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Life and death of Angoumoisin-type dolmens in west-central France

Architecture and evidence of the reuse of megalithic orthostats

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Abstract: During the 5th millennium Angoumois-type dolmens—tombs comprising a passage and a quadrangular chamber characterized by high-quality stone working—appeared in west-central France. During a recent collective research and evaluation program (2012–2015), excavations, multi-method prospecting, and technological and architectural analyses have yielded new data.
Megalithic monuments are part of a landscape that has been profoundly transformed by people, and are reflections of a desire to erect social and territorial markers. Geophysical prospecting undertaken for the first time on and around these monuments has revealed original features that contribute to the monumentalization of the landscape in the same way as the fortifications associated with the world of the living.
The excavations of the Petite Pérotte and Motte de la Jacquille (Fontenille, Charente) dolmens have enabled us to define both petrographical type and geographical origin of the monoliths as well as to bring to light the architectural choices made by the builders. The builders clearly focused on the monoliths of the funerary chamber, as exemplified by the construction of the stone door of Motte de la Jacquille, a unique example in European megalithism. This work goes beyond mere aesthetic preoccupations, and demonstrates a genuine investment of symbolism in megalithic construction. One of the most significant advances relates to the discovery of numerous examples of old structural stones in the construction of the Motte de la Jacquille funerary chamber. These point to the recycling of a previously existing funerary chamber, specifically deconstructed for this later occasion. Several scenarios are discussed to explore the possible motivations underlying such reuse.

Keywords: Neolithic, Western France, megalithism, passage grave, multi-method prospecting, landscape, reused monoliths.

Résumé : Au V^e^ millénaire, le Centre-Ouest de la France voit l'apparition des dolmens de type angoumoisin : tombes à couloir à chambre quadrangulaire caractérisées par un investissement important du travail de la pierre (Burnez, 1976). À l'occasion d'un programme collectif de recherche et de valorisation (2012–2015), de nouvelles données ont été obtenues grâce à des fouilles, des prospections multi-méthodes et des analyses technologiques et architecturales.
Intégré dans un paysage profondément modifié par l'homme, les monuments mégalithiques sont le reflet d'une volonté de marquage social et territorial. Des prospections géophysiques réalisées pour la première fois sur et autour des monuments ont révélé des structures inédites qui participent à la monumentalisation du paysage tout comme les enceintes du monde des vivants.
Les fouilles des dolmens de la Petite Pérotte et de la Motte de la Jacquille (Fontenille, Charente) ont permis de préciser la nature pétrographique et l'origine géographique des monolithes et de mettre en évidence des choix architecturaux. La tradition du travail de la pierre typique des dolmens de type angoumoisin se traduit dans les techniques de transformation du calcaire. Le débitage et l'équarrissage des orthostates produit des blocs aux dimensions standardisées. La transformation de la pierre s'attache ensuite à dresser les faces visibles grâce à un travail de martelage. Ce dernier est parfois suivi d'un lissage, voire d'un début de polissage sur les blocs les plus investis. La technique du champlevé est systématiquement utilisée dans l'art pariétal et s'inscrit parfaitement dans l'exigence de cette tradition technique. En fin de chaîne opératoire, les pierres les plus ouvragées sont réservées à certaines zones du monument et font l'objet d'une véritable mise en scène. À la Motte de la Jacquille, c'est la paroi la plus lisse qui fait face à l'entrée. Cette même paroi bénéficie d'un éclairement naturel alors que le reste de la chambre reste dans la pénombre. Ces éléments d'observation vont dans le sens de la présence d'une segmentation de l'espace. Au centre du dispositif de la tombe, la chambre funéraire est constituée d'orthostates jointifs et bien dressés de façon à créer un espace parfait au détriment du couloir. Ce dernier reste beaucoup moins investi et sert finalement de « faire-valoir » à la chambre. Tout concourt à la mise en scène

des parois visibles de la chambre funéraire, comme en témoigne la fabrication de la porte en pierre de la Motte de la Jacquille, exemplaire unique dans le mégalithisme européen. Ce travail dépasse de simples préoccupations esthétiques, au profit d'un authentique codage symbolique des parois.
L'une des avancées les plus significatives est la découverte de nombreux anachronismes de construction dans la chambre funéraire de la Motte de la Jacquille. Au total, dix orthostates sur les vingt que compte le monument portent des preuves ou des indices forts en faveur de la présence d'un épisode de réemploi, perceptible notamment par la présence de rainures d'emboitement inactives sur certains orthostates. Ces cas sont uniquement observés dans la chambre et dans la partie du couloir proche de cette dernière. Il est pratiquement certain que les blocs proviennent d'une autre chambre funéraire, et non du démantèlement d'un couloir, où les monolithes n'ont pas le même niveau de finition. Les bords avec rainures d'emboîtement et parois dressées sont l'apanage des chambres funéraires. Toutes ces anomalies montrent qu'une ou plusieurs chambres funéraires ont été réemployées dans la construction du monument de la Motte de la Jacquille. Un dolmen a bel et bien été recyclé dans un autre dolmen. Cet exemple est le premier cas démontré d'orthostates de chambre funéraire en réemploi dans une autre chambre funéraire. Différents scénarios peuvent être proposés pour expliquer les motivations d'un tel geste de recyclage. Un premier scénario serait le démontage d'un premier monument éloigné géographiquement de la Motte de la Jacquille. Il est fort probable que ce premier monument au moment de son démontage ne soit ni abandonné, ni vidé de son contenu. On en déduit une suite de gestes. D'abord, il est nécessaire d'enlever une partie du cairn puis la table de couverture. Cette dernière est-elle abandonnée ou elle-même recyclée ? Dans un second temps, il faut « gérer » les dépôts humains, sont-ils abandonnés ou déplacés dans une autre structure ? Ensuite, il faut dégager les orthostates sans les casser, avant de les transporter vers le nouveau lieu de construction. On constate que le mode opératoire d'un réemploi d'orthostat de chambre funéraire est beaucoup plus complexe que celui d'un menhir ou d'une stèle gravée. Le second scénario privilégie le démontage d'une chambre funéraire déjà construite à la Motte de la Jacquille et sa reconstruction selon un plan différent. Cette hypothèse s'appuie sur un cas avéré de réaménagement d'une chambre funéraire en place dans le monument E2 de la nécropole de Bougon (Mohen, 2002). À Bougon, la chambre funéraire initialement ronde a, dans un deuxième temps, été transformée en un espace quadrangulaire. Ces transformations de chambre ont d'ailleurs été possiblement plus nombreuses que ce seul cas avéré, à l'image des réaménagements de tumulus qui se chiffrent par dizaine (Joussaume, 2003). En termes de chaîne opératoire, le démontage suivi d'une reconstruction sur place implique la plupart des gestes évoqués dans le premier scénario sauf le transport, à moins d'envisager une reprise en sous œuvre. Le scénario d'une reconstruction *in situ* est privilégié et enfin confronté à des exemples ethnographiques.

Mots-clés : Néolithique, Ouest de la France, mégalithisme, tombe à couloir, prospection multi-méthodes, paysage, réemploi de monolithes.

The megalithic phenomenon in Europe, from the beginning in the 5th millennium, is characterized by a wide variety of architectural types and styles, corresponding to a plurality of Neolithic projects. The study of a subset of this variability, passage tombs, which has traditionally been conducted via typological methods founded on two-dimensional floor plans, has evolved towards an appreciation of these structures in three dimensions (Westphal, 2015). This allows us to construct novel typologies based on their elevations and evolutions, as well as the materiality of the stones: surface treatment, geological origin, monolith color (Scarre, 2004). While the study of mound structures has recently become central, we must not forget that the passage and chamber of these monuments, where most or all of the monoliths are sited, lie at the heart of these megalithic systems. A key example of the importance of the passage and chamber can be seen in Angoumoisin-type passage graves, as the skill and investment in the stone working in such structures is unparalleled in west-central France. This is exemplified by the near-perfect walls of burial chambers, whose monoliths are shaped so as to articulate perfectly with one another. Such mastery of stone working can be observed only in a few sites across Europe, such as Maes Howe, Orkney, in Scotland (Renfrew, 1985) or El Pozuelo, Andalusia, in Spain (Linares Catela, 2016). Another particularity of the Angoumousin tradition is that it provides us with the rare opportunity to observe the reuse of megalithic orthostats through the study of architectural 'anachronisms' (that is, the presence of stones reused from older monuments).

The distribution area of these Angoumoisin-type dolmens, West-Central France, is one of the oldest centres of megalithic art and architecture in Atlantic Europe, and from the 5th millennium BC the density of megalithic tombs increases considerably (Joussaume and Pautreau, 1990; Joussaume, 1999; Joussaume et al., 2006).

From Loire-Atlantique (La Roche at Donges) to Charentes (La Boixe C, Ors at Château-d'Oléron, Peu-Pierroux at Bois-Plage-en-Ré), and in Deux-Sèvres (dolmens E and F0 in Bougon), some dolmens have circular chambers and are constructed with corbelled roofs. Regionally, the earliest forms of quadrangular chamber appear during the middle of the 5th millennium in Vienne with the cists of La Jardelle at Dissay (Pautreau et al., 2006) and La Goumoizière at Valdivienne, the latter being attributed to the Chambon cultural group (Patte, 1971; Airvaux, 1996; Soler, 2007). The Antran tombs (Pautreau, 1991) have quadrangular, partially sub-surface forms, with a ramp access that seems to serve roughly the same role as a passage. In the north-western zone of West-Central France, we see the appearance of transept dolmens in

Loire-Atlantique, probably towards the end of the 5th or the beginning of the 4th millennium, confined to the coastal zone around the Loire Estuary, as well as 'Angevin dolmens' (Gruet, 1967) in Anjou, Saumurois, Limousin (Joussaume et al., 2008), the north of Vienne, and even further north, in a still poorly-defined form, in the Cognac region.

Between Sèvres and Charente the number of passage graves with quadrangular chambers increases significantly from the middle of the 5th millennium. These have a specific architectural form, dubbed the 'Angoumoisin dolmens' by Claude Burnez (1976). C. Burnez was in fact the first to recognize the originality of these megalithic tombs and to distinguish two main types: those with a 'p' or 'q'-shaped plan, and those with a 'T'-shaped plan. These megalithic chambers are either wholly dry stone-built, like a cairn, or else constructed by alternating dry stone walls with monoliths, which are often worked into a square shape (orthostats). Dolmens with chambers made only of orthostats are referred to as 'orthostatic' (Burnez, 1976). It should be noted, however, that the geographical term of Angoumoisin (from the city of Angoulême) is slightly restrictive because these monuments are known outside this area, in Charente-Maritime, Deux-Sèvres, and Vendée in particular. Most of these monuments were partially excavated or totally emptied during the 19th century, and were not truly studied or excavated in detail until the 1970s as part of a major project focusing on the Bougon necropolis (Mohen and Scarre, 2002), the multi-chambered Montiou tumulus at Sainte-Soline (Germond and Joussaume, 1983; Germond and Bizard, 1987), some chambers of the Planti tumulus at Availles-sur-Chizé (Bouin and Joussaume, 1998) in Deux-Sèvres, the Chenon (Gauron and Massaud, 1983) and the Boixe (dolmen B) cemeteries (Gomez de Soto, 1998, forthcoming) in Charente, and the Champ-Châlon (at least monument B) cemetery at Benon (Joussaume, 2006) in Charente-Maritime.

While 19th century activity consisted mostly of collecting artefacts from the chambers of these monuments, recent research has focused on their internal structural features (the chamber and passage), as well as on the form and chronology of the construction of the tumulus mass, as seen in the exemplary excavation of tumulus C of Péré at Prissé-la-Charrière in Deux-Sèvres (Laporte et al., 2002; Scarre et al., 2003; Laporte et al., 2006 and 2014b).

We argue that what would transform the study of these monuments would be to switch from a two-dimensional approach—that is, classical typology based on ground plans—to a three-dimensional approach, towards a typology founded on elevations and the evolution of technical traditions. This shift in perspective represents a considerable leap in the understanding of this monumental architecture, which was designed, built, and intended to be seen, often from far away.

As part of an ambitious program to upgrade and protect the megalithic heritage of Ruffecois (north Charente, west-central France), led by the local authorities of the French Ministry of Culture, we decided to renew the exploration of some of the dolmens, beginning in 2012. This zone is at the core of the Angoumoisin-type dolmen area, where we had already conducted research on ditched enclosures (fig. 1). The main aims of these renewed investigations were threefold: to situate the megalithic tombs in their natural and anthropogenic context, to assess the links between the world of the dead and the world of the living, through geophysical, ground-based, and aerial prospecting, and to renew knowledge regarding Angoumoisin-type dolmens through a geological and architectural reexamination of all the monuments in the sector, with targeted excavations for some. From 2013 onwards, as part of a collective research project (PCR), two excavations were undertaken at the Petite Pérotte and Motte de la Jacquille dolmens at Fontenille, major monuments that are structurally in a critical condition. In accordance with the agreements made between the Ministry of Culture (direction régionale des Affaires culturelles de Nouvelle Aquitaine) and the owners of sites, excavations were limited to a very small area and were concentrated in the chamber and passage area. Some test trenches were also conducted in the cairn area in order to obtain an initial idea of its architecture, but it was clear from these that more significant investigations will be needed in the future. Although the contents of these two passage tombs had been disturbed by former explorations and excavations, these new excavations resulted in a more accurate image of the quality of the stone working in the region, and in particular the identification, for the first time, of reused orthostats, taken from an earlier, dismantled dolmen.

The aim of this paper is to present the principal results of our latest research on Angoumoisin-type dolmens, as well as the new research prospects that have been opened up by the identification of this pattern of reuse. In this paper, we follow Burnez' definition (1976) of Angoumoisin-type dolmens, and we propose to analyze more closely the 'orthostatic' variant. These excavations, which were necessarily limited by the requirements of the authorities and landowners, were a good opportunity to analyze the internal spaces (chamber and passage) of three Angoumoisin-type dolmens in their area of definition.

LATEST RESEARCH ON THE ANGOUMOISIN-TYPE DOLMENS OF PETITE PÉROTTE AND MOTTE DE LA JACQUILLE AT FONTENILLE (CHARENTE): EXCAVATIONS FROM 2012 TO 2014

Geological context

The Petite Pérotte and Motte de la Jacquille dolmens are situated in the Ruffécois region, a natural region corresponding to a wooded-hilly plain mainly located in the north of the Charente department. This region is made up of Jurassic marine sedimentary formations related to

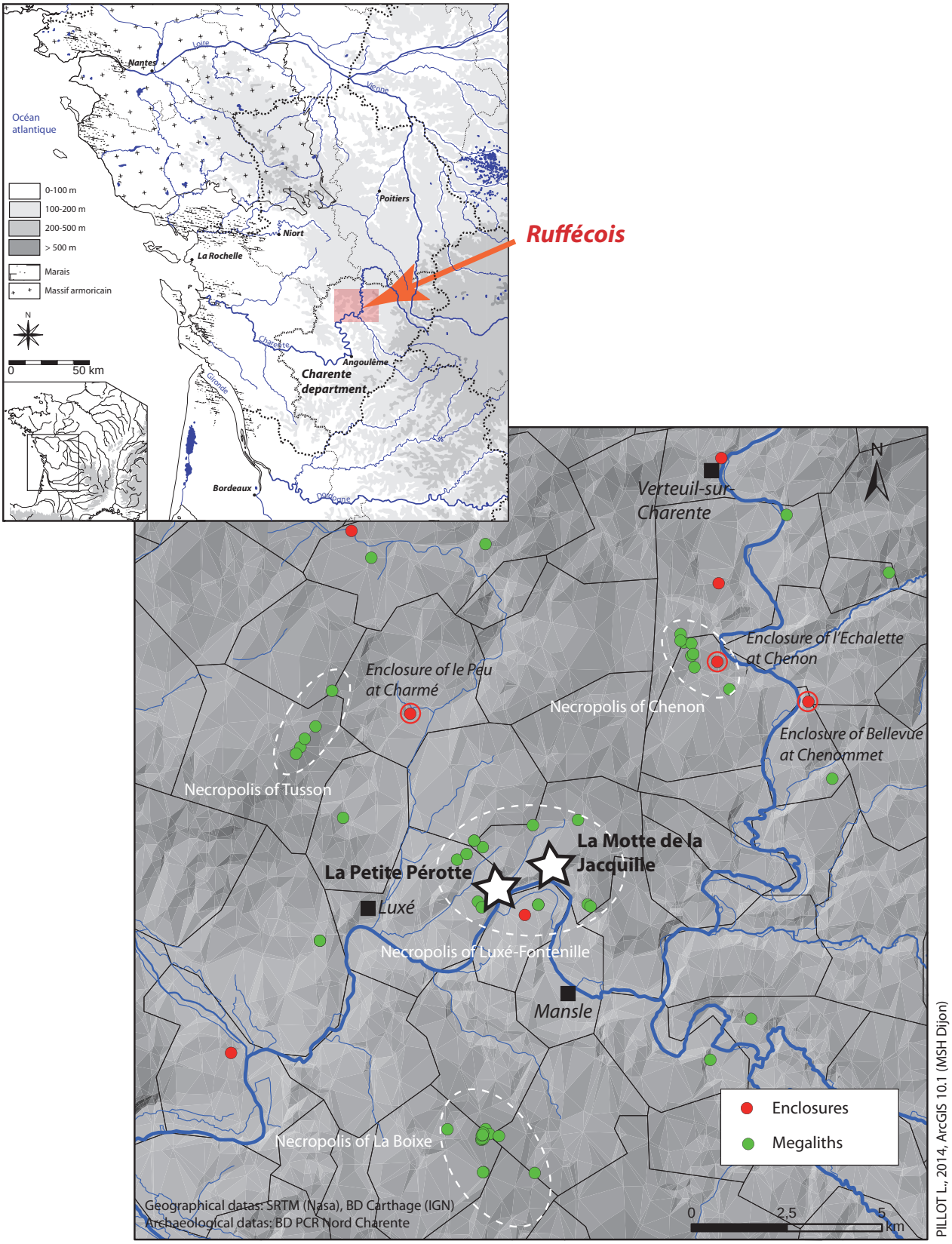


Fig. 1 – Location of the Petite Pérotte and Motte de la Jacquille dolmens at Fontenille (Charente, France) and Neolithic environment. The enclosures of Échalette at Chenon and Peu at Charmé were excavated between 2013 and 2015 and are dated to the Middle Neolithic, period of megalith building.

Fig. 1 – *Localisation des dolmens de la Petite Pérotte et de la Motte de la Jacquille à Fontenille (Charente, France) et environnement néolithique. Les enceintes de l'Échalette à Chenon et du Peu à Charmé ont été fouillées entre 2013 et 2015 et sont datées du Néolithique moyen, période d'édification des mégalithes.*

the northern edge of the Aquitaine Basin (Gabilly and Cariou, 1970; Hantzpergue et al., 1983).

Three main geological formations have been identified between Ruffec and Mansle. They constitute a nearly 200 m thick sequence that includes the Callovian and the Middle-Upper Oxfordian. Apart from the Argovian (Middle Oxfordian), which contains numerous organo-detrital facies, this relatively monotonous sequence is made up of regular bands of fine limestone, generally varying in thickness between 0.10 and 0.50 m, often associated with marlstone (Cariou and Gabilly, 1973; Hantzpergue, 1984).

The Ruffecois, located in the upper course of the Charente River, is one of the richest areas for megalithic monuments in Western France (fig. 1). It comprises isolated monuments and at least four large cemeteries (Chenon, La Boixe, Tusson and Luxé-Fontenille). Most of the monuments from the Luxé-Fontenille cemetery were only studied at the end of the 19th century (Burnez, 1976), or more recently in a clandestine manner. However, those of Chenon (Gauron and Massaud, 1983) and Boixe (Gomez de Soto, 1998) were excavated relatively recently and the Tusson cemetery had been untouched until now. The development of a project assessing the heritage value of the Ruffécois Neolithic fortuitously presented us with the opportunity to undertake partial exploration of three exceptional monuments located in the municipality of Fontenille. We were able to study the whole of their passages and chambers as well as part of the cairn at two dolmens (Petite Pérotte and Motte de la Jacquille), and to carry out partial exploration of the third (Grosse Pérotte).

The Petite Pérotte dolmen

Goals and main excavation results

The first large-scale archaeological operation carried out on a megalithic structure during our program focused on the Petite Pérotte dolmen at Fontenille, which is one of the most remarkable dolmens in this sector and has been described several times since the 19th century (e.g. Michon, 1844; Lièvre, 1881; Mortillet, 1896). It is considered as a high priority in the consolidation/restoration programme, supervised by the Regional conservation of Historic Monuments and the Regional Archaeology Service of the Poitou-Charentes (French Ministry of Culture). Indeed, significant cracks were visible on most of the orthostats supporting the imposing capstone, weighing almost 40 tons. In addition, the tumulus showed worrying signs of structural sagging.

The objectives of the excavation, carried out over two summer seasons (2012–2013), were threefold: firstly, to provide an initial presentation of the monument's architecture, in particular the design of the chamber, the access passage, and the cairn—all important for guiding the restoration of the dolmen; secondly, to offer new scientific data on Angoumoisin-type dolmens; and thirdly, to search for conserved human deposits in order to broach the question of the funerary uses of these monuments, which still remain insufficiently studied.

The results of this excavation (fig. 2 and 3)—on a dolmen long considered to have been completely emptied by former interventions—were well beyond our expectations and the main results are presented elsewhere (Ard et al., 2016). The funerary chamber opens onto the passage towards the northeast, through a 1.4 m wide entrance, and is encircled by seven preserved orthostats (B, C, D, E, F, K and O), including two hitherto unknown orthostats (O and K), to which we can add the two orthostats missing from the northwest angle, several fragments of which were found in the western scree-covered slope. The dimensions of this north-south facing chamber are 1.7 to 1.9 m wide from east to west, with a north-south length of 2.6 m. The total internal surface is thus about 4.7 m².

The funerary deposits have disappeared from the northern two thirds of the funerary chamber, but a strip of funerary deposits, radiocarbon-dated to the Late Neolithic Bell Beaker culture and the Early Bronze Age, was discovered *in situ* on a limestone paving slab of *opus incertum* at the base of the infill. Six sets of articulated bones and two Bell Beakers were present, and these indicate reuse of the monument from the end of the Neolithic onwards (Ard et al., 2016). These deposits need to be considered as a *terminus ante quem* (TAQ) for the construction and main use of the monument, because some small fragments of Middle Neolithic *coupes à socle* were also discovered in the infill of the chamber. Many items—flint, pottery, personal ornaments, human bones—were discovered in the 7.5m-long, east-facing passageway. These span nearly two millennia from the Middle Neolithic, when the monument was built, to the Bronze Age. The passage is made up of two main parts: a western part 3.5 m long and 1.2 m wide, formed by alternating monoliths (H, R, I, J, L and M) and low dry stone walling, and a slightly longer (4 m) but narrower (1 m) eastern part, delimited by two dry stone facings with no orthostats except at the entrance (fig. 2 and 3). However, clandestine interventions and tree growth have largely disturbed this part of the monument as most of the remains were no longer in a primary position. The maximum diametre of the cairn is about 15 m, and the partial exploration of this feature revealed two concentric dry stone facings, up to a metre high in the case of the innermost example, separated by a fill of limestone blocks, lying just beneath the ground surface.

In 2013, during the second excavation campaign, we completed the exploration of the passage and excavated a small, previously unknown lateral funerary chamber, accessible from the passageway between orthostats H and I, owing to the removal of the imposing capstone, slab G. It measures 1.2 to 1.4 m long from north to south and 1.3 to 1.6 m wide from west to east. The surface is around 2 m². The location of this lateral chamber, between the internal zone of the cairn and the main chamber, unlike the monument of la Boixe B, is unique in the region and the recovered objects (namely a carinated bowl and tranchet arrowheads with abrupt retouch) attest to deposits from the Middle Neolithic onwards. Radiocarbon dating is in progress. We now have an almost complete plan of this exceptionally well-conserved reference site.

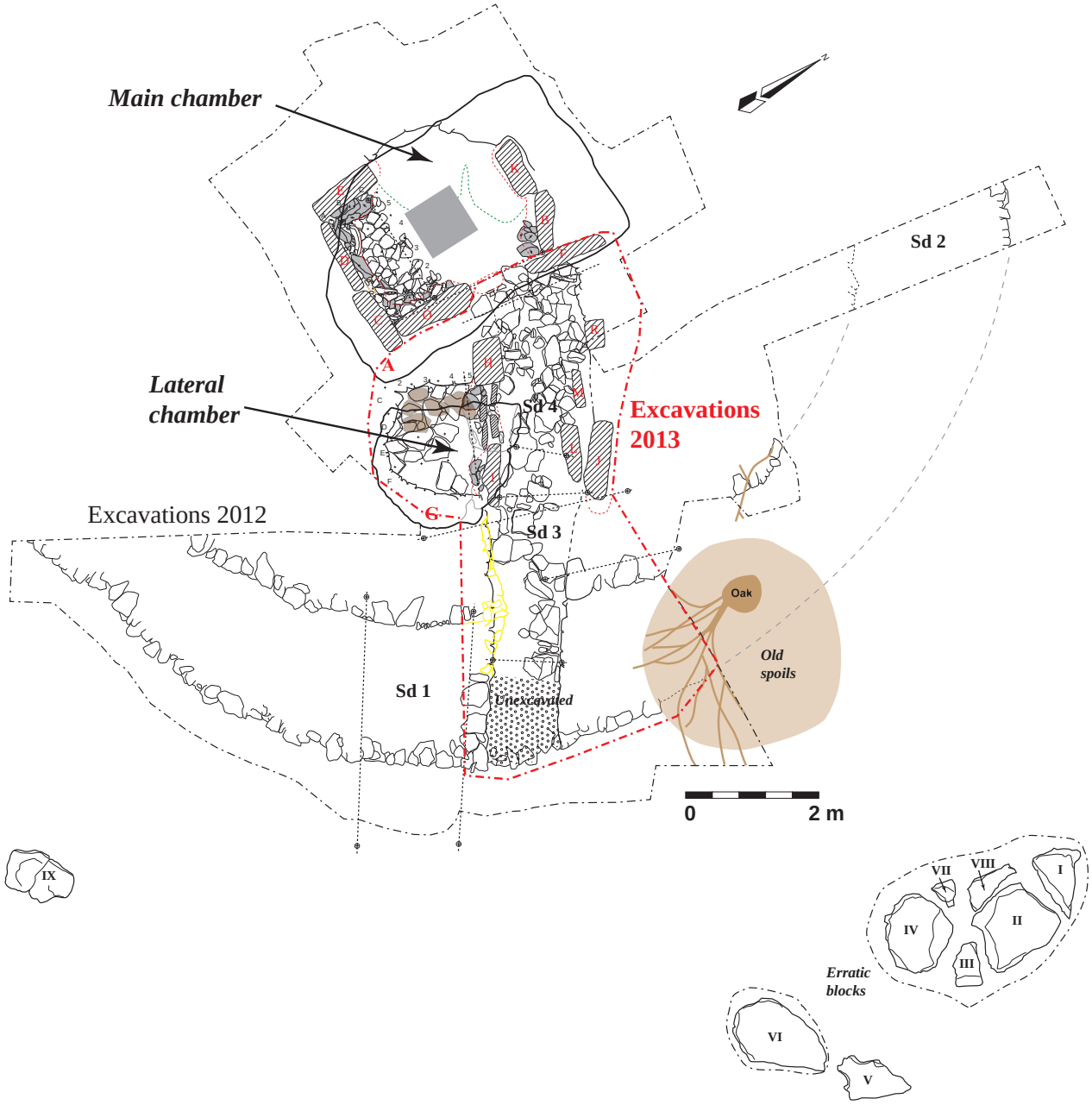


Fig. 2 – Fontenille, Petite Pérotte dolmen (Charente, France): general site plan and sectors excavated in 2012 and 2013 (CAD V. Ard).
Fig. 2 – *Fontenille, dolmen de la Petite Pérotte (Charente, France) : plan général du site et des secteurs fouillés en 2012 et 2013 (DAO V. Ard).*

Monolith architecture and technology

The fifteen limestone monoliths of the monument weigh a total of sixty tons. The weight is estimated using the density of limestone (2.6 tons per m^3), simplified by the rectangular shape of the monoliths and uniformity of their thickness. The funerary chamber weighs in at fifty-five tons, including forty tons for the capstone alone (fig. 3), whereas only five tons were used for the passage. The orthostats in the chamber weigh about two tons each and measure about 2.3 m. In the passage, the highest orthostat measures 1.5 m. Great care was obviously taken with the funerary chamber, not just on account of the mass of stone used, but also in terms of the finishing work. All the internal surfaces of the orthostats in the chamber had been meticulously shaped and smoothed. In contrast, the monoliths in the passage are often unshaped, or at best show a less elaborate shaping than the chamber orthostats. Less effort had been invested in monolith shaping as we move away from the chamber. Logically, therefore, the two orthostats facing each other in the passage at the entrance to the chamber were more elaborately worked. Their exposed surfaces are the only ones among the passage stones to have been smoothed. The less visible parts, such as the base and the sides, are simply hammered (see fig. 11). The surfaces on the cairn side were not worked at all.

Fig. 3 – Fontenille, Petite Pérotte dolmen (Charente, France): view of the monument from the passage entrance at the east (photo V. Ard).

Fig. 3 – *Fontenille, dolmen de la Petite Pérotte (Charente, France) : vue du monument depuis l'entrée du couloir à l'est (cliché V. Ard).*

As for architectural choices, everything is focused on the interior of the chamber. The stripped stone surfaces are systematically oriented towards the interior of the chamber whereas the natural surfaces face outwards, ensuring a vertical wall effect. This layout is the same for the capstone and the orthostats and is also well known in the megalithic architecture of Western France more generally (Mens, 2008; Mens and Large, 2009). This wall effect is clearly accentuated by a two-stage surface treatment. First of all, the wall is hammered in order to create a flat surface, then it is finished off by smoothing (see fig. 11)**.** The sides are hammered but not smoothed and the outer surface is not worked at all. The degree of stone working investment differs according to whether the surfaces are exposed or not.

Only one slab was found at the entrance on the chamber (monolith F). This entrance slab had been shaped by hammering so as to give it an arch shape along its interior edge, thus forming one side of the chamber entrance. It appears to be associated with an identical monolith situated opposite it to the south, only known by its packing stones in the stone socket. Similar arched-edged doors are known in the monument B of la Boixe at Vervant (Gomez, forthcoming) and at the Motte de la Jacquille at Fontenille (Gauron and Massaud, 1987). In the passage, the monolith to the left just before the chamber entrance is the only example with a rounded and widened top. This morphology was also identified in the Motte de la Jacquille monument, in the same position, and could represent a vague anthropomorphic design, like that seen in dolmen 1 of the Montiou at Sainte-Soline, in Deux-Sèvres (Joussaume and Pautreau, 1990).

While the wide and flattened shape of the top of the orthostats in the funerary chamber is well adapted to support the capstone, the irregularity of most of the orthostats in the passage makes them poorly adapted for this same function. The variable height of the passage orthostats also underlines the impossibility of them having played such a role. The purpose of these upright stones is therefore purely aesthetic or symbolic, with no intended mechanical function. The double orthostat system in the passage entrance (L and J) also supports this notion, as one of these monoliths (L) is not fixed in the subsoil. The same can be shown for the monolith M, meaning that the presence of such a double orthostat system currently remains unexplained.

The Motte de la Jacquille dolmen

Goals and main excavation results

A second monument was also explored as part of the Ruffécois megalithic monuments heritage assessment project in 2014: the Motte de la Jacquille at Fontenille (fig. 4). This is located at the top of a limestone peak at an altitude of 112 m, not far from La Petite Pérotte (fig. 1). Its existence has been known since the beginning of the 19th century (Lièvre, 1881). The originality of the Motte de la Jacquille monument in the landscape is largely due to its dominant topographic position as well as to the features surrounding the cairn (fig. 5). The location of megalithic monuments in the landscape corresponds here, as elsewhere, to a set of norms, as revealed by the works of Roger Joussaume, Luc Laporte and Chris Scarre, who underlined that the main tumuli of the Tusson and Luxé/Fontenille cemeteries were distributed around lines of successive parallel and inter-visible ridges: Tusson-Bessé-Courcôme, Pérottes-La Motte de la Garde and Folatière, from west to east (Joussaume et al., 1998; Laporte et al., 2014a). In each of these three complexes, the long mounds are sited along the top of the ridge lines in order to amplify their monumentality. These tumuli are frequently longer than 100 m and can contain numerous funerary chambers. They are surrounded by smaller, generally circular satellite monuments (<40 m), laid out in a more random manner, on highlands (Les Pérottes), as well as on valley floors (La Maison de la Vieille at Luxé).

Many clandestine operations took place in the Motte de la Jacquille, in particular between 1914 and 1979, prompting the implementation of the first programmed excavation in 1981 and 1982. The publication of the excavation results brought to light the exceptional stone door that closed the passageway between the passage and the funerary chamber, a unique specimen in Europe (Gau-

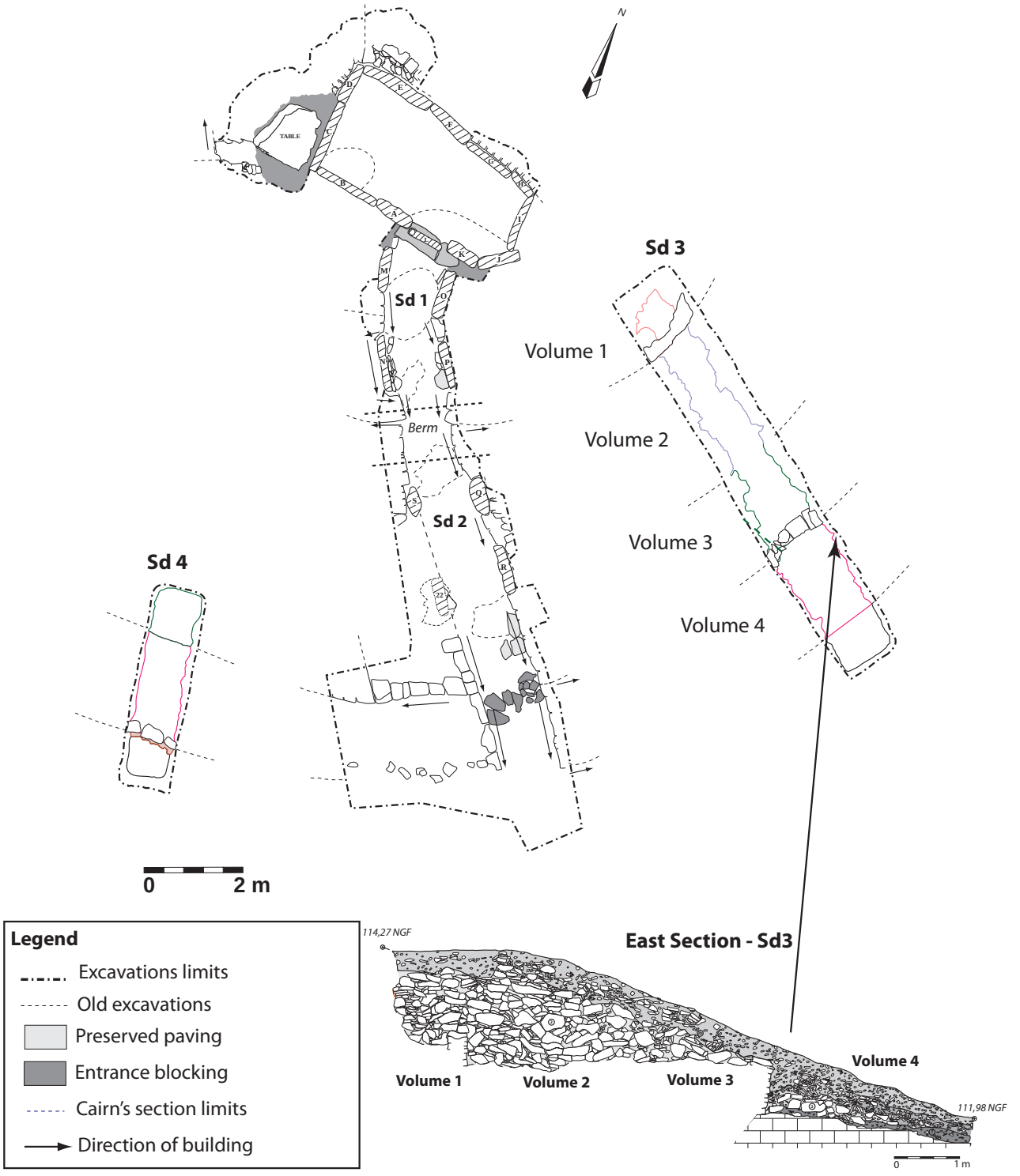


Fig. 4 – Fontenille, Motte de la Jacquille (Charente, France): general site plan and sectors excavated in 2012 and 2013 (CAD V. Ard and F. Cousseau).

Fig. 4 – *Fontenille, la Motte de la Jacquille (Charente, France) : plan général du site et des secteurs fouillés en 2012 et 2013 (DAO V. Ard et F. Cousseau).*

ron and Massaud, 1987). Although the monument was partially closed off during these excavations, the exposed architectural remains were not consolidated and this unfortunately resulted in their progressive deterioration.

The renewed archaeological investigation of the Motte de la Jacquille, during the course of July 2014, focused on two main goals: to check for the existence of features around the periphery of the monument, and to undertake a detailed study of the architecture of the chamber, the passage, and part of the cairn.

In order to record features around the tumulus, which had not previously been done, magnetic prospection was conducted on most of the promontory by the University of La Rochelle and ULR Valor (Mathé et al., 2016). Magne-

tic prospection carried out in 2013 resulted in the identification of a series of magnetic anomalies on this plateau and in the immediate vicinity of the tumulus. They form a string of U-shaped pits, flanking the tumulus to the north and the east at distances ranging between 15 and 30 m (fig. 5). The analogy between these magnetic anomalies and those identified on the ditched enclosures surveyed in the sector, in particular at Bellevue at Chenommet (Ard et al., 2015), and the position of these features in relation to the tumulus enabled us to propose that the hollow features were directly linked to the Neolithic tumulus. At the same time as the excavation of the megalithic monument, a test trench was excavated (St. 1) in one of these anomalies (fig. 5). The feature turned out to be much bigger than expected, with a maximum length of about 7 m, from north to south, with a relatively constant depth of 1.4 to 1.75 m below the present-day substratum level. It had a U-shaped profile, a flat base, with a clearly open southern side. This pit can, without any doubt, be interpreted as a quarry-pit for extracting the limestone slabs used for the construction of the cairn. As the upper limestone bands were too altered to supply exploitable blocks, the blocks extracted from the south of the pit were cast aside behind the pit, along the northern edge of the feature. This explains the totally different configurations of the two edges of the feature (Mathé et al., 2016). During a second stage, after an indeterminate lapse of time, excavation continued in this zone as a 3.4 m wide ditch, along the southern face of the quarry-pit, dug into the quarry spoil to around 1.7 m below the present-day substratum level. At the base of the slump level of an embankment erected along the ditch, a pile of bones belonging to at least two individuals (an adult and a juvenile, as identified by D. Linard), together with the fragments of two pots, one with a complete rounded base, correspond to an anthropogenic deposit which probably extended beyond the limits of the test pit. This level (US 0104) comprises rubefied limestone elements and a scant sedimentary matrix. The dating of the human bones from both individuals in this level yielded Middle Neolithic ages:

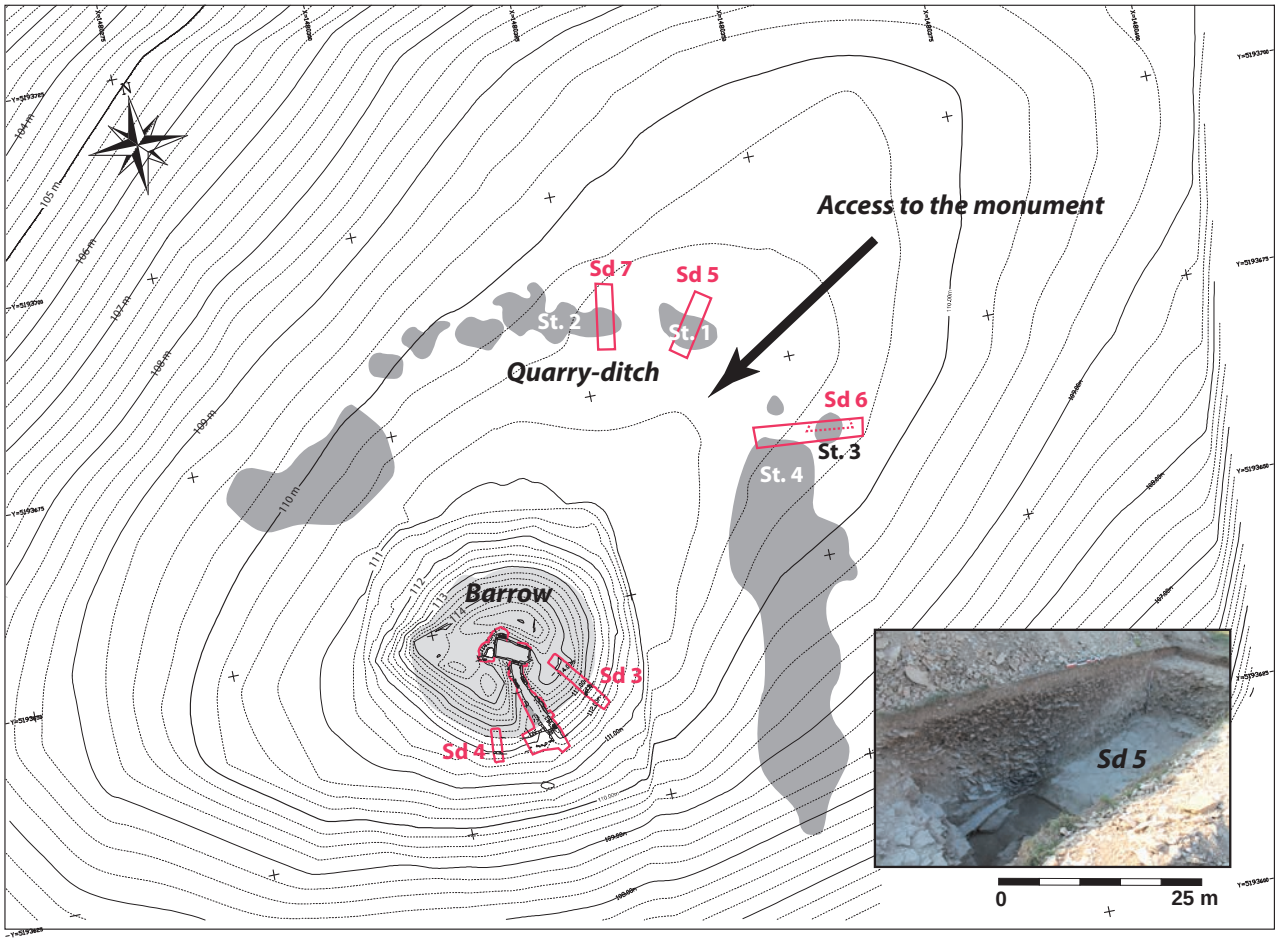


Fig. 5 – Fontenille, Motte de la Jacquille (Charente, France): site topography and location of the magnetic anomalies (in grey) detected by geophysical survey which block the access to the tumulus (topography lycée de Sillac; geophysical surveys V. Mathé and A. Camus – La Rochelle University and ULR Valor). Bottom right, views of the test pit in anomaly St. 1 revealing a quarry for small cairn stones and a Neolithic ditch dug into the infill during a second stage (photo V. Ard).

Fig. 5 – *Fontenille, la Motte de la Jacquille (Charente, France) : topographie du site et localisation des anomalies magnétiques (en gris) détectées par prospection géophysique qui barrent l'accès au tumulus (topographie lycée de Sillac ; prospection géophysique V. Mathé et A. Camus – Université La Rochelle et ULR Valor. En bas à droite, vues du sondage dans l'anomalie St. 1 révélant une carrière de petits appareils pour le cairn et un fossé néolithique creusé dans un second temps dans le comblement (cliché V. Ard).*

Beta-396716: 5040 ± 30 BP or 3950–3715 cal. BC and Beta-415794: 5220 ± 30 BP or 4050–3965 cal. BC (at 95 % probability, using OxCal 4.2, INTCAL 13). On account of the partial overlap of these two dates, we can accurately situate this deposit around 3950 cal. BC. A second trench excavated in 2015 on another anomaly (St. 3), located further east, with the same stratigraphy, resulted in the dating of a red deer antler, probably used as a pick, from the base of the quarry (Beta-417929: 4980 ± 30 BP or 3895–3695 cal. BC at 95 % probability).

By comparing the magnetic plots to the topography of the land, we observed that the sequence of pits, which could perhaps be more aptly described as an interrupted ditch during the second phase, blocks a strategic zone of the slope, that is, the zone providing access from the north to the end of the spur on which the tumulus is erected (fig. 5). It is probably a typical Neolithic causewayed promontory fortification which requires further investigation. The two largest anomalies, with much stonier infill to judge from the magnetic signal, close the access from the eastern and western hillside slopes. The two main interruptions, located to the northeast, on either side of feature 1, correspond to the two easiest access points to the tumulus. The identification of this feature provides us with a novel perspective regarding the monumental nature of the Motte de la Jacquille tumulus, which already possesses several exceptional features.

To our knowledge, this is the first discovery of a quarry, and of such an extensive interrupted ditch, directly associated with a circular tumulus in the region, or even in the whole of Western France. This ditch is clearly different from the quarry-ditch in tumulus D of the Champ Châlon cemetery at Benon (Charente-Maritime), which is peripheral to and only 3 m away from the tumulus façade (Joussaume, 2006). At Prissé-la-Charrière, tumulus C at Péré also presents a peripheral ditch dug out during the middle of the 5th millennium, in direct contact with the monument. The quarry thus contributes to amplifying the mass of the tumulus (Laporte, 2013). Although the window of observation remains very limited, the exceptional nature of the remains found at the base of the trench points towards a non-domestic feature directly linked to the funerary and symbolic function of the site. In the future, it will be essential to undertake a more extensive exploration of this feature in order to characterize it better and to bring to light any smaller features that the magnetometry survey may have missed.

Geophysical survey at the monument itself revealed the excellent condition of the cairn, which is only covered by a few centimetres of earth, and has an original diametre of around 20 m. Test pits revealed the external façade (volume 3 of the cairn) and at least three concentric internal faces. The walls of the 11 m-long passage are made up of alternating upright stones (M, N, O, P, Q, R and S as well as block no. 22 repositioned during the excavation) and dry stone walls (fig. 4 and 6). The passage is rectilinear with a NW/SE axis at the entrance, and then a kink at the other end to follow a N/S direction. This change in direction is associated with the concentric internal facing visible in the passage, and could indicate the presence of several architectural phases. A stone door sits at the entrance of the chamber. The top and bottom of this door have pivots, while the sill contains a hammered hollow, clearly designed to receive the lower pivot of the stone door (fig. 7). The chamber is oriented NW/SE and is of quadrangular shape, with a slightly narrower eastern side. Its maximum length is 4.1 m and its width varies between 2.1 m to the west and 1.6 m to the east. The total surface is about 8 m². The walls are formed by 11 orthostats, named A to K, from west to east. The rare remains discovered in the chamber and the passage—flint arrowheads, bone awls, personal ornaments and pot sherds—which escaped the successive excavations and looting, indicate that the monument was used from the end of the 5th or the beginning of the 4th millennium until the 3rd millennium BC. In the funeral space, all the remains had been displaced and it was impossible to select samples for dating.

Monolith architecture and technology

The weight of the 21 monoliths of the monument is estimated at 17 tons of limestone. This weight is not totally representative of the initial installation because the

Fig. 6 – Fontenille, Motte de la Jacquille (Charente, France): general view of the monument (photo S. Charbeau).

Fig. 6 – *Fontenille, la Motte de la Jacquille (Charente, France) : vue générale du monument (cliché S. Charbeau).*

capstone of the chamber and the passage have partially disappeared. The same unequal distribution scheme as at Petite Pérotte had been followed here, with 12 tons of stone used for the chamber walls and only five for the passage walls (fig. 6).

The height of the orthostats in the chamber varies between 1.7 and 2.1 m. They are not very thick (between 0.3 and 0.26 m), which explains the average weight of about one ton per orthostat, only half the weight of the Petite Pérotte orthostats. Apparently, the walls of the funerary chamber of Jacquille act more as a 'covering' than as a real support for the capstone (Laporte, 2015).

One of the most significant advances in recent work at Jacquille is the discovery of reused orthostats. Half of the orthostats had been 'recycled' from an earlier funerary chamber. However, this high rate of reuse does not preclude an elaborate configuration of the funerary chamber. As at Petite Pérotte, there is an area with perfectly upright walls in contrast with the passageway where surfaces are irregular and often unworked.

At the passage entrance, the morphology and exposed surface of the orthostats are very irregular. Then, this irregularity becomes increasingly less marked towards the chamber. However, it is even more visible at the two orthostats flanking the door of the funerary chamber. The contrast between the irregularity of these orthostats and the very smooth surface of the adjoining door creates a striking visual effect.

The fine work on the door gives the visitor a foretaste of what lies inside the chamber: very flat and regular stone walls (see fig. 11). Moreover, the orthostat located opposite the entrance, and thus the first stone seen as the visitor goes through the door, is appropriately the orthostat with the most refined surface. The flat and particularly smooth surface treatment, which is suitable for reflecting light, sums up the aim of the architect: to create a perfect internal area.

The slabs in the chamber are clearly flat and well joined; however, the area seems to be divided into two parts, especially during the construction phase of the oldest monument. The mass of the cairn is indeed characterized by four successive masses which probably correspond to as many construction phases (fig. 4). The first mass identified, close to the burial chamber, includes a portion of passage of less than three metres long. Even if it is slightly deflected, daylight can come easily into the chamber because of its short length. Thus, the zone located along the same axis as the entrance is naturally lit and reveals the presence of smooth, fine-grained walls. The part opposite this zone is left in darkness and contains rough, coarse-grained walls. These first elements of analysis point towards spatial segmentation in the funerary chamber.

The stone door of this chamber is unique in European megalithism. It measures 113 cm long, 82 cm wide and weighs about 300 kg (fig. 7). It pivots in a hollow carved into a sill stone and was probably inspired by a wooden model. It was entirely made by hammering and was carefully smoothed on its outer surface. It is clearly there not only to close the funerary chamber, but also to be seen. Even in the darkness at the end of the passage, the builders took care to enhance this passage. Symbolic meaning was clearly associated with this area of transition between the passage and the chamber. This is not very different from ethnological models where the door and its feature are much more than simple barriers (Dibie, 2012). The oldest stone door in Europe thus also possesses a symbolic function as a liminal device.

THE ART OF CONSTRUCTION IN 'ORTHOSTATIC'-TYPE ANGOUMOISIN MONUMENTS

Construction materials: varieties and sources

The analysis of the Petite Perotte and Motte de la Jacquille monuments shows that Neolithic people used diverse types of rocks to build them. Some of these rocks were available in the immediate vicinity of the sites while others come from several kilometres away.

The cairns consist of a disparate pile of flat cobbles, slabs and even blocks of lithographic limestone (Petite Pérotte) or argillaceous limestone (Motte de la Jacquille) that are all often frost-weathered and/or have poor mechanical resistance. These limestones are related to the 'Rauracian facies' (Upper Oxfordian), which forms the bedrock on which the megaliths were erected. The morphology of these stones, characterized by sharp ridges and fresh breaks, indicates that they had been quarried rather than being collected from the surface.

In all probability, these materials were extracted at the location, or quite near the location, of their subsequent use. (Rauracian limestone is copiously available on both sites near the surface.) At Motte de la Jacquille, where the cairn consists of nearly 1,500 tons of materials—an estimate based on its conical shape and a density of 2,000 kg/m^3—the quarry identified twenty metres further north had undoubtedly been used for such cairn-stone extraction, yet not for monolith extraction.

The orthostats reveal two very different petrographic facies (fig. 8):

1. Conglomeratic gravelly limestones, with angular pebbles of sub-lithographic limestone. At the Motte de la Jacquille, this facies is visually spectacular as it contains a high density of pebbles/cobbles, some of which are up to twelve centimetres long;

2. Fine- or medium-grained limestones with a crystalline aspect. These sometimes contain coarse gravel-rich zones, limonite nodules and sockets, and even elongated trails and intertwined trails (fucoids).

The first is classically of Middle Oxfordian date; the second has a more equivocal origin, as this type of material was identified in the Middle Oxfordian but also in the Upper Oxfordian (Cariou and Gabilly, 1973; Hantzpergue, 1984).

As for the capstone slabs, the same Oxfordian facies was identified at Petite Pérotte: grainy, extremely hard limestone with fine laminae for the main chamber (fig. 3), and very heterogeneous organo-detrital limestone for the adjoining chamber. On the other hand, at Motte de la Jacquille the capstone shows a very different facies: it is a sub-lithographic limestone containing calcite geodes and abundant brachiopods. In many ways, this limestone is similar to certain Lower-Middle Callovian levels (Hantzpergue, 1984).

The Middle Oxfordian ('Argovian facies') and the Upper Oxfordian ('Rauracian facies'), provide essential construction materials for both megaliths and outcrop abundantly in the Ruffecois (fig. 9). In particular, they appear near Mansle, in a NW-SE-orientated band at least 5 km wide. At the heart of this zone, however, natural outcrops are rare owing to the absence of marked differences in height. Supposing that the Neolithic populations did not quarry on the plain to reach the levels they were looking for (which would have meant stripping the overlying land), two sectors could have met their requirements:

1. To the southeast, the valley of Charente. This valley cuts into the Jurassic sequence for at least thirty metres. Between Luxé and Fontclaireau, sitting above the incised meanders on the right bank, sloped banks provide direct

External face

The stone door from the interior of the chamber

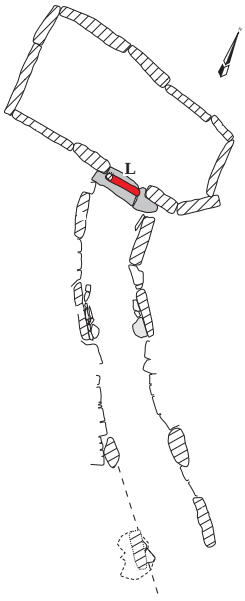


Fig. 7 – Fontenille, Motte de la Jacquille (Charente, France): the door of the funerary chamber (photos E. Mens and V. Ard).

Fig. 7 – *Fontenille, la Motte de la Jacquille (Charente, France) : la porte de la chambre funéraire (clichés E. Mens et V. Ard).*

Fig. 8 – Fontenille, Motte de la Jacquille (Charente, France): macroscopic aspect of the facies used for the orthostats in the funerary chamber (scale: 5 cm); left: conglomeratic gravelly; right: grainy limestone with fucoids (photos D. Poncet).

Fig. 8 – *Fontenille, la Motte de la Jacquille (Charente, France) : aspect macroscopique des faciès constituant les orthostates de la chambre funéraire (échelle : 5 cm) ; à gauche : calcaire conglomératique graveleux ; à droite : calcaire grenu à fucoïdes (clichés D. Poncet).*

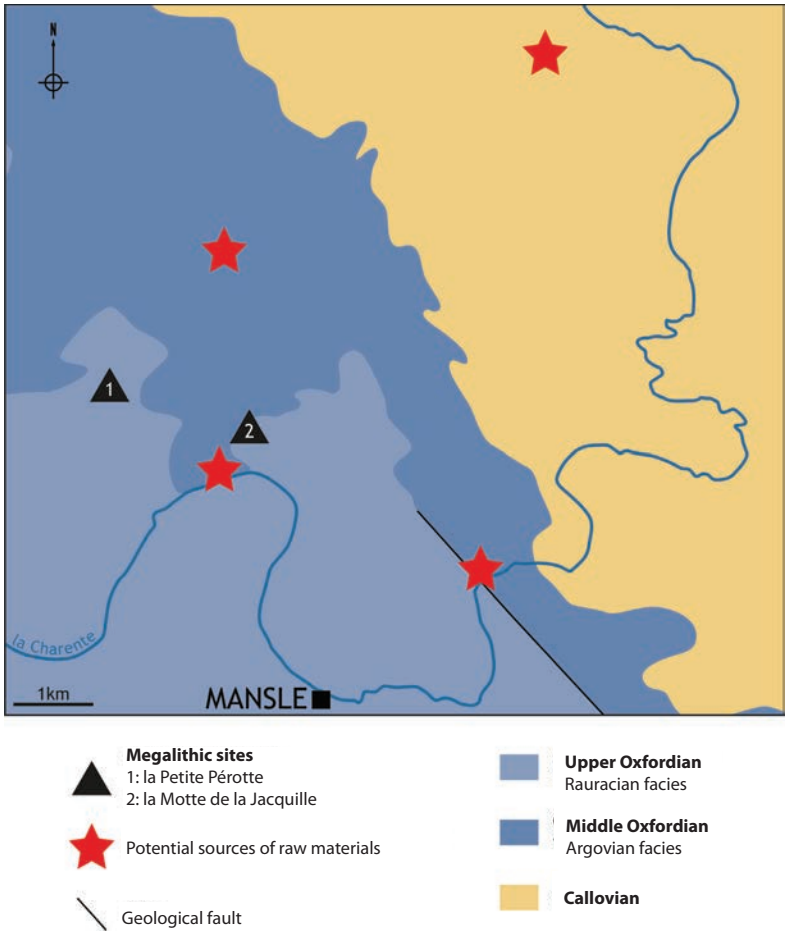


Fig. 9 – Location of potential raw material sites for the construction of the Petite Pérotte and Motte de la Jacquille dolmens (conception D. Poncet; CAD F. Raynard).

Fig. 9 *– Localisation des gisements potentiels de matière première mis à profit pour construire les dolmens de la Petite Pérotte et de la Motte de la Jacquille (conception D. Poncet ; DAO F. Raynard).*

access to different materials (conglomeratic gravelly limestone, grainy limestone, etc.) with characteristics compatible with block production (such as thickness of the banks, hardness of the rock and the absence of fractures);

2. Towards the North, around Juillé and Lonnes, as well as at Charmé and Courcôme, conglomeratic gravelly limestone of sometimes considerable size (several cubic metres) outcrops in certain places, resulting from the decomposition of the Argovian stratum by differential erosion.

The petrographic and technological study of the Petite Perotte capstone confirms its possible origin on the riverbanks of the Charente. This slab has a single weathered face and several fresh faces, thereby allowing us resituate the block in its original position within the initial outcrop through the use of 'mental refitting' (Mens, 2008). One of the short sides and the upper face of the cover slab form a weathered face recognizable from many traces of pre-construction erosion. The opposite short side and the underside of the slab are the quarried surfaces, recognizable by their angular morphology and the lack of pre-megalithic erosion. The shape of the weathered face unequivocally points towards a cliff-edge or ledge, which are common on the Charente riverbank. The high concentration of materials and direct access to the stone make the Charente valley a logical solution for monolith acquisition.

Irrespective of which sources had actually been used, potential monolith raw material sources were available at most 6–7 km (as the crow flies) from the sites chosen to erect the Petite Pérotte and Motte de la Jacquille dolmens (fig. 9).

While this is not far, the transport of monoliths (40 tons for Petite Pérotte) over such distances remains not only difficult to organize, but is also complicated by the local topography. Geological and technological studies show that the Petite Pérotte capstone comes from the edge of the cliff of the alluvial Charente Valley. Consequently, an important question is how this block had been extracted, since its location on the side of the valley renders such an operation particularly difficult. Two scenarios are possible after extraction. The first would involve transporting the 40-ton monolith to the top of the slope, then putting it on a sledge with rollers and moving it over land. The second, more probable scenario, would involve bringing the block to the bottom of the slope, before loading it onto a raft, in the same way as for the large broken menhir of Locmariaquer in the Morbihan region (Le Roux, 1997). This second scenario seems more plausible, as transportation by water of such a large volume is both energy- and time-efficient. Whichever strategy was ultimately chosen, the conditions of block acquisition indicate that the operation had probably been undertaken by a group of specialists.

The mechanical properties of the construction materials were probably not the only criterion applied to the selection of outcrops for megalithic construction. The recurrent presence of unusual natural forms raises the question of their intentional integration in the architectural feature. Two types of form are observed in the vertical orthostat walls: fucoids (fossil tunnels) and limestone dissolution holes.

The lower part of one of the orthostats in the Jacquille chamber bears zigzag-shaped fucoids with surprisingly symmetrical segments (fig. 8). This sector is irregular and not worked in any way, unlike the wall above it which is completely straight and levelled. The fucoid zone appears to have been intentionally avoided when hammering the surface. This could indicate a desire to enhance natural forms. By way of comparison, the tomb of Stoney Littleton (Somerset, England), with a transeptal passage, contains an orthostat with a large ammonite on its lower part. According to some researchers, the particularly visible location of this fossil represents a deliberate architectural choice (Darvill, 2010).

Dissolution holes are present in the Petite Pérotte and Jacquille chambers (see fig. 12). They vary in size, and some of them extend along the whole of the monolith wall. It is legitimate to ask whether this was a deliberate choice, as other stones without such flaws could easily have been used. For the record, the incorporation of stones with erosion holes is known in Breton megalithic art and architecture, particularly in the funerary chamber of Gavrinis in Morbihan (Le Roux, 1985, p. 85). Similar cases exist in the Iberian Peninsula at the Soto dolmen of Huelva (Bueno-Ramirez et al., 2015). In the row of menhirs at Douet in Hoedic (Morbihan) a natural basin was used to deposit objects (Large and Mens, 2009). However, there is no equivalent observed to date in Angoumoisin monuments; the function of dissolution holes remains unclear.

Careful shaping of orthostats in the funerary chambers

Certain Angoumoisin-type megalithic chambers provide evidence of an extremely high quality in their construction, which has contributed greatly to their current fame. The orthostats in the funerary chambers are generally well articulated (fig. 10). They are shaped and carefully finished to a very high standard, facilitated by the use of limestone, a soft rock that is relatively easy to work.

However, this high standard of craftsmanship is not systematic. Other Angoumoisin-type monuments were clearly not finished to such a high standard, creating a sort of hierarchy between monuments based on the quality of the finished monument.

Another feature of this stone-working tradition is the creation of rock art on their walls. The Angoumoisin-type megalithic monuments are the only examples in West-Central France to bear engraved figures on their walls, all created by the elaborate technique of raised relief. These figures are mostly of axeheads (Grosse Pérotte at Fontenille) and crooks (Boixe A at Vervant, La Folatière at Luxé), illustrating a clear link with the Breton corpus. More original are the representations of 'crochets' (small hooked objects) that are observed in several monuments

such as Grosse Pérotte, the Motte de la Garde and Bougon (Burnez, 1976).

There is some standardization between certain Angoumoisin monuments regarding the height of the orthostats, but this cannot be generalized for all of these types of monuments. For example, the height of the orthostats from Petite Pérotte (Fontenille) and those from tumuli F2 and A at Bougon, which are about fifty km apart, is between 2.20 and 2.30 m. However, the Grosse Pérotte monument, located at 50 m from Petite Pérotte, is 2.60 m high, showing that there is no clear norm.

The chamber orthostats are squared, often with an almost rectangular shape, thereby ensuring that the top surface is level (fig. 10). The technical function of supporting the capstone is associated with a major architectural choice, which is a genuine guiding theme in this region; that of erecting very flat and well-joined mineral walls.

The straightening of the wall surfaces had been carried out carefully (fig. 11). First of all, there was a hammering phase, sometimes followed by a final smoothing treatment, or exceptionally by the beginning of polishing. The visible side of the orthostat was more carefully worked while the opposing sides were simply hammered. The degree of finishing is thus very different depending on whether or not the surface is visible.

It is highly probable that this particular care in surface treatment represents more than mere aesthetic preoccupations, and probably entailed some kind of symbolic coding. In monuments located around the Loire Estuary, this coding is based on the natural color of orthostats, through opposing or alternating effects (Mens, 2002; Scarre, 2004). In the Angoumoisin monuments, we detect opposition effects based not only on the geology but also, and especially, in the state of the surface finish (rough, hammered, smoothed or polished). The spatial opposition or association of these surface conditions are elements used to identify the effects of spatial segmentation.

Fig. 10 – Fontenille, Petite Pérotte dolmen (Charente, France): well-squared and well-joined orthostats from the southern wall of the funerary chamber (photo V.-E. Leroux).

Fig. 10 – *Fontenille, dolmen de la Petite Pérotte (Charente, France) : les orthostates bien équarris et jointifs de la paroi sud de la chambre funéraire (cliché V.-E. Leroux).*

The most visible spatial segmentation is the transition between the passage and the chamber, which seems to be a special area in many Angoumoisin monuments. The system is based on slabs hammered into arch shapes along their interior edges, with worked edges that ultimately face each other. Some of these arched edges are underscored by mouldings or fine incisions as at Boixe B at Vervant. Arched slabs associated with a hinged stone door at the Motte de la Jacquille are the only currently-known example of this system.

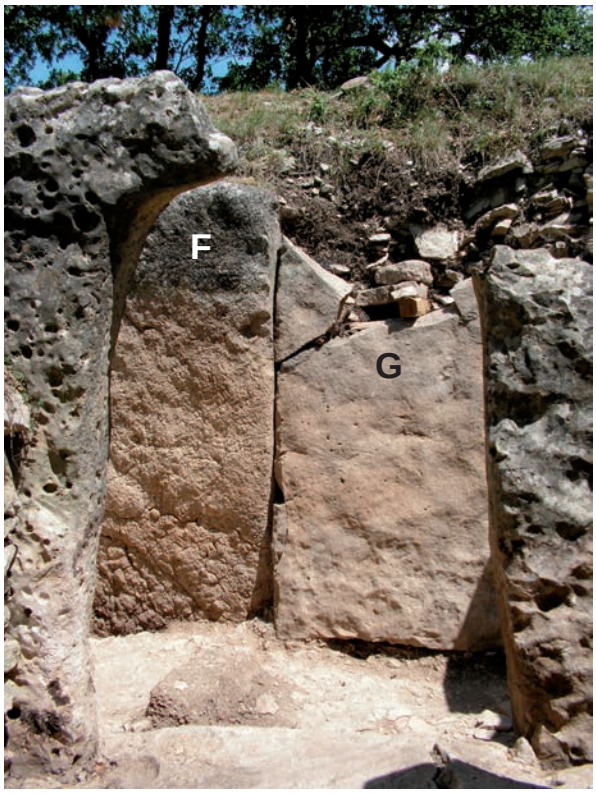
The very careful working of the edges of the orthostats ensures that each monolith in the funerary chamber articulates perfectly with its respective neighbouring monoliths. This work can be carried out in several ways, from the simplest to the most elaborate. The simplest form consists in straightening the side of the slab by hammering. This is sometimes followed by careful smoothing. The most elaborate form involves carving an interlocking system by making a groove (Burnez, 1976) or a rebate on the side of the slab (fig. 15). The depth of this work is very variable, ranging from several millimetres to several centimetres. The interlocking groove can thus go unnoticed if it is not specifically sought out.

Summary

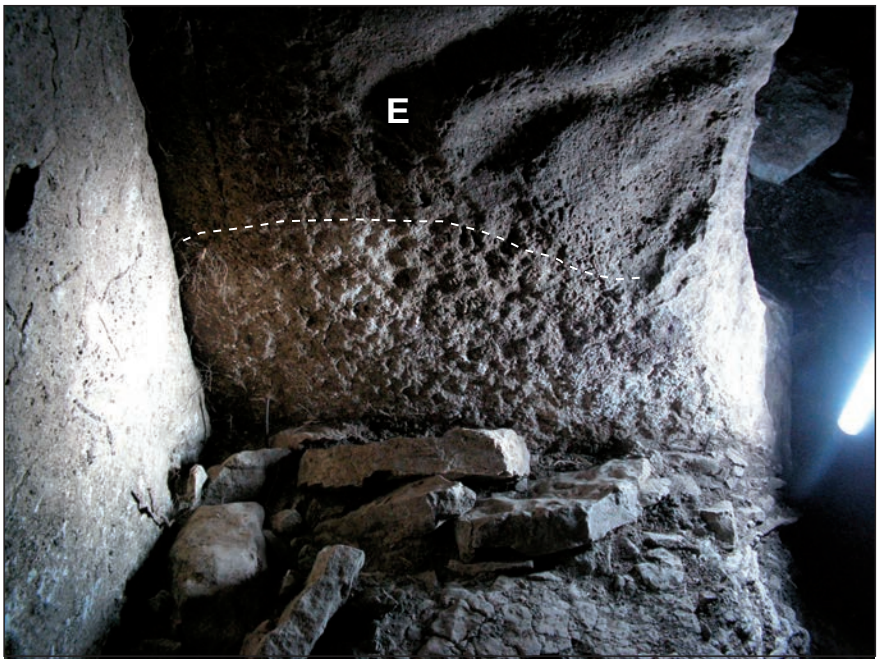
The Angoumoisin monuments illustrate a complete mastery of the *chaîne opératoire* of monumental stone working. The obvious presence of a technical tradition devoted to this activity points to the existence of specialized workshops.

The first illustration of this mastery of stone working concerns the techniques used for the acquisition of extremely heavy monoliths, sometimes in difficult conditions. At Petite Pérotte, the 40-ton capstone probably comes from a 45° slope located on the banks of the Charente. Regardless of the chosen scenario—bringing the monolith up or down the slope—the extraction and transportation required an experienced team.

This tradition of stone working is also illustrated by the techniques used to transform the limestone. Chipping and squaring produced blocks with standardized dimensions. The transformation of the stone then focused on straightening the visible surfaces by hammering. The latter operation was sometimes followed by smoothing, or even slight polishing on the most highly-worked blocks. The raised relief technique was systematically used for the megalithic art and is part of this technical tradition.



A: Fontenille, Motte de la Jacquille (Charente, France)



B: Fontenille, Petite Pérotte dolmen (Charente, France)

Fig. 11 – Fontenille (Charente, France), Motte de la Jacquille and Petite Pérotte dolmens: examples of orthostat's surface treatments. A: rough surface on F and smoothed surface on G; B: hammered surface on E (photos E. Mens).

Fig. 11 – *Fontenille (Charente, France), dolmens de la Motte de la Jacquille et de la Petite Pérotte : exemples de traitements de surface des orthostates. A : surface rugueuse sur F et surface lissée sur G. B : surface martelée sur E (clichés E. Mens).*

At the end of the *chaîne opératoire*, the most highly worked stones were reserved for certain zones of the monument and were carefully positioned. At Motte de la Jacquille, the smoothest wall is opposite the entrance. This same wall receives natural light, particularly during the first architectural phases of the monument, whereas the rest of the chamber is in darkness during the first architectural phases of the monument. These observations tend to corroborate spatial segmentation. At the centre of the tomb feature, the funerary chamber is made up of joined and well straightened orthostats, creating a perfect area in contrast to the passage. The latter is much less worked, and this serves to highlight the chamber. Everything is designed around the visible walls of the funerary chamber.

The level of investment involved in the preparation of the visible surfaces of the Angoumoisin sepulchral spaces has no equivalent in Western France. However, we note varying degrees of finishing from one monument

to another. Standards are not the same everywhere and these monuments are characterized by wide variability. There is clear variability in the dimensions of the orthostats: in some monuments, at considerable distances from each other, orthostats are of the same height, whereas other neighbouring monuments can display very different dimensions. Capstone thickness is also heterogeneous, ranging from several tens of centimetres (Motte de la Jacquille) to two metres (Grosse Pérotte).

Consequently, Angoumois monuments display a certain degree of variability. This heterogeneity was identified very early on through the form of the tumulus, the orientation of the passage, the system chosen to cover the chamber, and the choice of dry stone walls rather than erecting orthostats (Burnez, 1976).

LIFE AND DEATH OF A DOLMEN: THE EXAMPLE OF MOTTE DE LA JACQUILLE

Making new with old: evidence of the reuse of orthostats at Jacquille

The technological study of the Jacquille monument revealed the presence of numerous 'anachronisms' in comparison to the 'standards' applied to Angoumoisin-type constructions. These anomalies are observed in the funerary chamber, where the orthostats are well articulated, and in the passageway zone near the chamber.

In the funerary chamber, we observe the presence of two insertion grooves on the same orthostat. Only one of these had been functional in this monument, helping the main orthostat surface to interlock with another orthostat (fig. 12); the other served no such purpose. This is most unusual in the Angoumois context, where grooves are generally carved into the sides. Rather than regarding this as a design error, we interpret it as the presence of two distinct architectural phases. The first phase would involve the use of the groove on the side in a first funerary chamber. The second phase would involve the reuse of this block in the Motte de la Jacquille chamber. At this stage, the groove on the main surface would be carved out and the other groove would be abandoned.

There is also a case of a groove that does not fit into the adjoining orthostat on account of it having a different orientation (fig. 13). The other side of this same orthostat is completely straightened but is not adapted to the neighbouring orthostat. The presence of an inactive groove also points towards at least two architectural phases on the same monolith.

Another astonishing case is the existence of a groove twice as wide as the thickness of the adjacent orthostat (fig. 14). These two orthostats fit poorly together, underlining a probable instance of reuse.

On yet another example, the side of one orthostat (C) had been entirely straightened by hammering but is embedded into the cairn without touching the neighboring monolith. There is such a difference in the treatment of the well-straightened side and the hammering of the groove with no finishing that the most likely hypothesis appears once more to be one of reuse.

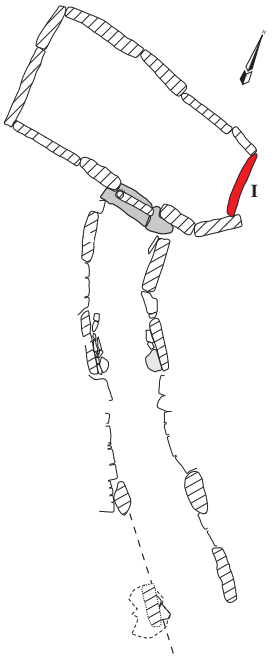
In the same way, orthostat D displays a perfectly prepared side but is also embedded in the cairn. In spite of this elaborate work, the side is not in contact with the neighboring orthostat; the main surface ensures this function. This raises the question of the utility of straightening the side and once again enables us to envisage reuse.

Other anomalies are present in the passage near the chamber. One orthostat bears two worked sides; one with an insertion groove (fig. 15), and another that is completely straightened. These sides are not in contact with other monoliths but with the dry stone wall of the passage. Both worked sides are thus in an entirely inactive position. The hypothesis of an error during shaping is not feasible and only the reuse of an orthostat from another funerary chamber can explain this anachronism. Orthostat P presents the same configuration of a straightened side embedded into the passage wall. The same interpretation as for the previous orthostat can be advanced.

All in all, ten out of the 20 orthostats from this monument present strong markers or evidence of the presence of an episode of reuse (fig. 16). These cases are only observed in the chamber and in the part of the passageway near the chamber. It is almost certain that the blocks come from another funerary chamber, and not from the dismantling of a passage. Indeed, the orthostats from the galleries of the Angoumoisin monuments do not present the same finishing standards as those seen on orthostats placed in the chamber. The sides with insertion grooves and straightened walls are thus very characteristic of a funerary chamber. All these anomalies show that one or more funerary chambers were reused for the construction of the Motte de la Jacquille monument. A dolmen (or dolmens) was thus recycled to produce a second dolmen (Mens, 2016), which confirms an earlier suggestion (Laporte, 2015) that until now had remained undemonstrated in Western France.

The particular case of the capstone

The capstone of the funerary chamber of Motte de la Jacquille was still complete and in position in the middle of the 19th century (Lièvre, 1881), but was destroyed soon afterwards when the monument was used as a quarry. Today, all that remains of it is a fragment discovered during our excavation. The geological nature of this rock is very different from that of the other monoliths in the sector as it comes from Lower-Middle Callovian strata (fig. 9), outcrops of which can be found northeast of the area between Mouton and la Magdeleine. Again, downstream from Lichères and as far as Barro, the Charente Valley could have supplied one (or several?) slabs for covering the Motte de la Jacquille funerary chamber. However, the facies used has only been identified on the plateau where the Chenon cemetery stands; this cemetery was partially explored during the 1970s (Gauron and Massaud, 1983). The geological study of the monuments from this cemetery



Active insertion groove
in a broken orthostate

Inactive insertion groove on the left edge

Fig. 12 – Fontenille, Motte de la Jacquille (Charente, France): two insertion grooves on the same orthostat I, one active and the other inactive (photo E. Mens).

Fig. 12 – *Fontenille, la Motte de la Jacquille (Charente, France) : deux rainures d'emboîtement sur le même orthostate I, l'une active et l'autre non (cliché E. Mens).*

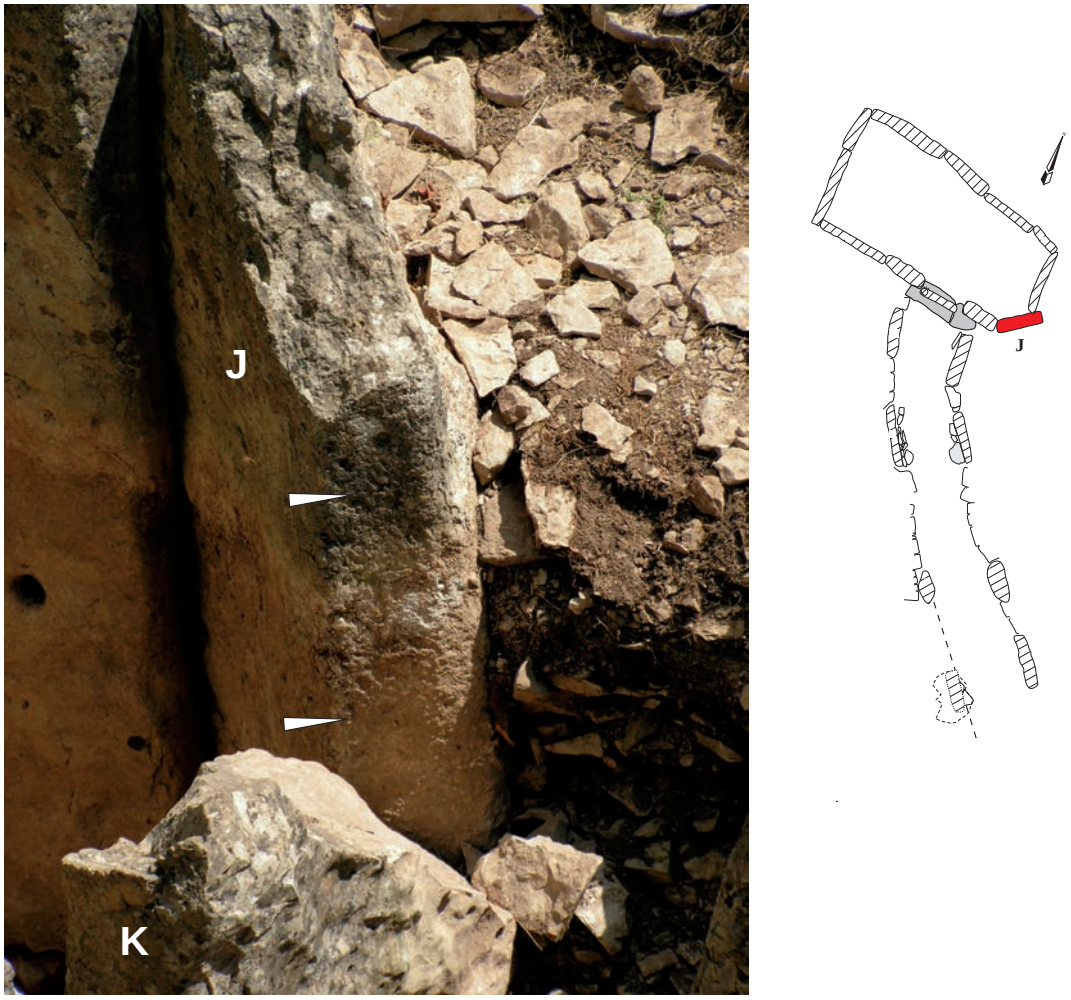


Fig. 13 – Fontenille, Motte de la Jacquille (Charente, France): insertion groove (orthostat J) not adapted to the neighbouring orthostat K due to a different orientation (photo E. Mens).

Fig. 13 – *Fontenille, la Motte de la Jacquille (Charente, France) : rainure d'emboîtement (orthostate J) inadaptée à l'orthostate voisin K en raison d'une orientation différente (cliché E. Mens).*

revealed that dolmens A1, A4 and B1 were entirely made with this material. It is perfectly possible that this stone comes from the sector of Chenon, and even from the cemetery itself, which represents a distance of 7 km from Motte de la Jacquille (fg. 1). Was this block extracted from a quarry or was it reused from a pre-existing monument? The question remains open.

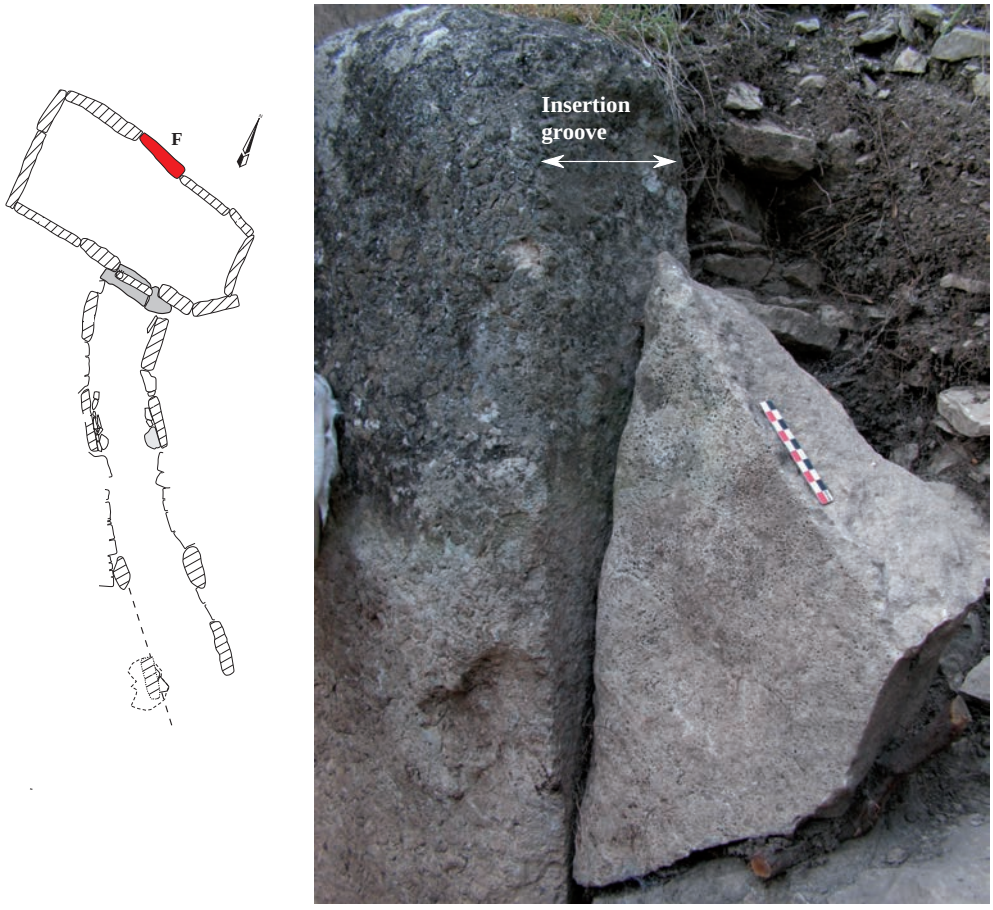
CHRONOLOGICAL AND ANTHROPOLOGICAL IMPLICATIONS OF THE EVIDENCE OF ORTHOSTAT REUSE

A unique case of proven orthostat reuse in a dolmen?

The Motte de la Jacquille example is the first demonstrated case of the reuse of funerary chamber orthostats in a second funerary chamber in Western France. This type of recycling is not really surprising as it is part of a continuous process during the whole period of megalithic monument use (Laporte, 2010 and 2015). It is simply the category of recycled materials that varies and some are easier to recognize than others.

Among these cases of reuse in megalithic contexts in the West of France, Luc Laporte cites millstones and polissoirs observed in the Loire Valley. There is also a unique case of a funerary chamber slab transformed into a menhir in the Changé dolmen in Eure-et-Loire (Jagu, 1996). We can also cite cases of dolmen orthostats erected around a pre-existing menhir at the site of La Table des Marchand at Locmariaquer (L'Helgouac'h, 1997, p. 116); small engraved blocks; and lastly, more spectacular cases of engraved stelae reused in tomb galleries. Given the scale of the phenomenon, it is highly likely that other cases of funerary chamber orthostat recycling will be identified in the future.

Laporte warns us against interpreting reuse in an overly chronological and classificatory way, by putting into perspective the recycling of polishers and engraved stelae: "Did it occur to anyone to infer from this that a



View from the interior of the chamber

Top view

Fig. 14 – Fontenille, Motte de la Jacquille (Charente, France): insertion groove on orthostat F twice as wide as necessary (photo E. Mens).

Fig. 14 – *Fontenille, la Motte de la Jacquille (Charente, France) : rainure d'emboîtement de l'orthostate F deux fois plus large que nécessaire (cliché E. Mens).*

Fig. 15 – Fontenille, Motte de la Jacquille (Charente, France): insertion groove on orthostat M in contact with the dry stone wall in the passage (photo E. Mens).

Fig. 15 – *Fontenille, la Motte de la Jacquille (Charente, France) : rainure d'emboîtement de l'orthostate M en contact avec le mur en pierres sèches du couloir (cliché E. Mens).*

quernstone or polisher phase preceded a gallery grave phase…? Certainly not. So why reserve such status just for engraved stele remains?" (Laporte, 2010).

He is right to alert us of the risks involved in basing phasing on illusions. Nonetheless, unlike quernstones, which were arguably merely simple objects used in daily life, the engraved stelae to which he alludes are part of the standing stone group and form genuine architectural systems. The transition from an open standing stone system to a closed passage grave system represents a real architectural rupture, and therefore denotes real historical meaning.

Chronological implications of reuse

The examples of orthostat reuse in the Angoumois region must be put into perspective by comparing them with other cases, such as the engraved stelae in the Carnac-Locmariaquer region in the Gulf of Morbihan (Brittany) which were recycled in passage graves. Unlike in the Angoumois region, the first cases identified by archaeologists of reuse in this sector are not identified on orthostats, but on capstones, notably at Mané Rutual at Locmariaquer (Jubert, 1974) and Gavrinis at Lamor-Baden (Le Roux, 1984). The site of Gavrinis soon became the most emblematic example of the reuse of these broken stelae in funerary chamber ceilings.

The first interpretation, which is accepted by most researchers, validates the existence of a phase of open-air engraved stelae before the passage grave construction phase (L'Helgouac'h, 1983). It is one of the first times where the pre-existence of standing stones in relation to passage graves was advanced in Brittany. An interpretation of the excavations carried out at Table des Marchand (Locmariaquer) subsequently led to the estimation of the interval of time between the erection of the stelae (4700–4300 BC) and the construction of the passage tomb (4000–3900 BC), reusing the engraved stelae (Cassen, 2009). This represents a considerable period of time, but this interpretation has been criticized by other researchers (Laporte, 2015).

A similar interpretation has been advanced in the south of the Iberian Peninsula where many menhirs and engraved stelae previously located in the open air were reused in passage graves (Bueno-Ramirez et al., 2014). As in Brittany, monoliths are reused on site or else moved. The reuse of engraved slabs has also been recorded in Ireland, but their initial function is not clear—though they may well have come from pre-existing passage graves (Eogan, 1998; Robin, 2009). Such cases are frequent in Europe and show to what extent the recycling process is intrinsic to megalithic construction.

What interval of time separates the first funerary chamber from the second in the Angoumoisin example?

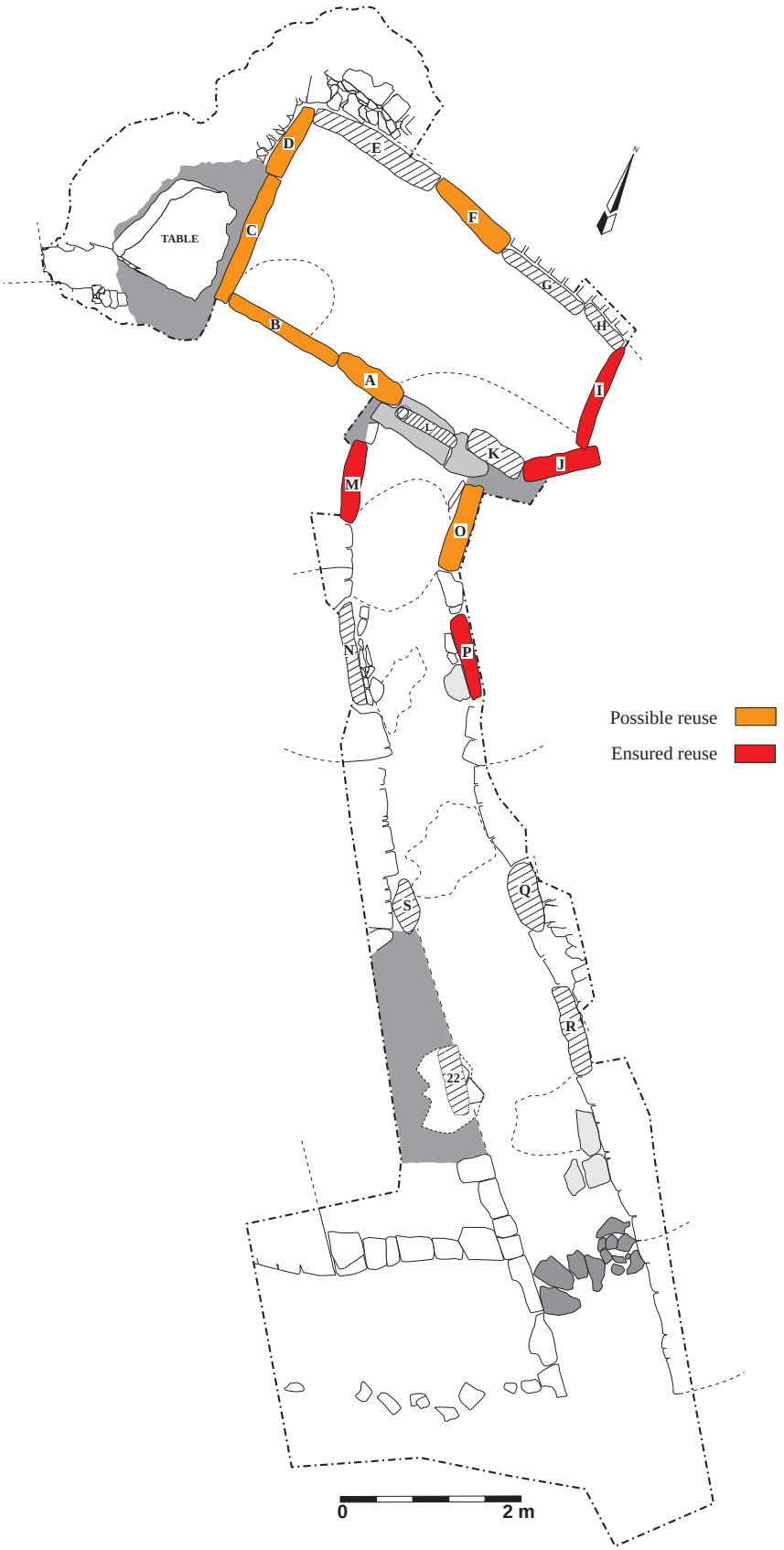


Fig. 16 – Fontenille, Motte de la Jacquille (Charente, France): location of the reused orthostats in the monument according to the degree of reliability (CAD E. Mens).

Fig. 16 – *Fontenille, la Motte de la Jacquille (Charente, France) : localisation au sein du monument des orthostates en réemploi selon le degré de fiabilité (DAO E. Mens).*

Is it a short lapse of time or lengthy gap? In the Breton example, there is an architectural rupture between the standing stone phase and the passage grave phase. The same does not, however, apply to the Angoumois situation where the architecture in question varies little. A funerary chamber replaces another funerary chamber. This architectural continuity could consequently be used to inform the chronological interpretation. One of the two chambers is clearly older than the other but the interval separating them is not necessarily equivalent to the half millennium proposed in the Breton model. Hypothetically, this interval of time is probably shorter. Therefore, for the Angoumoisin case, the recommendations of Luc Laporte have helped us to understand the situation (Laporte, 2010).

Deconstructing to reconstruct: possible scenarios

Two scenarios can be imagined for orthostat reuse in the Motte de la Jacquille monument.

The first would involve the dismantling of the first monument, which is geographically distant from Motte de la Jacquille. It is highly probable that this first monument had neither been abandoned, nor emptied of its contents, at the time when it was dismantled. We thus can infer a sequence of events. First of all, it would have been necessary to remove part of the cairn and the capstone. Was the latter abandoned or recycled? Secondly, the human deposits would have been "managed", either by abandoning them or moving them elsewhere. Subsequently, the orthostats would have been removed without breaking them, before transporting them to the new construction site. We observe that the operational mode of the reuse of orthostats from a funerary chamber is much more complex than for a menhir or engraved stele.

The second scenario concerns the dismantling of a funerary chamber already present at the Motte de la Jacquille site and its reconstruction following a different plan. This hypothesis is based on a proven case of *in situ* funerary chamber reorganization in monument E2 of the Bougon cemetery (Mohen and Scarre, 2002). At Bougon, the initially round funerary chamber was, during a second stage, transformed into a quadrangular area. There may have been more chamber transformations, just as there had been reorganization of tens of tumuli (Joussaume, 2003). In terms of the *chaîne opératoire*, the dismantling of the feature, followed by the on-site reconstruction would involve all of the stages involved in the first scenario, apart from transport, unless we envisage works to reinforce the monument.

The scenario of dismantling followed by on-site reconstruction at Motte de la Jacquille is all the more plausible in that Petite Pérotte also displays anomalies that could indicate the same situation. In its current position, more than half of slab F, located at the entrance of the chamber, is masked by the cairn (fig. 17). This unu-

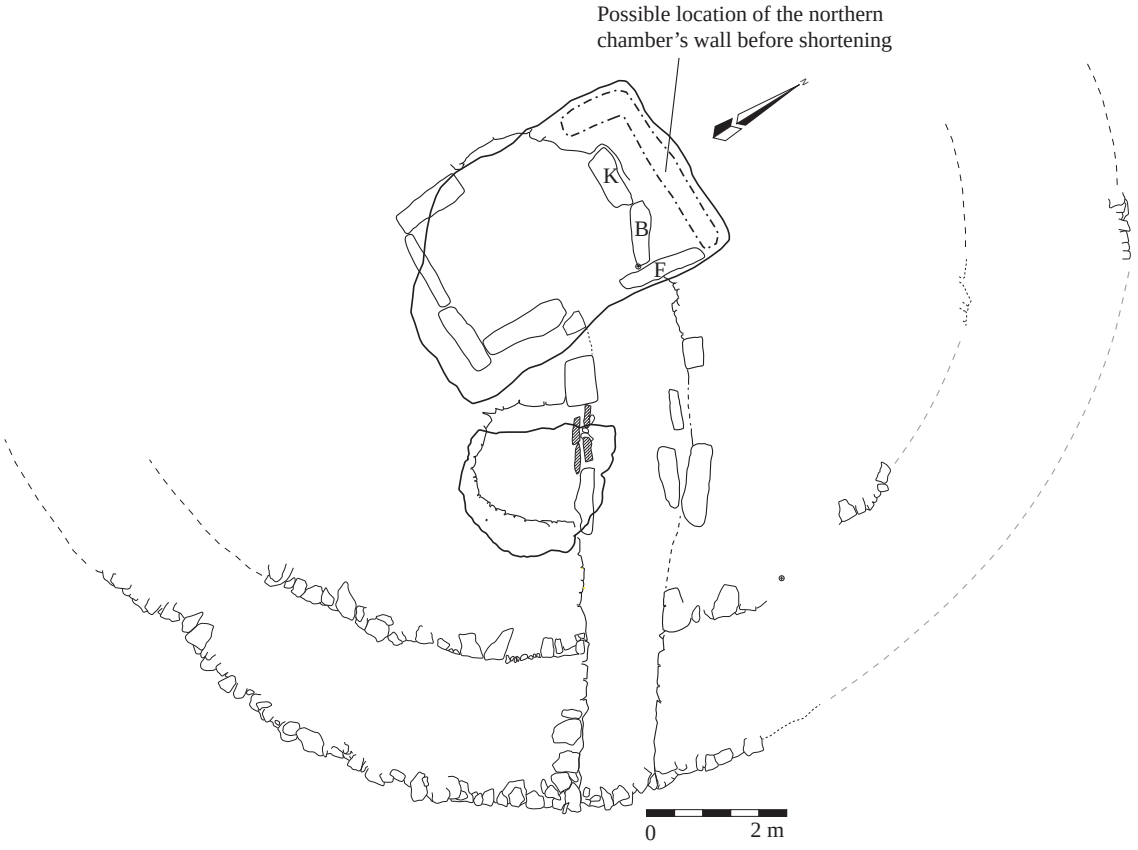


Fig. 17 – Hypothesis of a phase of shortening the Petite Pérotte funerary chamber at Fontenille (CAD E. Mens and V. Ard).

Fig. 17 – *Hypothèse d'une phase de raccourcissement de la chambre funéraire de la Petite Pérotte à Fontenille (DAO E. Mens et V. Ard).*

sual position could be explained by a phase of shortening the chamber by moving orthostats B and K towards the south (fig. 17). According to this model, the initial surface of the chamber was a rough copy of the capstone surface. Currently, the capstones extend 1.20 m beyond orthostats B and K, whereas elsewhere, they are aligned with or extend slightly beyond the orthostats. If we follow this scenario, a 'T'-shaped funerary chamber would have been transformed into a 'q'-shaped chamber.

The reuse of a dolmen to produce a second dolmen raises questions as to the reasons behind such actions. We know that the retrieved material is not derived from brutal destruction as it is intact when reused in the new monument. It was clearly methodically dismantled, meaning that this material is thus the result of a *deconstruction* phase and not a *destruction* phase.

Possible interpretations thus involve a complex process, made up of several codified stages: construction, deconstruction, transport and reconstruction of the funerary chamber. Yet the non-use of several insertion grooves on certain orthostats does not point towards dismantling and identical reconstruction. Moreover, other grooves were carved out near the old ones and chamber orthostats were reused as passage orthostats. We thus infer that reused blocks no longer maintained their original function. It might have been the purely pragmatic recycling of construction materials.

Ethnographic comparisons

In order to compare archaeological and ethnographic data, we must go beyond the simple funerary function traditionally bestowed on dolmens in order to understand the overall social function of the monument.

The technology of the insertion grooves, possibly reminiscent of techniques derived from woodworking, as was seen to be the case for the stone door, is singular and rare. The fact that blocks are reused with the same 'interlocking' technique during both chronological states of the Jacquille monument highlight a probable continuity in technical traditions and therefore a short lapse of time between the two states. This also argues against an alternative hypothesis in which a new quarry would have been opened to obtain the necessary materials. The low petrographic variability indicates that the blocks were taken from local monument(s) or cemeteries, probably without opening a new quarry for extracting materials.

Using ethnographic models (Defaix, 2006), derived from historical and anthropological data mainly from Asia, the Pacific and Latin America, three main scenarios of block removal from prior monuments have been suggested: filiation, stones without memories, and dead stones.

Filiation

When a community relocates or expands to a new area, it feels the need to preserve its identity and thus it brings an element from the 'mother' monument in order to build a new megalithic complex (Bensa, 1992; Babadzan, 1993; Hamayon, 1990). This fission and fusion movement reinforces social links and rights between communities. This type of social management can take place in different ways, using bone material taken from graves. This interpretation does not seem to correspond to Jacquille, given the extent of block reuse and the characteristic chamber finishing work. Indeed, the filiation is illustrated by the collection of a single block and not by a massive reuse of monoliths.

Stones without memories

In the example of the Toraja megalithic circle (Indonesia), where these stones represent a person, stones can be removed when the nominative memory of the people in question disappears (Paliwan Tandilangi, 1975; Koubi, 1982). This particular stele case is mentioned here as anthropomorphic pillars are known from megalithic monuments. However, the groove technology used at Jacquille seems to exclude this hypothesis. Oral culture is a good memory vector and the conservation of a particular technique of interlocking grooves suggests a short time, indefinable, but meaningful for the group.

Dead stones

A change in the state of stone, as for example through burning (Hutton, 1926; Van Gennep, 1926), can lead to the loss of its symbolic value. This does not seem to have been the case, however, with the monuments considered here.

The reuse observed at Jacquille does not appear to conform to any of these scenarios and is more likely to have been part of an *in situ* transformation program of the monument without relocating the stones. This architectural project can be part of a process of monumentalization (Laporte, 2010) or it can illustrate the symbolic desire to monopolize the social signs of the monument of ancestors. These two hypotheses are not exclusive.

CONCLUSION

The Motte de la Jacquille and Petite Pérotte monuments show the mastery of monumental stone working in Angoumoisin-type megaliths during the 4th millennium, if not longer. These megalithic monuments are incorporated into a landscape bearing the imprint of profound human modifications and they reflect the desire to display social and territorial marking. In the same way as the ditched enclosures in the world of the living, they contribute to the monumentalization of the landscape (Müller, 2014).

Everything points towards the existence of a strong technical tradition, anchored in a restricted territory, mainly located between the Charente and Sèvres rivers. This tradition is attested in the way in which imposing

slabs were obtained and in the transformation of the limestone by squaring, straightening and smoothing its surface. This technical tradition points towards the existence of specialist manufacturing workshops in a position to transmit this complex know-how.

The high level of investment in stone working highlights a refined architectural project with elements of symbolic coding. At the centre of the feature, the funerary chamber is the focus of attention, unlike the passage which serves to highlight the chamber. The configuration of the funerary chamber, with the smoothest walls opposite the entrance and lit by natural light, points towards a segmentation of the internal area, whose purpose remains to be discovered. This aspect had not previously been noted.

A lot of work thus went into the internal surfaces of the Angoumoisin monuments, but standards appear to vary from one monument to another. Unlike the commonly-portrayed image, Angoumoisin-type monuments are rather heterogeneous in this respect.

One of the key aspects of this technological study was to devise a protocol showing, for the first time in Western France**,** the existence of reused orthostats. Ten out of the 20 blocks used for this monument come from another funerary chamber, deconstructed for this purpose.

Among the possible scenarios, the reuse of on-site monoliths appears to be the most likely, rather than the physical transport of a dolmen. This hypothesis is still somewhat tenuous, but is nonetheless based on ethnographic models and on the anomalies observed in the Petite Pérotte monument. These anomalies provide possible proof of a transformation of the design of the funerary chamber.

Lastly, as for the reasons underlying the reuse of a dolmen to produce a second dolmen, we know that the material did not undergo violent destruction and that it was still intact. Therefore, it demonstrates a careful dismantling followed by reconstruction where some of the orthostats no longer had the same function. In this way, chamber orthostats became passage orthostats. All these elements point to a pragmatic recycling of construction materials, maintaining an ancestral Angoumoisin tradition. The possibility that some of these stones have "specific meanings attached to them" should be considered (Scarre, 2004, p. 152).

This study opens interesting new prospects for the redefinition of Angoumoisin-type dolmens and other types of nearby megaliths in order to gain an enhanced understanding of their architectural variability. It is essential to analyze these monuments in three dimensions by including them in the territory of the world of the living.

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