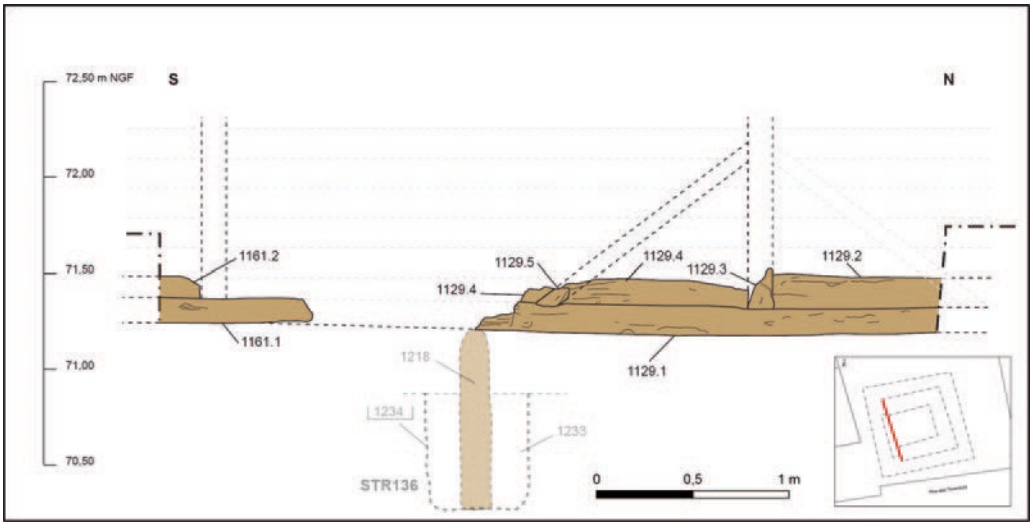

Fig. 14. Moissac, rue des Tourneurs, eastern face of the wooden wall STR130 and restitution proposed.

of one with the other is uncertain, since this post, made of a reused beam with a mortise and a half-timbered joint (1218), was installed in a hole (STR136) dug from a lower level than the one on which the sole plate rests (fig. 14).

In any case, this discovery allows us to reconstruct a wall made of planks stacked between posts, assembled on a sole plate placed directly on the ground, the whole being reinforced by bracing (fig. 14). Despite the good state of preservation of this structure, many questions remain about the assembly, particularly between the planks and the posts. In fact, the only one preserved (1129.3) was too damaged to identify any grooves for the embedding of the planks. It should be noted that although the same construction principle as that used for the elevation of the wall of the house before the fire (STR138) can be found (i.e. a wood architectural structure filled by horizontal boards, without dowels or nails), the configuration used here seems different, with the use of bracing pieces and posts of smaller section.

4.2. A house built after AD 1162, replacing the one destroyed by the fire

Several features were uncovered on the ground level associated with this structure: nine stake holes, as well as two open fireplaces made of tile fragments (fig. 11). These data and the absence of evidence of artisanal functions lead to its identification as a domestic space and the interpretation of the building as a house. Despite the fire and the subsequent filling in, a kind of continuity can be recognised between the building limited by structure STR138 and the one closed by wall STR130. Indeed, the layout of the two walls is identical, and their interior fittings are quite clearly superimposed. This suggests the same use despite the reconstruction.

The very good preservation of structure STR130 allowed several samples to be dated, but as with the previous structure, not all the timbers could be dated by dendrochronology. The study of the sole plate did not yield any results and finally only two planks provide *a terminus post quem* for the construction of this structure: plank 1129.4, whose last observed ring can be attributed to the year 1162, which indicates a later use, and plank 1161.2, whose examination gives a very similar result (absence of sapwood, last observed ring dated AD 1160) (Labbas 2021). If this dating is consistent with those obtained by dendrochronology on the previous phases (first building after AD 1142, fire after AD 1155), the reconstruction of the building which took place immediately after the fire obliges us to consider that STR130 was implemented at a date close to that of the fire, after AD 1162 but without being able to specify when in the late 12th century.

Once again, the infrequent nature of such discoveries makes comparisons difficult. Indeed, while the technique of the palisade wall with vertical planks (*Stabbau*) has long been attested for houses of this period in northern Europe, such as in Antwerp (Belgium), Emden (Germany), or Lund (Sweden) (Chapelot, Fossier

1980, p. 270), *pièce-sur-pièce à coulisse* constructions are rarely documented by archaeology. This technique is most often deduced from indirect observations and its use remains hypothetical, as in the case of the reconstructions proposed for the Anglo-Saxon buildings excavated at Chalton (Addyman, Leigh 1972, pp. 25-26). Walls mobilising horizontal planks wedged between posts have been observed in London but for late 12th-century quayside construction (Milne 1992, p. 39). In York, archaeologists have reconstructed this technique for 10th-century houses based on finds, although the method of construction remains uncertain (Milne 1992, p. 99). In France, apart from a structure dated to the beginning of the 10th century at Pineuilh (*supra*, Prodéo 2007), this type of wall has been deduced for the house of Mirville dated to the second half of the 11th century (Halbout, Le Maho 1984, pp. 69-70). In Italy, it should be noted that this method is proposed for two buildings excavated in Ferrara, via Vaspergolo - corso Porta Reno. Structures 1 and 2, associated with the first half of the 11th century, are indeed made up of sole plate and grooved posts, which suggests the use of horizontal or vertical planks (Guarnieri 1997, p. 183). Although these examples are older than the structures observed at Moissac, it is also known that this construction technique continued throughout the Middle Ages and into the modern period. In Zug (Switzerland), numerous 15th-century buildings constructed in *Bohlenständerbau* (as *pièce-sur-pièce à coulisse* is termed in German) are still preserved in elevation (Moser 2015).

5. The wooden structures identified in Rue des Mazels

The excavations carried out in Rue des Mazels have documented levels of occupation like those described above, characterised by a remarkable state of conservation of organic elements and the discovery of numerous wooden elements. While the campaign carried out in 2017 made it possible to excavate the remains of a plank wall implemented in the second half of the 12th century, the most remarkable discovery remains that of the foundations of a powerful winepress dated to the very end of the following century (Lefebvre 2020b). Excavation of this structure revealed that it was installed by replacing numerous pieces of wood, in particular a series of vee-edged and grooved planks used as a planking for the foundation of the winepress screw.

5.1. The construction of a palisade dating from 1161 to 1178

In combination with a quadrangular post, sixteen aligned and adjacent oak planks, but without any joint between them, allows the restoration of a fence approximately 3 m long (STR317) (fig. 15). The excavation of this structure revealed that the planks did not all have the same dimensions, but that all had a sloping lower end, reaching a point. This arrangement indicates that the planks were not

Fig. 15. Moissac, rue des Mazels, the palisade of planks driven into the ground (STR317), view from the north.

installed in a trench (no associated digging was observed), but that they were rammed into the sediment: the oblique cut facilitated penetration.

Although a significant length of the palisade has been preserved, its function is not known. The layout of the wooden planks shows that the role of this structure was at least to physically delimit two spaces. During the excavation, it was not able to recognise a clear limit in the stratification that coincides with this alignment of planks, but obviously there is a difference between occupation on either side. The structures associated with this plank alignment suggest outdoor spaces on both sides, so this structure is interpreted more as a palisade than the wall of a building (Lefebvre 2020a).

The best-preserved timbers of this structure were dated by dendrochronology (*Dendrotech* 2019). The dates obtained tend to show that the structure is homogeneous so does not consist of replaced pieces. Thanks to the preservation of sapwood on two pieces, it is possible to estimate the felling of the timbers that were used to carve the planks between the years 1161 and 1178.

5.2. Vee-edged planks and grooved posts belonging to buildings from the second half of the 13th century

The excavation carried out in the rue des Mazels yielded many other wooden planks, several of which were uncovered during the excavation of the winepress (Lefebvre 2020b) (fig. 16). Of these, thirteen are undoubtedly vee-edged planks

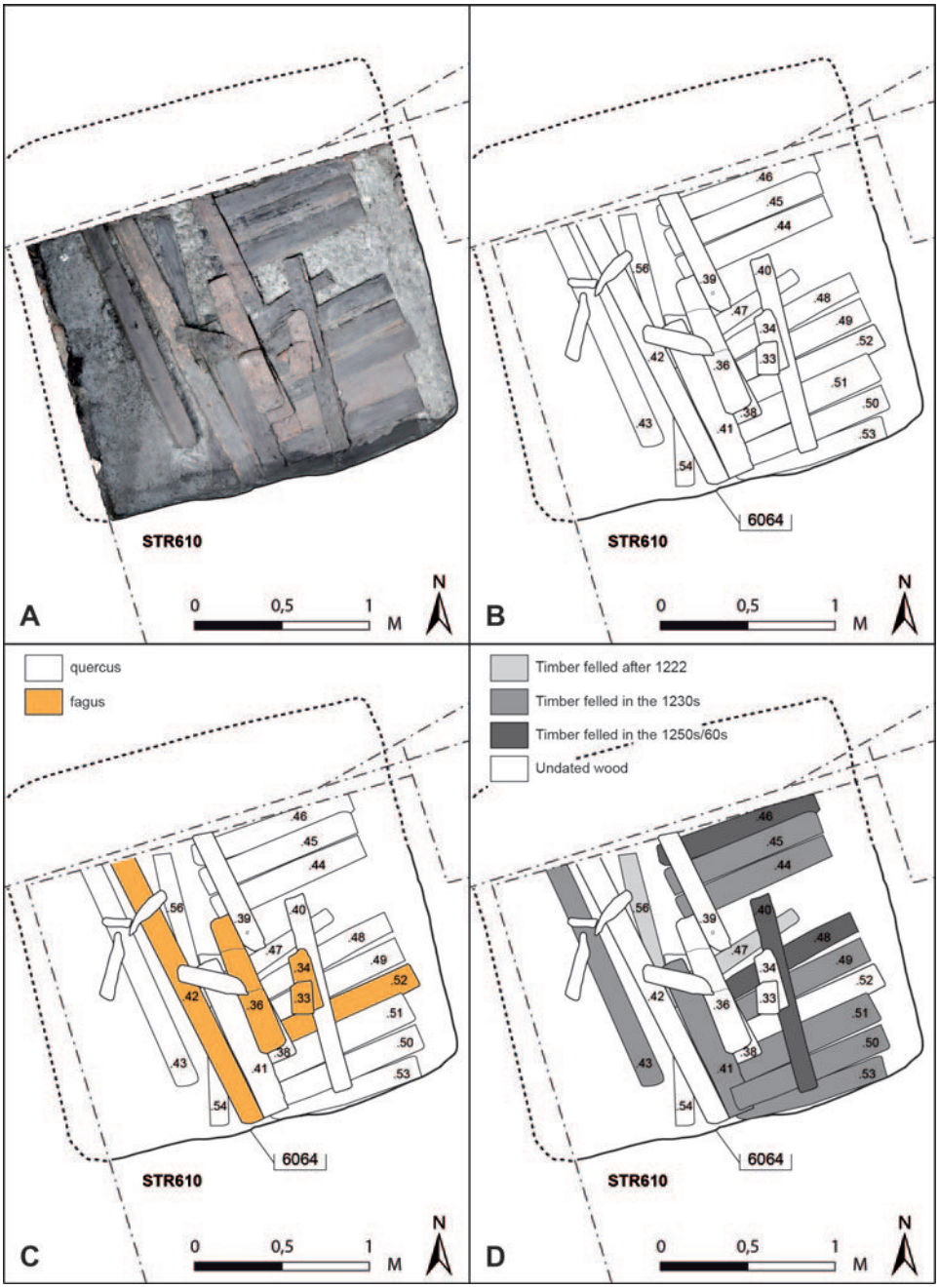

Fig. 16. Moissac, rue des Mazels, the planking for the foundation of the winepress screw. A: orthophoto ; B: the drawing of the pieces of wood; C: wood species; D: dendrochronological results.

obtained by quarter-cutting oak log, except for plank 6055.52 which was made of beech. Observations by Vincent Labbas suggest that after splitting, the pieces were refined with a drawknife, cut smoothly on one edge, and completed with a deep groove of about 1.7 cm on the opposite side (fig. 17, A). This profile allowed the planks to be nested into each other. Although they are not all identical, these pieces are nevertheless very similar in their dimensions (averaging 95 cm in length, 15 cm in width and 2 cm in thickness) and in their shape. Several planks were found still embedded in each other, and all of them seem to come from the same structure that was dismantled and partly recovered for the construction of the winepress. However, dendrochronological dating suggests three phases of felling of the wood used to make these pieces: the first around 1240, the second around 1259 and the third around 1268-1269 (Labbas 2019).

These planks originally belonged to a wall made entirely of wood. They would have formed the infill between grooved posts, according to the *stabbau* technique, if they were placed vertically, or in a *pièce-sur-pièce à coulisse* wall, if they were placed horizontally between grooved posts. Several such posts were found during the same excavation (fig. 17, C). Although it is not possible to associate them with certainty with the planks just described, their presence suggests possible assemblages. Five posts were discovered on the site: three used in a possible palisade had a single groove (6066, 6085, and 6071), while two elements had grooves on two opposite faces, one discovered in a dump pit prior to the installation of the press (6111 - obj. 652), the other in the foundation of the press (6055.20). These posts, with their carefully shaped and relatively deep grooves, were evidently used to hold planks together[4]. The small cross-section of these posts suggests that they could have been placed on a sole plate, and thus constitute a structure similar to the one excavated in Rue des Tourneurs (STR130, *supra*). The vee-edged and grooved planks could have been assembled to such posts, but other planks without a groove could also have been mobilised in a construction of this type, stacked without being assembled together, such as those recorded as 6055.36, 6055.38 or 6055.42, for example (fig. 17 B). However, there are differences in morphology between these planks and the vee-edged ones: plank 6055.42 is much longer (1,65 m) and shows traces of dowelling, while nails were observed on 6055.39.

The excavation in Rue de la République, located only a few dozen metres to the west, uncovered a post with two opposing grooves. One of them still accommodated a horizontally placed board, but with neither groove nor vee-shaped, so without any possible interlocking with the upper plank(s). The planks were simply to be laid edge-to-edge (Georges 2020, pp. 207-208). The very limited excavation did not make it possible to fully study this structure, so that it is not

[4] These grooves are too deep and too well cut to correspond to staves used to hold mud as is known for late medieval timber-framed houses.

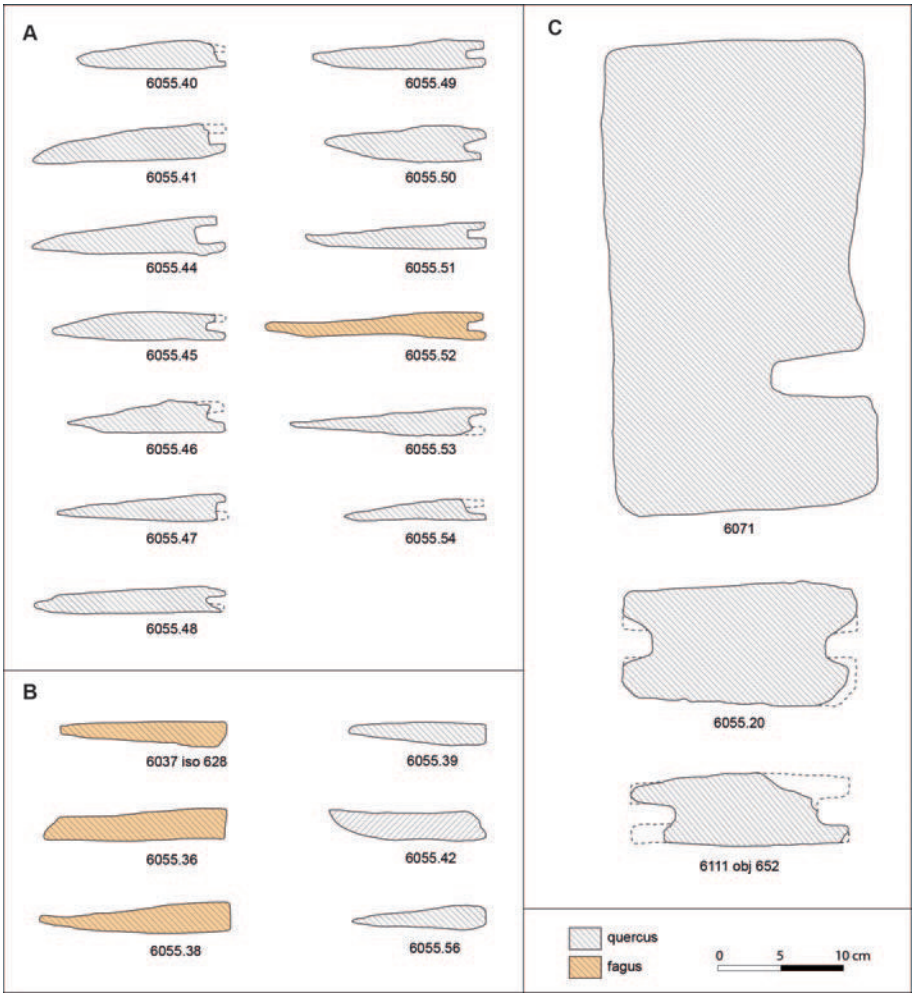

Fig. 17. Moissac, rue des Mazels, survey of the profiles of the main pieces of wood that may come from "pièce-on-pièce à coulisse" constructions. A: vee-edged and grooved planks; B: boards; C: grooved posts (drawings made from scans made by V. Labbas).

possible to know whether the post was connected to a sole plate, as was observed on structure STR130, Rue des Tourneurs (*supra*).

5.3. A piece of a wooden roof

As in the Rue des Tourneurs, the excavations in the Rue des Mazels yielded a very large quantity of tile fragments, including in the deepest levels, potentially pre-dating the 12th century. Indeed, it is possible to envisage that the buildings

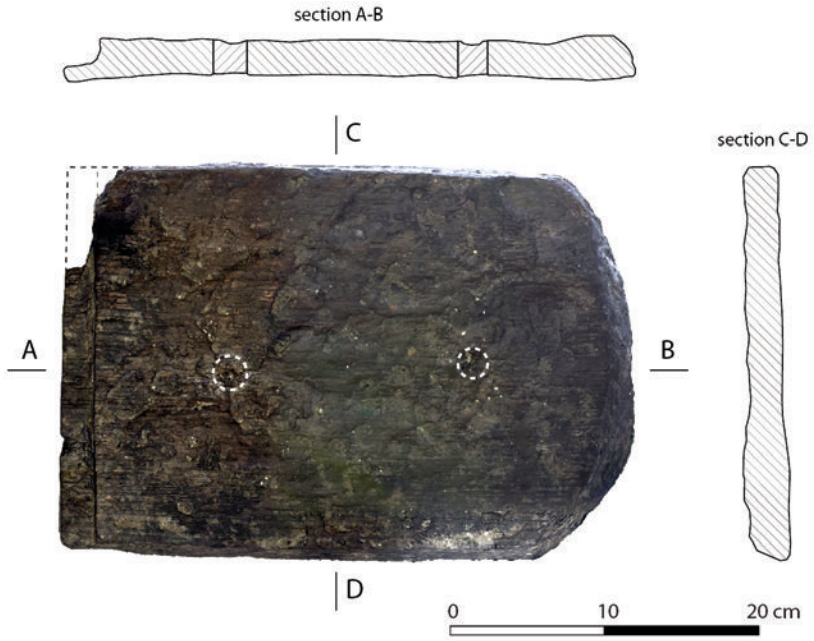

Fig. 18. Moissac, rue des Mazels, the shingle discovered in 2016.

constructed on the site or in the immediate vicinity were covered with tile roofs, including those with solid wood elevations[5]. However, during the 2016 campaign, a complete wood shingle was excavated in a level containing multiple rubble. It is roughly rectangular, 37 cm by 25 cm, about 2 cm thick, with a curved and slightly chamfered top. Its long sides are straight or very slightly chamfered, while a rebate is cut on its fourth edge. No nails were identified, although two dowels (diam +/- 2 cm) are visible (fig. 18). The presence of the rebate is not easy to explain, but could be related to the roof sheathing. The wood shingles are quite similar to those found at Pineuilh (Prodéo 2007, pp. 401-402), which are however longer, or to those documented for the late Middle Ages in Viollet le Duc's Dictionary (Viollet le Duc 1854-1868, t. 2, p. 117). On the other hand, they are quite distant from those found at Saint-Denis or Rennes, which are much longer. The wood shingle discovered in Moissac is dated by dendrochronology as later than AD 1109 (attribution of the last measured ring) (*Dendrotech* 2019). Its morphology and degree of elaboration make it quite singular compared to examples known elsewhere in France and Europe (Mille 2022, pp. 88-94).

[5] There is no problem with the 'weight' of the roofs, as many more recent timber-framed houses still preserved in elevation have tiled roofs.

6. Conclusion

The recent discoveries in Moissac add new examples and more information about post-and-plank construction, a technique used in much of Europe during the Middle Ages.

Obviously, the palisade wall technique (*Stabbau*) is most often attested by archaeology. In France, this type of architecture is highlighted in overviews about rural housing, by J. Chapelot and R. Fossier as early as 1980 (Chapelot, Fossier 1980), or to a lesser extent by J.-M. Pesez (Pesez 1998). For these authors, it is a method inherited from the palisade walls formed by juxtaposed posts (log building), a device attested as early as the Iron Age but used until the Middle Ages in Northern Europe (Germany, Poland or Sweden). *Stabbau*, a more elaborate technique in terms of the introduction of joints between the vertical planks, is more characteristic of the 9th-12th centuries and has a wide variety of uses. For J. Chapelot and R. Fossier the range of this technique could be quite vast and cover a large part of north-western Europe, despite discoveries mainly concentrated in Germany, Denmark, Sweden and England (Chapelot, Fossier 1980, pp. 275-279). Indeed, as these authors point out, the absence of finds does not necessarily mean that buildings of this type were not built elsewhere, particularly in France, but that the conditions for the conservation of their remains are infrequent (humid environment allowing preservation of wood).

The archaeological data collected since then has proved these authors right, since evidence of constructions made of assembled vertical planks (*Stabbau*) has been uncovered in more southern contexts, in France and in Italy, most often in sites marked by a humid subsoil. Thus, such constructions have been recognised for example in Normandy (Halbout, Le Maho 1984, p. 50), at Lezoux (Puy-de-Dôme) (Gaime, Charmoillaux, Parent 2018) or in the 1980s at Saint-Denis (Seine-Saint-Denis). In this town, excavations carried out in Rue des Boucheries led to the discovery of two reused posts, which must initially have belonged to a building erected after AD 995, made of *Stabbau* on posts and sole plate (Mille 2022, pp. 85-88). In Italy, houses built entirely of wood have been uncovered in Piadena, Fidenza (Santangeli Valenzani 2011, p. 107). In Ferrara, where excavations in via Vaspergolo - corso Porta Reno have revealed, in addition to the structure already mentioned, a well-preserved set of eight vertical vee-edged and grooved planks assembled together, laid on a sole plate, was built between the mid-11th and mid-12th centuries (Guarnieri 1997, p. 188).

According to J. Chapelot and R. Fossier, the *Stabbau* technique tended to become rare after the 12th-13th centuries and was limited to the annexes of Alpine houses or to certain Norwegian churches (Chapelot, Fossier 1980, pp. 280-281). The reconstruction of this kind of wall for the seigniorial building I of Notre-Dame-de-Gravenchon (second half of the 12th century) still fits into this chronology (Halbout, Le Maho 1984, p. 71), as do the structures documented at Mois-

sac. However, these examples differ from each other not only in the nature of the buildings concerned (a seigniorial building in a rural setting in Notre-Dame-de-Gravenchon, and ordinary houses in an urban setting in Moissac) but also in the use of *Stabbau* or of horizontally laid boards according to a technique that seems to be less frequently attested. Several questions need to be asked, starting with whether this type of construction is remarkable or not. As has already been pointed out, knowledge of post-and-plank constructions is only possible if the posts and planks are preserved, whereas the identification of one type of construction rather than the other (*pièce-sur-pièce à coulisse* or *Stabbau*) is only possible if the walls are preserved beyond the sole plates. However, most of the time, the wooden planks are found in a secondary position and it is more by default that the authors suggest interpreting them as *Stabbau* elements, as this technique is better described in scholarship.

One could also question the technical advantages of different methods of construction, in particular the reasons that led the carpenters to arrange the wooden planks horizontally or vertically between the grooved posts. Furthermore, one could ask why choices were made to sometimes use planted posts with a discontinuous sole plate, and sometimes posts attached on a continuous sole plate, i.e. constructions that are laid down and not with dug out foundations, as observed for the STR130 structure (*supra*).

The geographical distribution of this type of architecture must also be questioned. It is no longer possible to conceive of wood plank construction as a solely Scandinavian or northern European technique. The Italian examples and the discoveries made at Moissac also demonstrate that this architecture was not limited to Alpine regions. Wooden plank constructions were probably built in a large part of Europe, like the timber-framed buildings found later in the Middle Ages, and even the log buildings (*Blockbau*) found in northern, eastern and central Europe, but also in France, in Dordogne (Saint Jean Vitus, Seiller 1998, pp. 70-71). Even the question of chronology arises. Although it is likely that this type of architecture gave way to the timber-framed construction from the end of the Middle Ages onwards, it must be recognised that post-and-plank constructions did not completely disappear, whether in Alsace for the construction of the *Stube*[6] (vertical planking), in Austria or in Switzerland (*Bohlenständerbau*) (Moser 2015).

The discovery of post-and-plank constructions in Moissac was only possible because of the exceptional subsoil context. These conditions have also made it possible to identify other structures[7] and objects[8] which, in a different context, would have been more difficult or even impossible to observe, but which are valuable evidence for showing the fragility of a part of mediaeval domestic housing.

6 Traditional wooden room inside mediaeval Alsatian houses.

7 Like the winepress dated to the end of the 13th / beginning of the 14th century (Lefebvre 2020b).

8 Like a leather game ball (Lefebvre 2019-2020).

Abstract
Based on the study of two walls entirely made of wood and several reused boards, recently excavated in Moissac (France), this paper investigates the post-and-plank construction technique. Generally found in northern and eastern Europe, and most often associated with the early Middle Ages, this building system is rarely highlighted due to lack of preservation. However, the recent discovery of structures in Moissac shows that this type of architecture was probably used in a wider area of Europe and over a longer chronological period, including the 12th and 13th centuries.
Keywords: wooden construction, housing, post-and-plank construction, High Middle Ages, *stabbau*

Basandosi sullo studio di due pareti lignee e parecchie tavole riutilizzate, recentemente scavate presso il sito di Moissac (Francia), questo articolo analizza la tecnica costruttiva 'post-and-plank'. *Generalmente trovata nell'Europa settentrionale e orientale in ambito altomedievale, questo sistema costruttivo è di raro evidenziato a causa della sua scarsa conservazione. Tuttavia, la scoperta recente di strutture a Moissac dimostra che questo tipo di architettura era probabilmente usato in un'area geografica più estesa e per un periodo cronologico maggiore, compresi i secoli XII e XIII.*
Parole chiave: *costruzioni in legno, abitazioni, costruzione* 'post-and-plank'*, pieno medioevo,* stabbau.