ANALECTA PRAEHISTORICA LEIDENSIA

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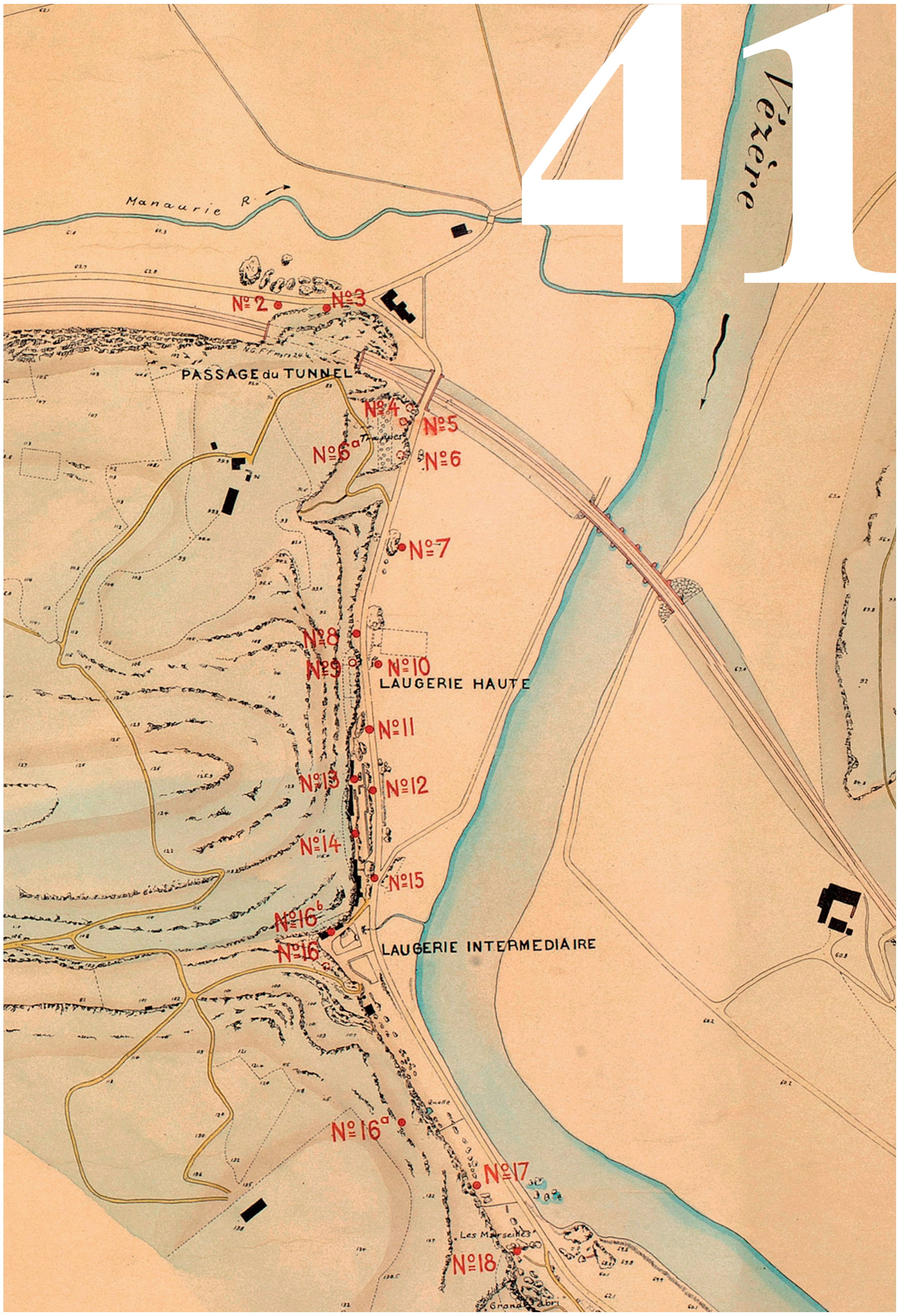

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Watching The River Flow:
A small-scale survey of the floodplain deposits in the Vézère valley, between Le Moustier and Les Eyzies (Dordogne, France)

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Between 1997 and 2001 a small-scale survey of the geology and archaeology of the fluvial deposits of the Vézère river between Le Moustier and Les Eyzies (Dordogne, France) was undertaken. The focus of the project was a study of the relationship between the fluvial history of the Vézère and archaeology yielding deposits in some of the classic rock shelter sites in the area. This paper reports the results of this survey, which consisted of an augering campaign in the current floodplain of the Vézère river, the construction of a small test trench at the foot of the Laugerie-Haute Est rockshelter and a study of the quality and availability of lithic raw materials in the study area. We conclude that the major part of the deposits in the current floodplain of the Vézère is probably Holocene in age, with the majority of the Pleistocene deposits having been eroded away. However, at several locations Pleistocene sediments are still present below Holocene overbank deposits. Our limited fieldwork in front of Laugerie-Haute Est shows a much larger spatial extant of the abri deposits there than previously envisaged, the distal talus of the rock shelter deposits and its enclosed archaeological remains having been obscured by Holocene Vézère deposits.

1 Introduction

The Vézère valley in the Dordogne, south-western France, is a key area of world prehistory, well-known in palaeoanthropology for the high density of Palaeolithic sites, amongst which are eponymous ones such as La Micoque, Le Moustier, La Madeleine and the abri of Cro-Magnon. The valley, rightly called *La Voie Royale de la Préhistoire* (Ajoulat *et al*. 1991), appeals to an even larger audience because of its many superb cave art sites, which include Lascaux and Font de Gaume. Traces of human occupation of this area go back to more than 400,000 years ago (Turq *et al*. 2010), but most of its prolific archaeological record dates from the Late Pleistocene.

The abundance of rock shelters and cave sites in this limestone area attracted a large number of excavators from the second half of the nineteenth century onwards, following Lartet's and Christy's explorations in 1863 (Lartet and Christy 1864; 1865-1875). The excavations in the area have created a unique Palaeolithic database, remarkable by its richness as well as by the fact that it is heavily biased by work on rock shelter and cave sequences. Comparatively little information exists on the archaeology of open-air settings for the Palaeolithic of this region. Large-scale excavations of open air sites carried out in the context of *archéologie préventive*-operations have diminished this bias somewhat in recent years, with the rich record from the INRAP excavations at the *Déviation de Bergerac* providing a good illustration of the enormous "open-air" potential of the area (Bourguignon *et al*. 2004). In other regions of France, e.g. north of the Seine river, one encounters exactly the opposite situation, with almost all information coming from open air sites. Caves and rock shelters are virtually unknown there, not to mention their usage by prehistoric individuals. Studies of these open air sites have shown how fluvial and aeolian sedimentation can preserve the traces of former human presence in open settings, as testified by some of the Lower and Middle Palaeolithic sites in the Somme valley (Tuffreau 2001) or for example the pristine record from the Magdalenian sites southeast of Paris (Enloe 1991; Leroi-Gourhan and Brézillon 1972).

The Vézère valley is significantly narrower than many of the northern river valleys, especially in the trajectory between Le Moustier and Les Eyzies. This may have had negative consequences on the preservation of traces of human activities in the floodplain over vast lapses of time. On the other hand, the Vézère valley and especially the trajectory between Le Moustier and Les Eyzies has the advantage that many of the excavated key sites of world prehistory, such as Le Moustier, La Madeleine, Laugerie-Haute and Abri Pataud, are situated at a short distance from the current river. Some of these are said to contain fluvial deposits that have yielded artefacts, e.g. at the lower rock shelter of Le Moustier (Laville and Rigaud 1973; Laville, Rigaud and Sackett 1980; Peyrony 1930) and at La Madeleine (Bouvier 1977; Capitan and Peyrony 1928). Hence it may be possible to relate the abri deposits to the fluvial history of the Vézère and to chart the distribution of fluvial deposits possibly contemporaneous with the formation of the rich record from these sites.

This was the *raison d'être* of our project in the Vézère valley, set up as collaboration between the Musée National de Préhistoire at Les Eyzies (France) and the Faculty of Archaeology of Leiden University (The Netherlands). In a series of small-scale fieldwork campaigns from 1997 to 2001 attention was paid to various aspects of the geology and archaeology of the Vézère deposits in its current floodplain. This involved hand augering of the fine-grained Vézère deposits, mapping of the heights of the various deposits, especially the terraces and several key sites as well as a limited *sondage* at the foot of Laugerie-Haute Est, where hand augering had revealed the presence of flint artefacts and bone fragments in deposits of the Vézère.

This paper reports the results of these studies. First we will give an overview of some of the main characteristics of the Vézère valley landscape (section 2), which is followed by a short presentation of the geological results of our survey work (section 3) (see also Mol *et al*. 2004). We will then present a brief overview of the observations from our *sondage* at the foot of Laugerie-Haute Est (section 4). This is followed by a short review of the distribution and availability of raw material sources in the working area, carried out in parallel to the surveying work by one of us (A.T.; section 5). The combined data will then be integrated into a discussion of the history of the Vézère (section 6), concluding with several summarizing comments (section 7).

2 The Vézère valley landscape

The study area is located in the southwest of France, in the northeastern part of the Aquitaine Basin (fig. 1). Surface deposits in the study area are underlain by Upper Cretaceous (Coniacian) limestone rocks in which the famous rock shelters of Le Moustier, La Madeleine, Laugerie-Haute and Pataud referred to in this paper were formed. Between Le Moustier and Les Eyzies limestone cliffs dominate the valley of the Vézère river. On the plateaus these limestones underlie Tertiary weathering products rich in flints (alterites), while in the valley bottoms the limestones are covered by gravel, sands and silts deposited by the Vézère and its tributaries. Travertine deposits formed where the Beune joins the Vézère river at Les Eyzies.

The Vézère displays very broad meandering loops, which are very pronounced close to the La Madeleine site, and occur encased in a narrow valley, approximately 500 m wide at Les Eyzies. The distance between Les Eyzies and Le Moustier is 9 km as the crow flies, but following the meanders of the Vézère the actual length is almost twice that, about 15 km. The level of the Vézère at its lowest discharge is approximately 62 m above sea level (asl) in front of Le Moustier (Peyrony 1930) (see below, fig. 3) and about 55 m at Les Eyzies (Judson 1975), i.e. the river descends about 7 m over 15 km, a slope of 47 cm/km.

The average low water level of the Vézère near Les Eyzies is currently 54.50 m, while the floods of December 1944 and November 1952 reached heights of respectively 61.93 and 61.08 m at Les Eyzies, the 1944 *crue* (flood) reaching a level probably comparable to the 1843 one (Judson 1975). Thus we are dealing with a vertical range extension of more than 6.5 m within one century (the *grande crue* of October 4 1960, 69.44 m at Le Moustier, is not taken into consideration, as this was an artificial one, due to the opening of the floodgates of the Donzère dam (cf. Judson 1975).

The Vézère is entrenched in a deep valley with steep limestone cliffs. The gradual incision of the meandering river resulted in the formation of different terrace levels along its inner bends. Five different terraces, from top to bottom, Fv, Fw1, Fw2, Fx and Fy1, and the recent floodplain (Fz) have been distinguished in the valley reach studied (Karnay *et al*. 1999; Konik 1999). As shown by Konik (1999), these terraces show clear differences in heavy mineral content, and some of the terraces have been dated: a series of ESR and U-series dates performed at La Micoque (see below) suggest that the deposits of Fw1 date to MIS 12 and Fw2 to MIS 10 (Texier 2009).

Our work however mostly focused on the floodplain of the river (Fz), the lower part of which is still flooded frequently. The overlying overbank deposits consist of several metres of loam and loamy sand, whose age and composition have thus hardly been investigated. In our work we were able to benefit from some earlier studies on the relationship of Pleistocene occupation and the history of the Vézère valley. This previous work included studies generated by fieldwork at sites such as La Micoque (Texier and Bertran 1993), Le Moustier, La Madeleine, Abri Pataud and especialy more general surveys such as (partially unpublished) studies by Texier and by Mémoire (Bouvier and Mémoire 1992; Mémoire 1984), or the earlier ones by D. Peyrony (1939; 1947a). Mémoire's (1984) study is well known to workers in the area, especially by its graphic representation of more than 150,000 years of incision and aggradation of the Vézère. According to this scheme, the 'vertical range' of the river during the Riss II/III to Holocene time span was 10 m only. Bouvier and Mémoire's (1992) attempt at reconstruction of the history of the Vézère was based on sandy fluvial deposits found in rock shelters and usage of the age of the find layers to date the fluvial deposits (see Mol *et al*. 2004).

Konik (1999) studied stratigraphical relationships between archaeological sites, slope deposits and fluvial sediments in the Vézère valley. He distinguished two low terraces: Fy1, located ca. 4 m above the present floodplain, and Fy2, covered by overbank deposits (Fz). His heavy mineral studies showed terrace Fy1 to have a composition similar to the fluvial sediments in the lower rock shelter of Le Moustier (see below).

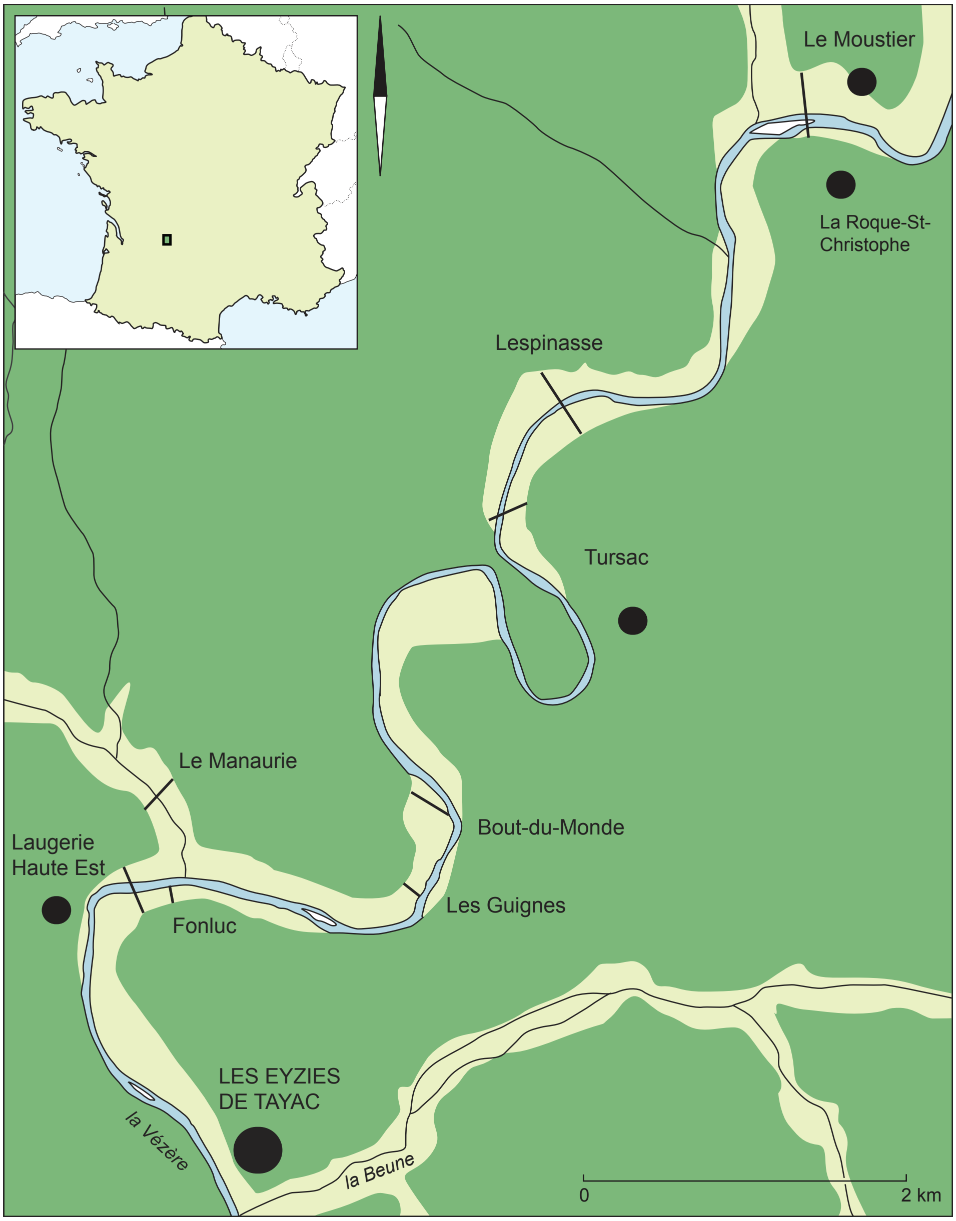


Figure 1 The study area, with the location of the transects through the valley of the Vézère and its tributary Le Manaurie. The figure shows the present valley floodplain, which is incised in limestone, as well as some of the key sites mentioned in the text.

Near the confluence of the Dordogne with the Isle, Moisan also differentiated two low terraces for the Dordogne: a low terrace (*basse terrasse*) not covered by overbank deposits, and a "very low" terrace (*très basse terrasse*), covered by overbank deposits (Moisan 1987). As with the Vézère, the low terrace is situated ca. 3-4 m above the present floodplain. Pollen analysis has assigned an Eemian or early Weichselian age to a peat level below the base of this low terrace (Moisan 1987), pointing to a Weichselian age for the terrace. The Isle river also provides data that are of interest here. Texier (1982) divided its most recent fluvial deposits into two geomorphological features: Terrace Fx and the current floodplain K. Terrace Fx is 2-4 m above the present floodplain and is not covered by overbank deposits, whereas the present floodplain contains a thick cover of overbank deposits, similar to the situation for the Dordogne.

The tributaries of the Vézère, like the majority of the valleys in northeast Aquitaine, nowadays constitute green, often humid or even swampy parts of the landscape. The infill of these valleys is to some degree known by studies carried out since the middle part of the last century. A first study dealing with the valleys of the two Beune rivers (Donner 1969) showed the existence of fine-grained organic river deposits with a thickness of 10 to 15 m, dating to the Holocene.

In the Dronne valley, northwest of our study area, major infills dating to the final part of the Pleistocene (*Tardiglaciaire*/ Late Glacial) and the Holocene have been described (Leroyer *et al*. 1998; Leroyer, Fouere and Reynet 1997; Leroyer *et al*. 2006). Comparable sequences were identified further south, in the Lot-et-Garonne, in the drainage basin of the Lémance river, all of post-glacial age (Turq, Detrain and Vigier 2000) – as was the case for the Boule, a tributary of the Dordogne (Detrain *et al*. 1996). In fact, comparable observations have been made repeatedly in the northeast of Aquitaine during geological survey work preceding large-scale construction and road building activities. In the area at stake in this paper, these deposits have been encountered (apart from the valleys of the Beune rivers – see below) in the valley of the Manaurie during fieldwork by Texier, below La Micoque, as well as occasionally in other tributaries during systematic surveys of earth moving activities in the valleys (e.g. building activities, constructions of fisheries, cleaning of ponds etc.).

The formation of these fine-grained sediments may have been related to the presence of obstructions in the small and deeply incised valleys: tuff-travertine deposits, debris cones coming from slopes or small valleys obstructing the course of the river or even dams created by the activities of beavers, which resulted in swampy river plains with deposition of organic loam (Turq, Detrain and Vigier 2000).

Taking the thickness of these recent sediments into consideration yields a vastly different last glacial landscape. Deeply incised valleys, as those of the Beunes, were even deeper then. Some archaeological sites that nowadays are more or less at the level of the river valley, e.g. La Grotte des Combarelles, Cro le Biscot or Commarque (Peyrony 1947b) were several metres *above* the valley bottom during the (Late) Weichselian.

Furthermore, these post-glacial sediments cover the coarse-grained river deposits of the valley floor which were exposed during the Weichselian. These alluvial gravel deposits mainly consisted of limestone pebbles but they also contained flint, as can be observed in the exposures of the fluvial deposits at La Micoque (valley of the Manaurie) and in the Verdier quarry (Beune). When exposed, these deposits constituted very rich flint sources, which were renewed after every major flood. Studies of the lithic assemblages from sites in the proximity of these locations (e.g. Le Cap Blanc, Laussel) show how attractive these flint sources must have been. Flints from these river deposits are often of a very good quality, as the most fragile low quality pieces had often been destroyed already during fluvial transport (Turq 2003) (see below).

One of the particularities of the Vézère valley resides in the spectacular high cliffs bordering its course in our study area. The river meanders between these *falaises*, and in order to move over the river plain one very often has to cross the river or make detours of several kilometres and master differences in height of more than 100 metres. River crossings are however often facilitated by the presence of fords (fig. 2).

Our working area is situated between two major structural features of tectonic origin, upstream the La Cassagne fault line, and downstream the Saint Cyprien fault, both running from the southeast to the northwest. Between these two features lies the Sarlat syncline, itself influenced by two synclines, the Montignac and the Pech de l'Azé one (Turq, Antignac and Roussel 1999). Karnay *et al*. (1999) have shown the existence of an important network of faults in the study area: "Le canevas tectonique influence très nettement tout le tracé des réseaux de vallées secondaires et secteurs de la morphologie des vallées" (Konik 1999, 49). Hence, we can assume that the majority of the fords are of tectonic-structural origin and were already present at their current position during the Pleistocene. Starting from this assumption, White (1985) already showed that a large number of Upper Palaeolithic sites were located close to these fords. If one enlarges the sample by taking sites from all periods into consideration, the pattern becomes even more striking. The correlation between the location of sites and fords is clear (fig. 2). For hunter-gatherers, such fords may have been very attractive: they facilitated the procurement of wood and lithic raw materials, allowed river crossings, made catching fish (e.g. during salmon runs) easy and constituted ideal hunting locations to intercept game animals during their crossing of the river.

Along with the cliffs alongside the river, rock shelters constitute one of the characteristic elements of the Périgord landscapes. Various studies have dealt with their formation (Laville 1975; Laville, Rigaud and Sackett 1980), but it has only recently become clear that there exists a semi-continuous rock shelter horizon in the Vézère valley, at the contact of the Middle and Upper Coniacian strata (Ajoulat 2002). The largest rock shelters, occupied during prehistoric or medieval times, are situated at this level: the Abri du Château des Eyzies, Laugerie-Basse, Laugerie-Haute, La Madeleine, the *abri classique* at Le Moustier and La Roque Saint Christophe.

Another important element to take into consideration is the use life of these rock shelters. The time period between the

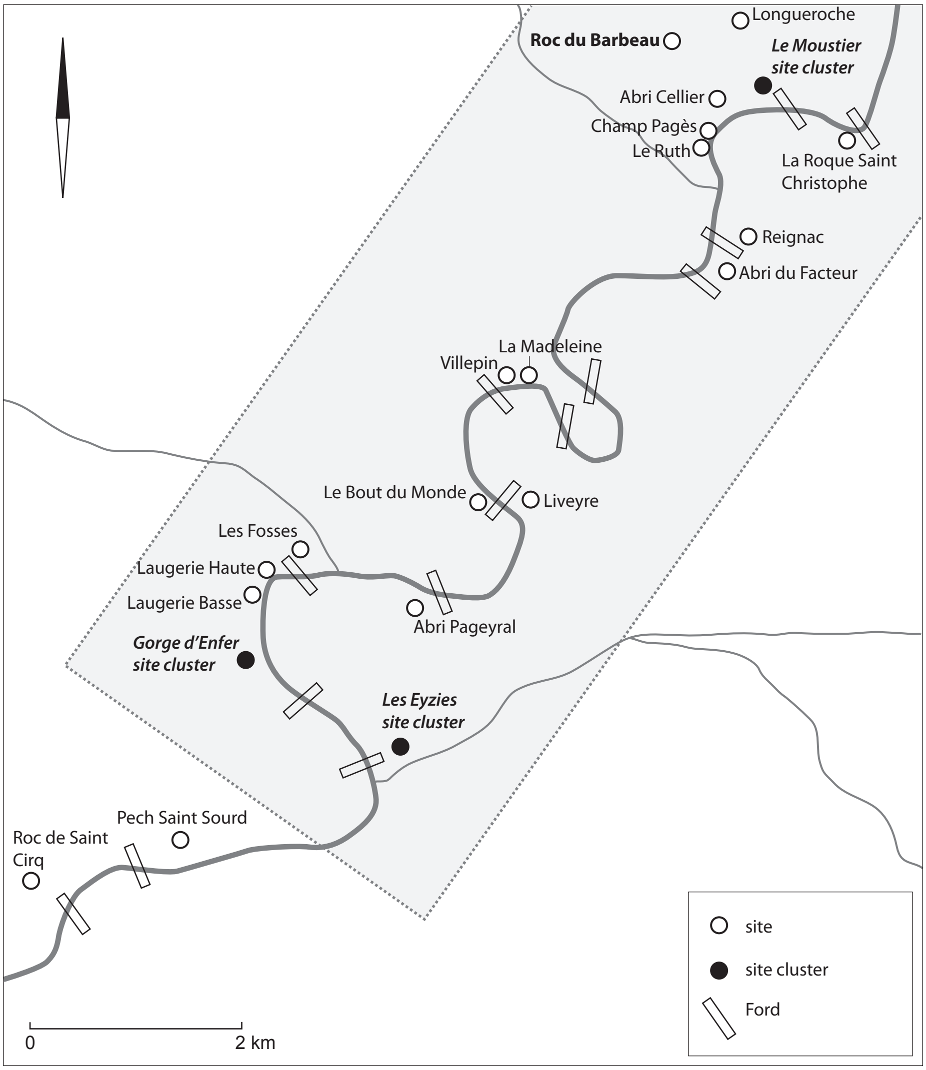


Figure 2 Location of the fords and the main Palaeolithic sites: the shaded rectangle indicates the part of the syncline in which the large rock shelters of the *Périgord noir* developed. The complex of shelters at Les Eyzies corresponds to the sites of Cro Magnon, Pataud, Vignaud, the Abri du Chateau, Casserole, Chadourne, Grotte des Eyzies, Abri Audi, the complex of the Gorge d'Enfer to the sites of the Abri Lartet Christy, the Abri du Poisson, Abri Pasquet, Abri d'Oreille d'Enfer, the Grotte d'Abzac, and those of Le Moustier to the *abri classique*, the *abri inférieur* and the Trou du Bréchou.

first and last occupations of such shelters, i.e. the moment at which a structure becomes interesting for humans to occupy and its collapse, can on archaeological grounds be inferred to be 10,000 to 15,000 years (Bouvier and Mémoire 1988). At Laugerie-Haute the rock shelter was in use between the *Périgordien final* and the middle part of the Magdalenian, at the Abri Pataud between the early Aurignacian and the Solutrean. This means that these structures change over time and relatively fast too.

3 The survey

3.1 Introduction

In this section we present the results of the various forms of fieldwork we undertook from 1997 to 2001. Through a geomorphological survey of the area, the study of maps and aerial photographs and an extensive augering programme we tried to develop an insight into the sedimentation history of the sediments in the floodplain and of the potential of these sediments for the preservation of Palaeolithic material in a primary archaeological context. In this we could profit from the rich database of J.-P. Texier (Bordeaux), who was so kind to put his (unpublished) terrace map at our disposal, which afforded a first insight into the history of the river.

As a first step in our fieldwork we simply wanted to get an idea of the thickness of the valley bottom's infill, by means of a manual augering programme. In the end ten transects were made at strategic locations, totalling 237 augering holes, up to depths of almost 7 m (fig. 3-8). Usually the augering was blocked at higher levels though, often by gravel, sometimes by the limestone bedrock. This is obviously not an ideal way to probe a valley bottom, as one can usually only guess at the character of the level blocking the boring. Therefore, during the final year we used a gravel auger, which could penetrate deeper into the gravelly channel deposits.

All borings were described in terms of sediment texture, structure, colours and inclusions, and their position located by means of a Total Station or a differential GPS. Figure 1 shows the location of the various transects. The results of the augering campaign will be presented below, starting with the initial data obtained in 1997 in the area close to Le Moustier, where we made a small *sondage*, trying to establish the geology of an inferred flint knapping site, previously reported from a field (Champs Pagès) close to the river – an activity also reported on in this section. Next we move to the Lespinasse-Tursac area, then to the Bout-du-Monde/Guignes area and we end with a series of transects near Laugerie-Haute Est.

3.2 Le Moustier and surroundings 1997

Hand augered boreholes in the floodplain in front of the lower rock shelter at Le Moustier yielded a cross-section through the Vézère valley infill, of approximately 550 m long (fig. 3). In the boreholes the infill proved to be up to 5 m in thickness. The channel deposits consist of sandy gravel. Usually, the auger was blocked on top of these deposits, although occasionally gravel was sampled, thus enabling the distinction between channel sediments and the bedrock. The depth of the coring proved a valuable tool for establishing the height of the terrace gravels.

The level of the current river is located at ca. 62 m in this transect. At the southern bank the channel deposits range in height from ca. 62 m to 61 m near the present channel. At

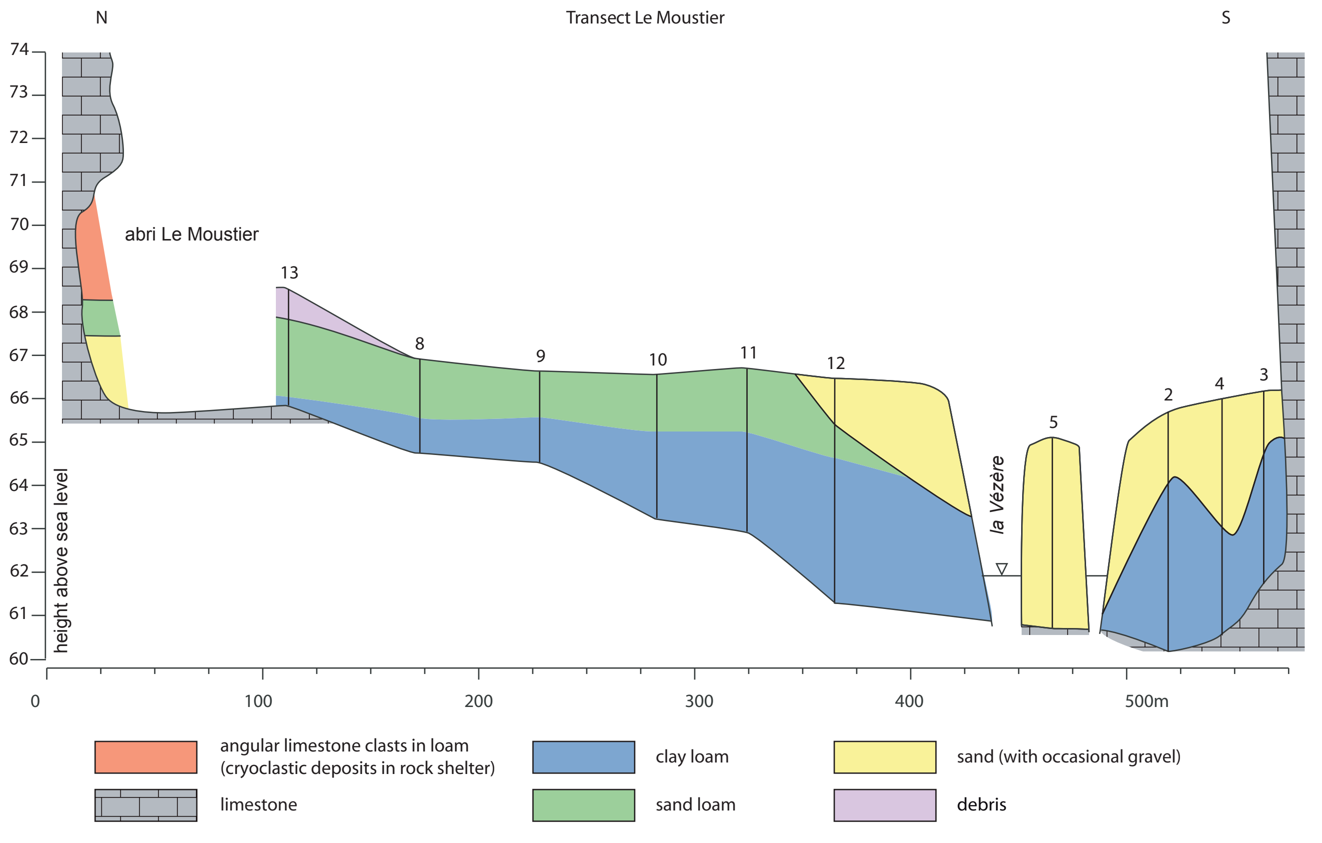


Figure 3 Transect in front of Le Moustier

the northern bank, in front of the *abri inférieur* of Le Moustier, the channel deposits are located at a much higher level, at almost 66 m, decreasing stepwise to 61 m near the Vézère. This stepwise decrease in height suggests the presence of different terrace levels, which are covered by overbank deposits. Here, at least one (65-66 m) and perhaps two (another at ca. 63 m) older levels are present above the current alluvial plain. The overbank deposits that cover these older terraces are characterized by firm clay loam, with sand loam and sand on top.

The lower part of the valley bottom infill of the north bank consists of heavy clays, brown (7.5 YR 4/4-6) to reddish brown (5YR 4/6) in colour, with many mica fragments and an occasional gravel particle, up to 5 mm in size. In borehole 12 these were underlain by pure well-sorted sands (7.5YR 5/4) at 4.20 to 4.70 m below the present surface.

The overbank deposits show a coarsening upward sequence, in which the final phase appears to have an erosional nature. This change in depositional style is probably related to formation of the present alluvial plain, which started with an incision of at least 2 m and a change to coarser-grained overbank deposits. These overbank deposits erosively overly the older terrace and overbank deposits.

The height of the top of the highest terrace, located in front of the *abri inférieur* of Le Moustier, is similar to the base of the sedimentary sequence in the lower rock shelter. These deposits have been dated to more than 55 ka by means of thermoluminescence (TL) dating of heated flints from the cryoclastic sequences on top of the fluvial sequence (*couches* G to K). This shows that the fluvial units A to F are older than 55.8 ± 5 ka, while *couche* I has a TL age of 40.9 ± 5 ka (Valladas *et al*. 1986).

It is tempting to relate these channel deposits to the fine-grained part of the fluvial sequence of the lower *abri*. However, the coarsening upward sequence as encountered in the floodplain deposits is not found in the fluvial sequence in the rock shelter. Here, the deposits clearly show a fining upward sequence, ranging from (gravelly) sand to silt loams at the top. Therefore, it is more likely that the Vézère valley's infill as documented in our boreholes at Le Moustier is younger than the fluvial deposits in the lower *abri*, as visualized in the transect. It suggests that the Vézère at Le Moustier is currently eroding an earlier floodplain, dated to > 50 ka.

This interpretation finds an independent support in work by Konik (1999), who studied the heavy mineral composition of samples from mechanical boreholes from the Vézère valley between Montignac and Le Bugue. He found strikingly consistent differences in heavy mineral composition between the erosional and aggrading banks of the Vézère over this large distance, which, again, implies that the Vézère is eroding an ancient valley fill (S. Konik, pers. comm. June 1997; Konik 1999). The heavy minerals of the eroding side of the floodplain resemble the composition of layer E at Le Moustier, the fluvial loam referred to above, with a TL age of more than 55.8 ± 5 ka (see below).

Our altimetric studies at the lower abri of Le Moustier showed that the limestone bedrock at the base of the sequence is at 65.60 m, roughly similar to the top of the terrace deposits, with the top of the fluvial (overbank) deposits at Le Moustier (Layer F) being situated at 68.29 m. Layer F is overlain by a series of cryoclastic deposits, G to K (Valladas *et al*. 1986), in which Peyrony has mentioned the presence of a 20 cm thick layer of sands (*sable fluviatile, couche I*) (Peyrony 1930). This layer is situated about 2 m above the top of the lower fluvial sequence, i.e. at a height of approximately 70 m (see also Hauser 1911, Plan 5). Peyrony's fluvial origin interpretation has been corroborated by Laville, though on the basis of mineralogical studies only (Laville 1975; Laville and Rigaud 1973). Alternatively, one could interpret the *Couche* I sands with their typical Vézère mineral association along the lines suggested by Farrand for the Abri Pataud sequence (Farrand 1975; 1995). There, the sandy matrix of some stratigraphical units clearly derived from the Vézère floodplain, likewise on the basis of heavy mineral analysis. Farrand attributed their presence to aeolian activity though, as he did not observe any indications of the action of running water in the abri (Farrand 1975).

Champ Pagès 1997

In his study on Le Moustier, Peyrony (1930) paid considerable attention to the discovery of a Levallois *atelier de débitage* in the floodplain of the Vézère between Le Moustier and Le Ruth, at a few metres from the river only. Following initial finds by the farmer Robert Pagès in 1928, large quantities of Levallois flakes and cores were excavated there, reportedly at only 40 cm below the surface and over quite a "large area". The flakes, mixed with river pebbles, formed a regular layer of about 5 to 10 cm thick (Peyrony 1930, 154). In a section at the Champ Pagès, Peyrony observed basal gravels of the same type as those of the lower abri at Le Moustier, overlain by a thick layer of loam on top of which the finds were present, covered by only 40 cm of sediment (Peyrony 1930, 154). During our augering work at the Champ Pagès we did encounter such a sequence in our boreholes, be it without the find level, which has probably been destroyed over most of the field as a result of the extensive excavations there. The sequence was encountered very close to the river only, where a gravel layer blocked our auger, at about 15 m from the Vézère at a depth between 1.05 and 1.35 m (boreholes 20 and 21), while more than 40 cm of coarse sand was encountered from a depth of 1.60 m onward in borehole 22. Such sequences were not documented further north, in the floodplain at the foot of Le Moustier.

Peyrony interpreted these findings as the remains of a Middle Palaeolithic flint workshop, focused on the production of Levallois flakes from flint nodules collected in the Vézère gravels. He was clearly puzzled by the presence of these finds so close to the river and so close to the present day surface. Peyrony even envisaged the possibility that the material had been recently collected at another site and had been brought to the field to form the floor of a house. He rejected this eventually because of the large find distribution. The presence of Upper Palaeolithic elements, such as endscrapers and burins, in the assemblage was likewise puzzling.

In June 1997 we tried to establish the geological context of the Champ Pagès finds, but because of the fact that major parts of the fields had been disturbed by earlier excavations and the construction of a water pipe line and because of the extreme high water level of the Vézère, this part of the 1997 fieldwork was not very productive (Turq *et al*. 1997). The disturbed sediments in our small trench yielded a few hundred flint artefacts, mostly waste products, probably rejected by earlier excavators who went for the *belles pièces*. The finds included blades and blade fragments – some soft hammer struck –, a fragment of a *lame à crête*, a borer and small cores for the production of bladelets, all indicating an Upper Palaeolithic component. These were associated with flakes with a centripetal or convergent dorsal pattern with facetted butts and a few backed knives, all probably of Middle Palaeolithic age. The sediments also contained many fist sized river pebbles, which are very common on the surface of the field, and might, again, reflect the intensity of "excavations" at the site.

We were not able to make a definitive statement on the character of the assemblage uncovered at Champ Pagès by earlier workers. However, in view of the results of our work at Le Moustier (see above), we are inclined to reject the interpretation that the Champ Pagès assemblage was in a primary archaeological context. Its close association with large river pebbles and the co-occurrence of Middle and Upper Palaeolithic artefacts suggests that it is a secondary association. In view of the possible implications of an in situ occurrence of a Levallois workshop at that location, however, this hypothesis definitely needs to be tested by further fieldwork at the site.

3.3 The Lespinasse/Tursac area

La Madeleine and environs

The excavations by Bouvier at La Madeleine have demonstrated the importance of the Vézère deposits in the infill of this large rock shelter. The earliest archaeological level is a Magdalenian IV, in the basal part of a fluvial sequence, which is up to 3m thick (Bouvier 1977). The Magdalenian IV is at about 1 m above the Vézère's present water level (Bouvier and Mémoire 1988, fig. 3) and its matrix consists of loamy sand with some gravel (Bouvier 1973, 2627).

The deposits were interpreted as fluvial. It is difficult to correlate this depositional flooding phase to a specific terrace level, as observed in the transects in the present floodplain, since the terrace deposits are coarse-grained channel (lag or bar) deposits related to an average water level within the channel, in contrast to the fine-grained deposits in the rock shelter, that were deposited as flood deposits. The majority of these deposits is not preserved, but probably eroded during a later flooding phase.

Situated at about 100 m downstream from the centre of the La Madeleine abri, in the same cliff, is the Abri de Villepin, where Peyrony (1936) excavated two Magdalenian VI layers, situated in deposits of the Vézère. It is very well possible that these constitute only the final part of a much more important fluvial sequence, as demonstrated at La Madeleine by Bouvier (1977, 77).

Over 2.8 km upstream (or 500 m in a straight line) of La Madeleine two transects were sampled in the alluvial plain of the Vézère in 2001, transects Tursac (fig. 4) and Lespinasse (fig. 5). Roughly 1.6 km downstream of La Madeleine, another transect, Bout-du-Monde (fig. 6), was cored. The corings were all intended to sample the alluvial deposits up to the coarse-grained channel floor.

Transect Tursac 2001

Transect Tursac (fig. 4) shows the valley bottom of the present river, which consists of gravel, at a depth of ca. 59 m. The gravel is covered with ca. 4.5 m of mainly overbank deposits. Directly on top of the terrace gravel (clayey) laminated overbank loams are present. The clayey loams are erosively overlain by loamy sands. These sands can be interpreted as levee sands, related to the present channel course. In the east these levee deposits are overlain by sand loams with locally some clayey intervals. The present river course appears to be dominated by coarser overbank deposits and to have incised in older overbank loams.

Transect Lespinasse 2001

Transect Lespinasse (fig. 5) has a complex sequence. From the valley sides, the top of the gravelly valley floor deposits decreases stepwise in height, down to the present thalweg, which is located at a height of ca. 58.7 m. At both valley sides the top of the sandy gravel deposits is located at a height of ca. 62 m. This level decreases to a height of 61.2 m in the north. In the south, the height decreases further to 59.7 m and finally 58.7 m near the present river.

The stepwise incision points to buried terrace levels. At least two, perhaps three higher terraces can be distinguished from the present river, based on the height of the terrace gravel. In the uppermost terrace, in the east, a palaeochannel

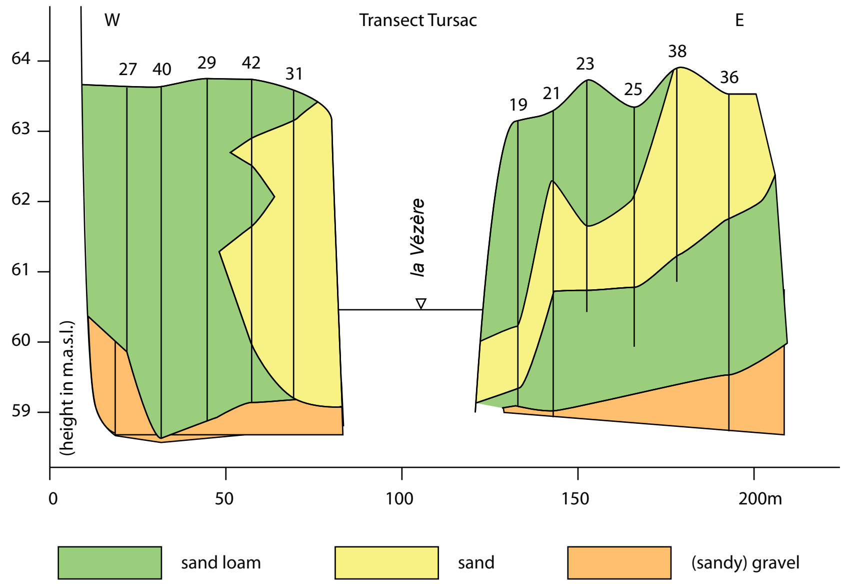


Figure 4 The transect at Tursac

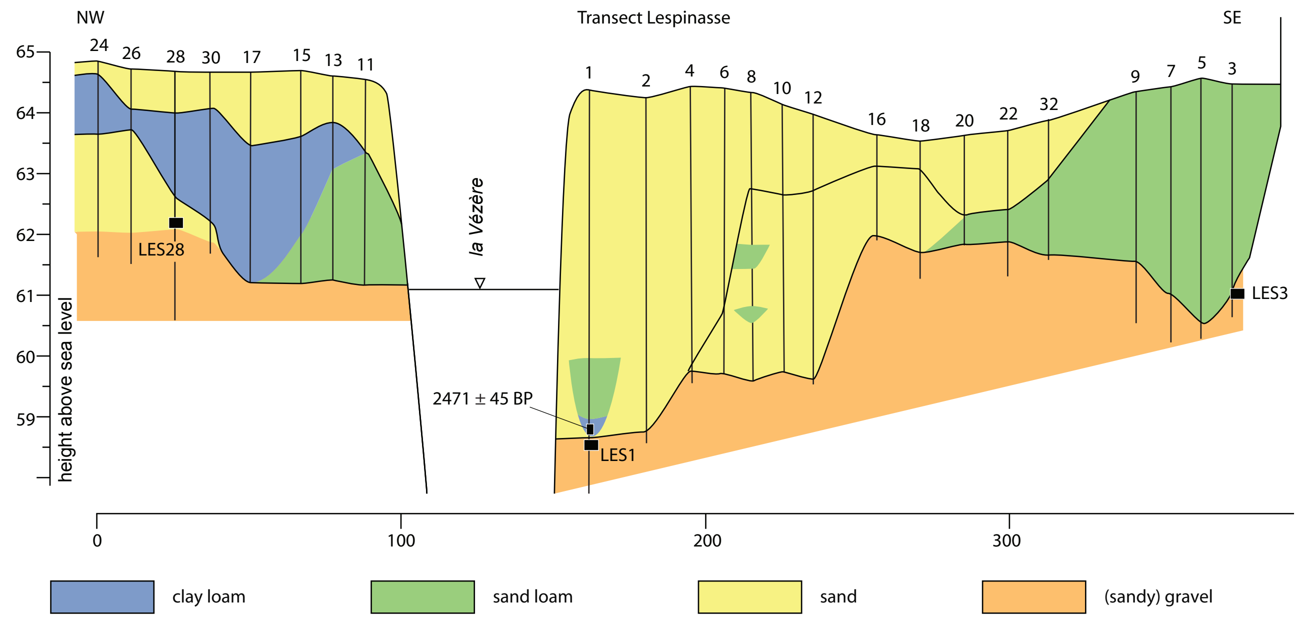


Figure 5 The transect at Lespinasse

has been preserved, which is filled with clayey overbank deposits. In the north, loamy fluvial sands are present on top of the highest terrace, at a height of ca. 1.0-2.8 m above the present water table, which may be related to similar deposits at La Madeleine. The terraces are capped by overbank deposits. The upper terrace is covered by ca. 2.5 m of overbank deposits, and the following terraces by 3.2 and 4.8 m respectively.

The present river has incised deeply into the older fluvial deposits and laid down predominantly (loamy) sand, suggesting a change in river regime to a more energetic system, similar to our observations in the Transect Tursac.

The relative chronology of the sequence could roughly be established by C14-dating and by Optically Stimulated Luminescence (OSL) dating. Near the present river course an organic interval at 10 cm above the channel base was sampled, which contained many leaves and several seeds as well as a fragment of catkin from *Alnus glutinosa*. The fragments were probably not transported over a long distance, as the delicate organic remains were relatively well preserved. The seeds and catkin dated to 2471±45 BP (UtC-11501), i.e. 760-410 cal BC (calibrated with Oxcal 4.1). Furthermore, three OSL samples were dated. Two were sampled from sandy intervals on top of the highest terrace (LES28 and LES3) and one (LES1) was obtained from the sandy interval just below the C14 sample. The luminescence dates showed inconsistent results, which is either due to improper bleaching, according to M. Bateman (Sheffield University, United Kingdom) or to inhomogeneous dose rates between the different grains, as suggested by J. Wallinga (Delft University, The Netherlands).

The OSL results obtained by M. Bateman are shown in table 1. The resulting OSL ages are not unproblematic and spread widely, however they do seem to suggest that the final incision phase is very young (LES1). The radiocarbon date points to the Iron Age for the time of sedimentation, while the OSL-sample LES1 obtained from below the C14 sample points to an even more recent date. The other two OSL-samples indicate a Late Glacial to Early Holocene age for the sediments on top of the terrace sequence, suggesting a Weichselian Pleniglacial age for the underlying channel deposits.

3.4 Transect Bout-du-Monde 1998

At 700 m straight or 1.8 km along the present river downstream from La Madeleine is the Abri Bout-du-Monde (Peyrony 1947a). The limestone bedrock of the *abri*, situated approximately at the current level of the Vézère (Peyrony 1947a, 182) is covered by about 1.55 m of sandy Vézère deposits which yielded a reindeer antler. These sediments are covered by 0.5 m of calcareous *eboulis* from the disintegration of the rock shelter’s roof mixed with fluvial sands, on top of which a Magdalenian assemblage was uncovered from fluvial sands (“sables fluviatiles abandonnés par la Vézère”, Peyrony 1947b, 184-186). The assemblage contained various Magdalenian facies, with late Magdalenian elements being the most important ones.

Transect Bout-du-Monde (fig. 6) starts near the rock shelter and shows the fluvial deposits from the limestone cliff up to the present river. It was sampled in 1998 and the first coring next to the abri shows a sandy fluvial sequence of almost 4 m. The coring could not penetrate deeper and it was believed that the calcareous basement was reached, since only calcareous flakes were sampled. The fluvial sand is covered by ca. 1.8-2.0 m of overbank deposits, increasing to 4.5 m to the present river. The overbank deposits consist of sand loam, overlain erosively by loamy sand. This loamy sand usually contained gravelly intervals and a gravel base, suggesting an erosive nature. The presence of the older fluvial sand near the limestone cliff agrees with the data of Peyrony (1947b), and may suggest that the fluvial sand in this transect also dates from the Magdalenian. The overbank deposits on top are younger.

The stratigraphical data from Bout-du-Monde correlates well with transects Lespinasse and Tursac, which also show the incision and a change to a more energetic system, dated roughly to the Iron Age in Transect Lespinasse. The top of the fluvial sand near the *abri* is located on the same (relative) height as the top of the sandy deposits on the highest terrace north of the present river in transect Lespinasse. Both are situated ca. 1.5 m below the average surface level. This may suggest a similar age, with the OSL-date (9.5 ±1.0 ka) and the Magdalenian dates for Bout-du-Monde forming a – admittedly very rough – match.

3.5 Transects Le Manaurie 1998 and Laugerie-Haute Est 1999

Transect Le Manaurie samples the small tributary just upstream of Laugerie (fig. 1 and 7). It was cored in 1998 and shows a sequence that is characterized by relatively fine-grained deposits. The current thalweg is located at 59.5-60 m and the top of the channel deposits do not increase in height towards the valley side. The channel deposits are covered by clayey loam and sandy loam, a coarsening upward sequence similar to the transects in the Vézère valley. Since the channel deposits are situated roughly at the same height it can be concluded that the valley has no older terrace remnants. This is common for smaller rivers: they often react

Lab code	Field ref.	Depth (m)	Dose rate (μGy/a)	Palaeodose (Gy)	Age (a)
Shfd02018	LES1	6.3	1995±112	2.77±0.02	1415±80
Shfd02019	LES28	3.5	2892±254	16.66±0.38	5760±520
Shfd02020	LES3	3.5	2938±219	35.98±0.48	12250±930

Table 1 OSL-age estimates (in years) for sediment samples from the Lespinasse transect (see fig. 5 for position of the samples) (data pers. comm. M. Bateman, Sheffield University, UK).

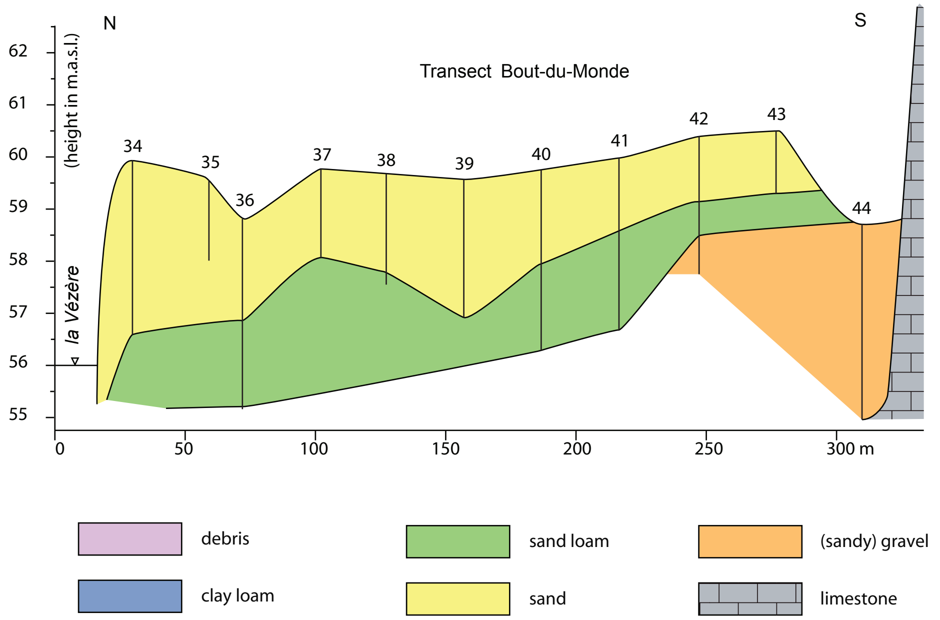


Figure 6 The transect Bout-du-Monde

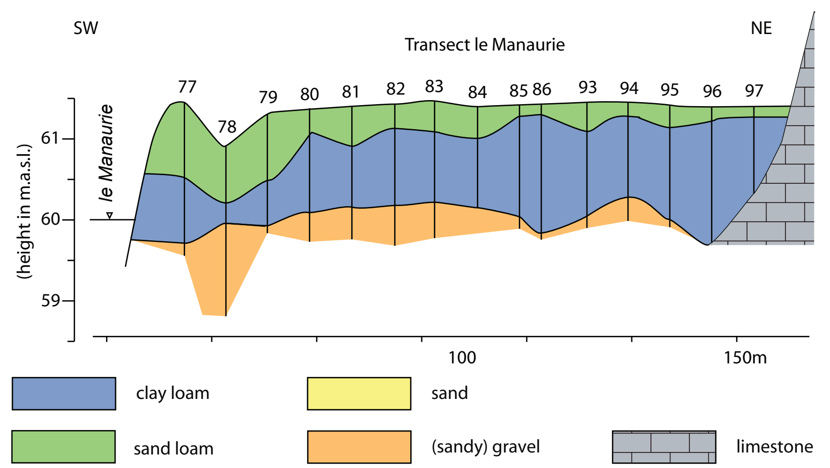


Figure 7 The transect through the valley of the Manaurie river.

less sensitive to changes in climate or hinterland. Apparently here, the threshold for an incision to a new alluvial plain was not passed, in contrast to the Vézère river.

Transect Laugerie-Haute Est is located just below the Laugerie-Haute Est rock shelter (fig. 8) and sampled the floodplain in front of that abri in 1999. The fluvial deposits were sampled from directly in front of the abri deposits that were excavated in 1999 (see below). These abri deposits were covered by the *déblais* from earlier excavations by Peyrony and others including Otto Hauser (fig. 9 and fig. 10) (see below). On the transect this pile is well visible in the steeper slope.

The fluvial sequence consists of gravelly sand and gravel at the base, which range in height from ca. 56 m near the present channel up to 59.5 m near the front of the abri. The southeastern bank shows one terrace step at 57-58 m, while the channel deposits in front of the abri, on the opposite bank (NW) show a more complex topography, with at least two

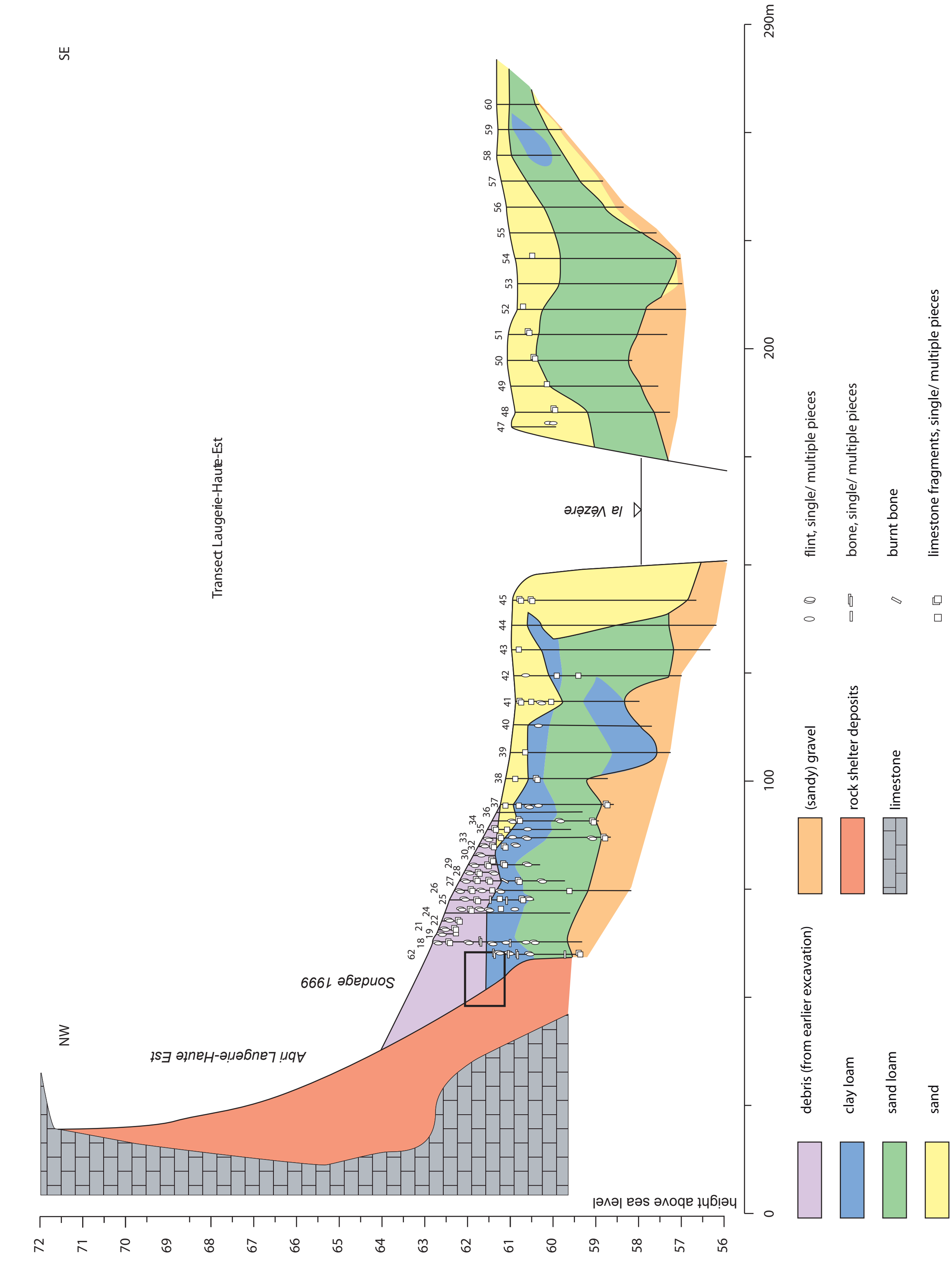


Figure 8 The transect in front of Laugerie-Haute Est, from the back wall of the rock shelter via the departmental road (RD47) and the location of the sondage to the Vézère river. The position and depth of the augering holes is indicated by a vertical line.

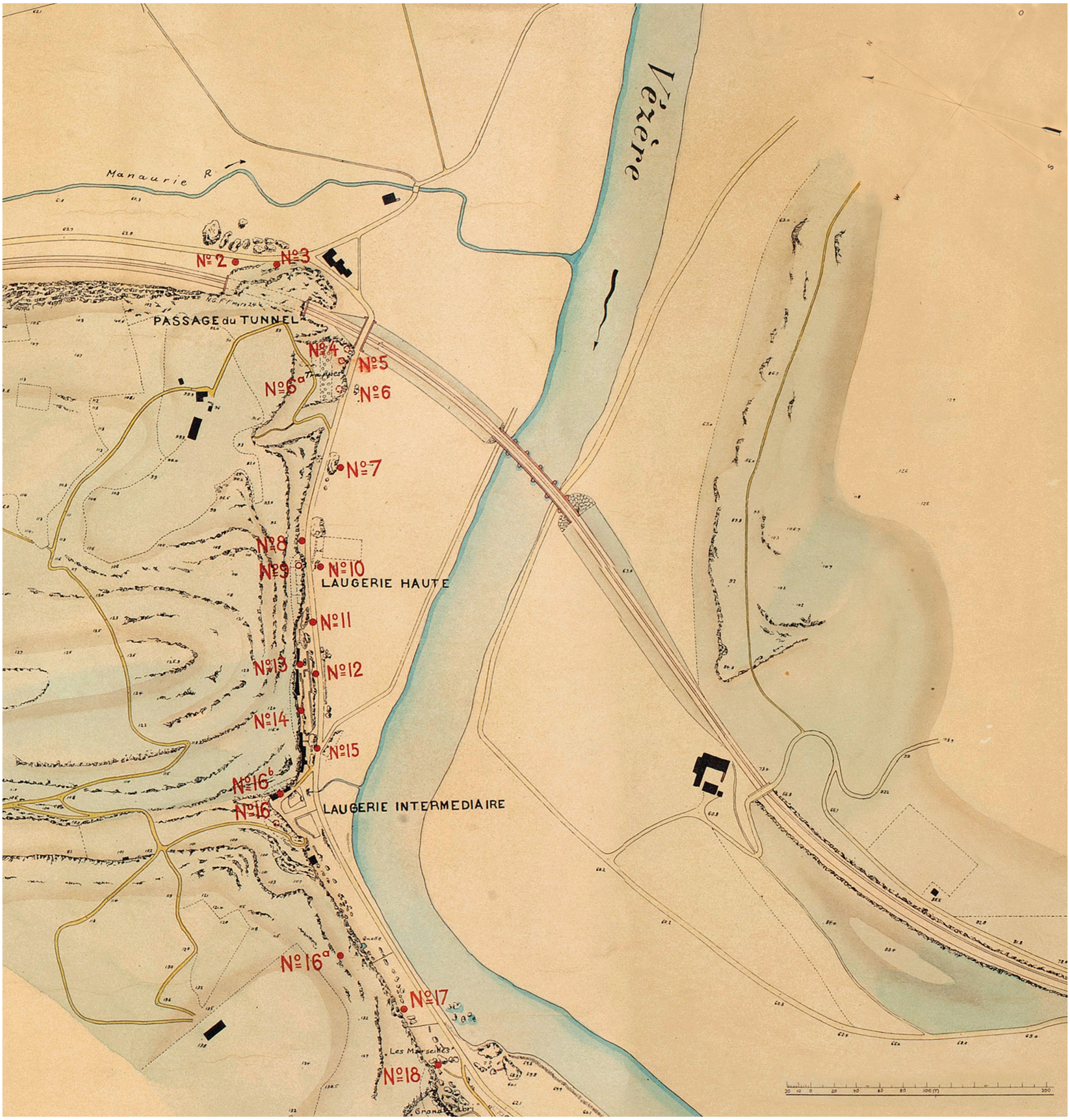


Figure 9 Detail of a map of Les Eyzies and environs, produced by Otto Hauser, zooming in on the Laugerie-Haute site complex, early 20th century (*Übersichtsplan der prähistorischen Fundstätten No. 1-41 und Font de Gaume in der Umgebung von Les Eyzies im Tale der Vézère. Aufgenommen und gezeichnet von April 1907 – Mai 1908 von Th. Baumgartner, Ingenieur u. Konkordatsgeometer Seebach-Zürich*).
Scalebar = 220 m.

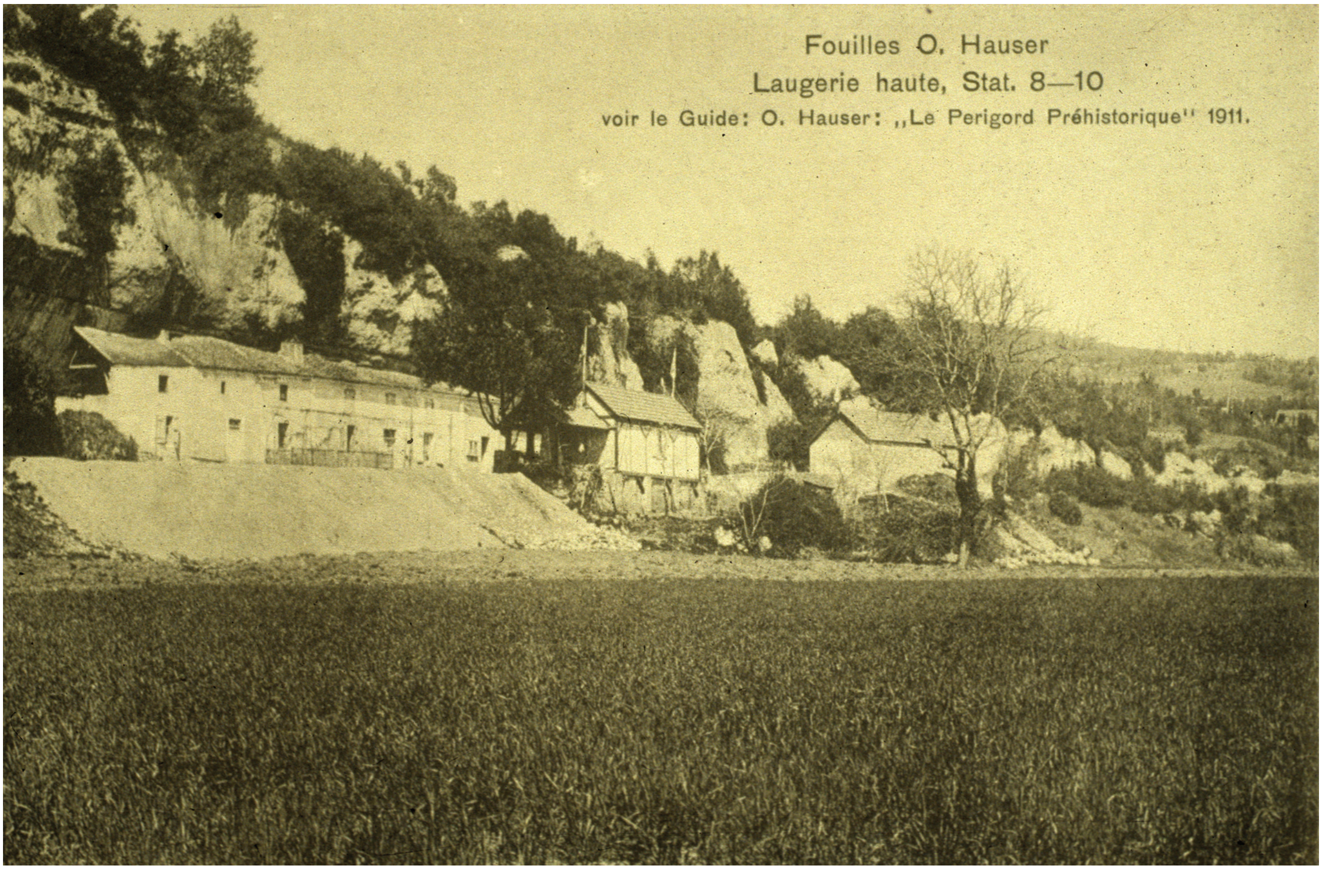


Figure 10 Early 20th century postcard of Laugerie-Haute, showing the location of Otto Hauser's excavations at the base of the cliff.

different steps, at 59.5 m and at 57 m. The latter might be similar to the terrace on the opposite side of the river. The upper level may relate to the upper terrace level in transect Lespinasse. The gravel is overlain by overbank deposits, which consist of sandy loam at the base, with locally some clayey intercalations. This sandy loam is overlain by clayey loam in front of the rock shelter and all deposits are finally erosively overlain by (loamy) sand. During augering, artefacts were recovered in these fluvial sediments at various depths, up to ca. 3 m (Roebroeks *et al*. 2000).

In general, the overbank deposits show a coarsening upward sequence, similar to the other transects. The loamy sand cover is related to the young erosional phase that has incised into the older deposits of the river. This phase has also been sampled in transect Tayac (published in Mol *et al*. 2004). At 5.25 m below the surface, the sandy deposits yielded a branch of *Populus* wood interpreted as driftwood, which was C14-dated to 1215±40 BP (OxA-8503). Although this date is much younger than the date in Transect Lespinasse, it also strongly suggests a young age for the final incisional phase and accompanying deposition of sand. Near the rock shelter the older overbank deposits show a clayey interval on top of the sandy loam, similar to the left bank in transect Lespinasse. They overlie the southern part of the excavated abri/slope deposits that contain Magdalenian artefacts (see below).

3.6 Conclusions

Similar to the other larger river valleys in this region, the valley of the Vézère is dominated by a large sequence of terraces that date to the Pleistocene. During the final phase of the Late Pleistocene, the period at stake in this study, the Vézère still displayed an erosive character: older gravelly terrace deposits were eroded and replaced at lower levels by a younger, gravel-dominated alluvial plain. Since then, during the Holocene, the river has changed from an erosive to a depositional style, in which several meters of overbank loam have been deposited on top of the older terraces.

The current, Holocene, infill of the valley of the Vézère mainly consists of coarser, loamy, sands. This depositional phase is preceded by an incision phase which is probably relatively recent. The radiocarbon evidence points to an Iron Age or an even younger date for these deposits and hence for the final incision phase. Since then, the depositional style of the river has changed to a more energetic one, with sand and levees. Currently, the river is probably still eroding its older deposits, as suggested by the data from Lespinasse and Le Moustier. The sand covers older, finer-grained clayey and loamy overbank deposits. These loams completely cover an older terrace sequence, thus concealing an important episode of the history of the Vézère river (see also Mol *et al*., 2004). The OSL-dates, although disputable, point at least to Weichselian ages for the buried terraces and correspond to some extent with the archaeological evidence. At some localities the overbank loams also cover fluvial sands (Lespinasse, Bout-du-Monde) or very firm loams (Le Moustier). It is believed that these deposits are remnants of older fluvial depositional phases that once covered the channel deposits, but are now eroded in most places. It has become clear that the best chance of finding an old terrace sequence with fluvial sand on top (and possibly with primary context traces of Palaeolithic human presence) is near the steep valley sides, located far from the present river.

4 Laugerie-Haute Est: Sondage 1999

4.1 Introduction

In the 1998 fieldwork, hand-augering of the deposits at the foot of Laugerie-Haute Est (see the transect discussed above, fig. 8) showed the presence of small flint artefacts and faunal remains at various depths in fine grained deposits interpreted as Vézère sediments (fig. 8). We considered the presence of these finds in front of the prolific *abri* sequence of Laugerie-Haute as indicating that this might be a good area to study the relationship between *abri* and river valley deposits and for retrieving material remains of human activities in the river valley proper. The 1999 fieldwork focused on these questions, more specifically on the question whether 'intact' *abri* deposits were still present south of the Route Départementale 47, and if so, how they would relate to the fine grained river deposits of the Vézère, which are up to 5 metres thick there[1]. In order to answer these question we opened a small *sondage* (fig. 11).

4.2 The Sondage

The aim of the *sondage* being to identify the presence and the character of the artefact bearing deposits encountered in the 1998 boring and their relationship to the *abri* deposits, we started to remove the ploughsoil and the back dirt (*déblais*) of earlier excavators by hand. This was done, over an area of about 3 by 5 metres, in the northwestern part of *parcelle* no. 1193 (see fig. 12), where earlier work carried out during road extension suggested that the *abri* deposits might still be present (pers. comm. A. Morala and A. Turq 1998). This was a time demanding enterprise, as the thickness of the *déblais* proved to be considerable, up to about 1 m. As already stressed by other workers at Laugerie-Haute (Chadelle 1994), these deposits contain large numbers of flint artefacts and faunal remains, alongside modern material, especially fragments of broken bottles. They are probably part of the 2000 cubic metres back dirt of earlier excavators, which D. Peyrony removed in July 1921, before starting his own excavations at the site (Peyrony and Peyrony 1938).

Once these deposits were removed and the probable *abri* deposits were encountered, the trench was narrowed down to an area of roughly 2 by 6 metres, the central part of which could not be deepened because of the presence of a major north to south running water pipe which had cut right into the *abri* deposits and necessitated relocation of the layout of our sondage.

After removal of the *déblais* over the 2 by 6 metres area, a square metre grid was laid out by means of a Total Station, and these square metres were subdivided into four 50 by 50 cm squares (1A up to and including 10D). These squares and sub-squares formed the basic collecting units for the remainder of the 'excavation', with the deposits of squares 5A, 5B, 6A and 6B largely having been destroyed during the insertion of the water pipe. As our operation was not aimed at an excavation per se, we limited ourselves to a documentation of the find distribution in the 'clean' top of the abri deposits (fig 13). Hence artefacts and faunal remains encountered during the superficial (2-5 cm) *décapage* (D1) of the *abri* deposits were collected per quarter of a square metre, while all the sediment was wet sieved through a 1 mm screen. The location of all finds was recorded by means of a Total Station. For artefacts and faunal elements more than twice as long as their width, the slope angle and direction were registered.

During the first *décapage* it became clear that the sediments encountered below the *déblais* south of the squares 3 and 4 were not the same as those from squares 1, 2, 3 and 4. As visible in the section drawing and description of the east wall of the sondage (fig. 14), in the southern part of the trench an extra layer wedged in between the top layer and the unambiguous abri deposits, up to a maximum thickness of 50 cm in square 10. The removal of these intermediate deposits included collecting of all artefacts and faunal remains encountered and sieving of all sediments. All finds from this setting obtained the provenance L99 *D1 Verdiepingsvlak*, with the additional information on their provenance within the grid system. The finds from this fluvial matrix were probably "displaced" from the abri deposits by the (Holocene) activities of the

Figure 11 A view of the sondage, taken from the north, with the limestone cliff of Laugerie-Haute in the background. The cars are parked next to the Route Départementale 47, which separates the field with the sondage from the cliff. The entrance to the actual excavation area at the Laugerie-Haute Est rock shelter is to the left of small row of houses, once in use by Otto Hauser.

Vézère, and will not be considered further here. Wet sieving of these deposits yielded some interesting finds though, e.g. three small beads, two of which were made out of agate, one out of quartzite.

After removal of these – very probably: fluvial – deposits (see below), the top of the abri deposits proved to display a slope angle of about 18 degrees in the southern part, i.e. steeper than in the north, where the angle was around 12 degrees. The abri sediments and the enclosed finds were recorded in the same way as had been done for the northern squares.

Hence, artefacts registered as being from the first (and only) *décapage* in the northern part (D1 in squares 1-4) are the stratigraphical equivalent of those from the second *décapag*e (D2) in squares 5 and higher numbered squares. All of the finds from that same level have been assigned to level D1_2, and only these will be described here.

One metre to the south of the main trench a second, smaller trench (2 by 3 m) was opened in order to chart the distribution of the abri deposits and their relationship with the river sediments. Once the abri deposit level was reached (D2), at about a depth of 1.4 m, this was treated in the same way as in the main trench. However, it proved to be preserved over a north-south extension of 0.8 m only, the deposits having been eroded further south, very probably by the Vézère (see below).

In the second trench, the loamy Vézère deposits contained flint artefacts and the occasional faunal element, with a notable vertical concentration about 80 cm below the top of the sequence, i.e. at 61.60 m. Our initial field interpretation was that these finds had been ‘excavated’, reworked by the Vézère from the abri deposits during various high water level events, and that they were in secondary position, occasionally concentrated into a kind of ‘lag’ deposit as reflected by the concentration with extremely ‘flat’ orientation of flint artefacts.

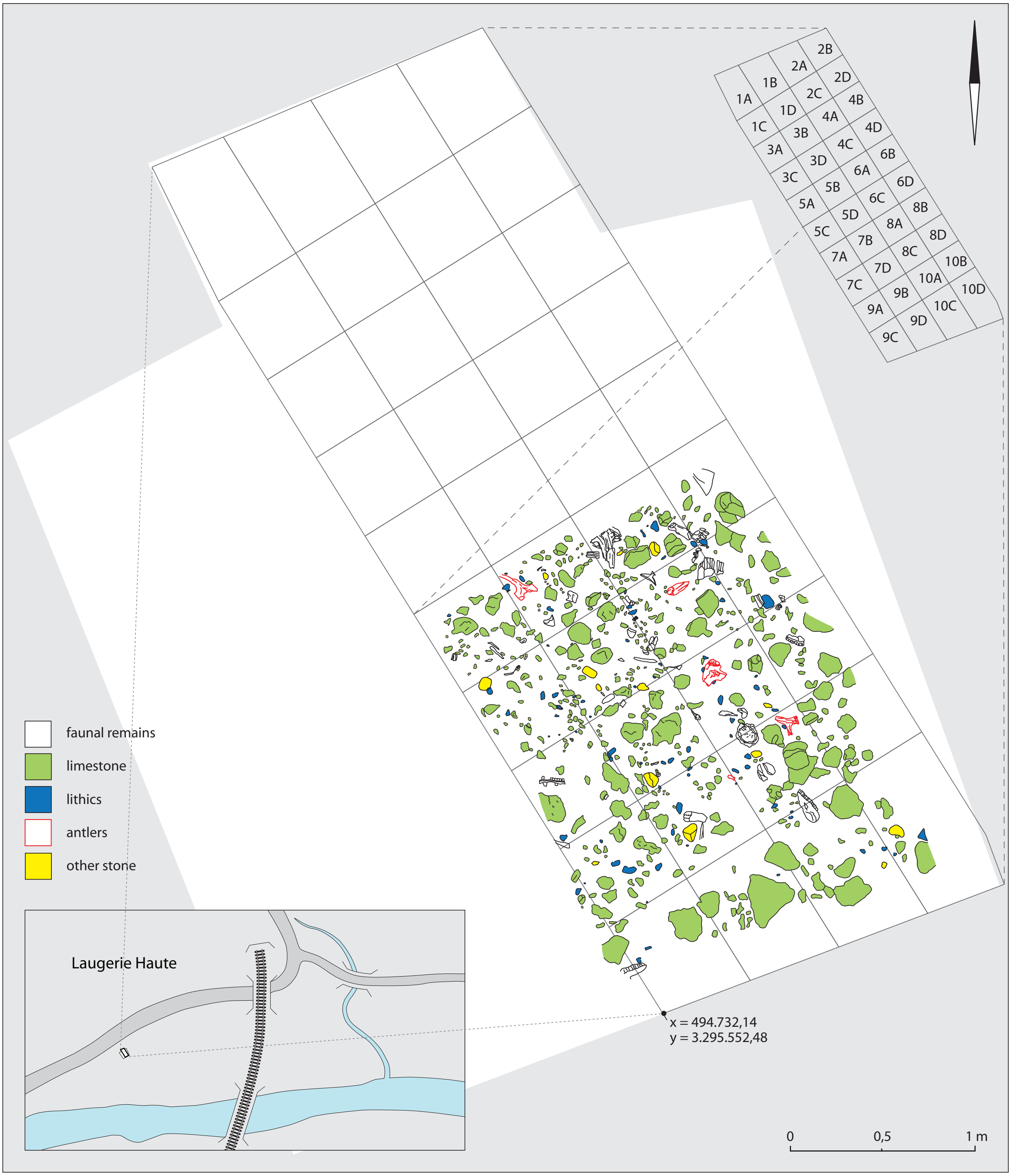


Figure 12 An overview of the spatial distribution of the D1-D2 finds (outlines traced only) in the southern part of the sondage. Indicated are the excavation grid and the coordinates of the excavation trench.

Figure 13 An overview of the top of the abri deposits during sampling, in the northern part of the sondage.

4.3 Stratigraphy

Figure 14 gives a schematic drawing of the east section of Sondage 1999, with a description as well as an interpretation of the various layers.

4.4 The Finds

Lithic industry

Most of the stone artefacts recorded from the top of the abri deposits were made out of dark gray to black flint, generally locally collected as judged from the rolled cortex of the raw material. Small numbers of artefacts were made out of Bergerac flint, jasper (*jaspe*), chalcedoine and hyaline quartz.

Tables 2 to 4 give a general overview of the assemblage recovered from the top of the abri deposits, following the typology of de Sonneville-Bordes (1960). Comparing the assemblage with the earlier observations by Peyrony and Peyrony (1938), the bulk of the 1999 *sondage* assemblage fits very well into Peyrony's Magdalénien III: *lamelles droites à bord abattu*, sometimes denticulated, are common,

Flint artefacts < 3cm	3126
Flint artefacts > 3cm	1278
Blades and blade fragments	384
Cores and core fragments (see Table 3)	14
Tools and tool-fragments (see Table 4)	112
Chutes de burin	74

Table 2 Composition of the Laugerie-Haute Est 1999 Sondage lithic assemblage, recorded from the top of the abri deposits, i.e. D1_2 (tools from the sieving residue included).

Nucleus prismatique à un et deux plans de frappe	2
Nucleus pyramidal	3
Nucleus globuleux	2
Nucleus informe	6
Nucleus discoide	1

Table 3 The cores from the Laugerie-Haute Est 1999 Sondage lithic assemblage, recorded from the top of the abri deposits (typology cf. De Sonneville-Bordes 1960).

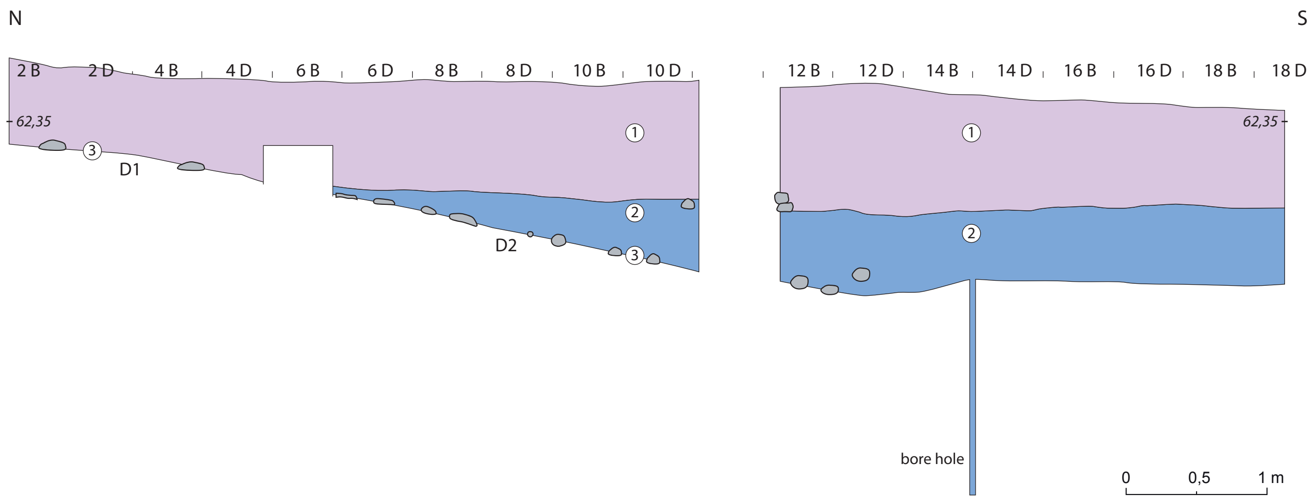


Figure 14 Schematic section of the east wall profile of the 1999 sondage.
Description
1) Loamy silt (7.5YR3/3), friable, with abundant chalk fragments (up to 25 cm diameter), flint artefacts and pebbles, common fine and larger biopores, the upper 35 cm somewhat lighter in colour (7.5YR3/4). Boundary with horizon below sharp (<5cm) in the southern half of the exposure (Trench 2), less visible in the north. In Trench 2 many horizontal flint artefacts are present at the sharp boundary with the horizon below.
2) Loamy silt (5YR4/4), friable to firm, with especially in the northern part common chalk fragments – some burnt -, flint artefacts and bone fragments, common medium biopores, boundary with horizon below vague (10cm) (sediment sampled by J.-P. Texier, Bordeaux, for thin section analysis, October 20th 1999).
3) Loamy silt (5YR3/4) with many chalk fragments (from 1 mm up to 25 cm), many of which are burnt (orange, 2.5YR6/8), many flint artefacts and bone fragments, fragments of quartz pebbles and other cultural material.
Interpretation
1) Ploughsoil developed in a mixture of excavation *deblais* and fluvial deposits, in the northern part of the section the ploughsoil has developed in the abri deposits.
2) Fluvial deposits of the Vézère floodplain, with reworked archaeological material “excavated” by the action of the river, which nowadays still reaches the location of the sondage, be it very rarely.
3) Top of the Laugerie-Haute abri deposits, in the southern part of the exposure ending abruptly, very probably as a result of erosion by the river. The height of the“talus” of the eroded abri deposits is more than 2.10m, as shown by a boring south of the sondage.

while *triangles scalènes*, typical for his Magdalenian II, are virtually absent (Peyrony 1938, 56). In a comparison of cumulative graphs of the assemblage from our sondage to those published by Francois Bordes (1958) for Magdalenian assemblages retrieved during his excavations at Laugerie-Haute Est, Kamermans *et al*. likewise conclude that the D1_D2 assemblages display a striking resemblance to Bordes’ Magdalenian III assemblage (Kamermans *et al*. 2003).

Indices (N=112)		
Indice de grattoir IG	23.2	(26)
Indice de burin IB	25.0	(28)
Indice de percoir IP	3.6	(4)
Indice de burin dièdre Ibd	17.0	(19)
Indice de burin sur troncature Ibt	8.0	(9)
Indice de grattoir aurignacien IGA	0.9	(1)

Table 4 Survey of the tools from the Laugerie-Haute Est 1999 Sondage lithic assemblage, recorded from the top of the abri deposits, D1_D2 (typology and indices cf. De Sonneville-Bordes 1960).

Apart from the typology of the assemblage, the raw materials also point to a correlation with Peyrony’s (and Bordes 1958) Magdalenian III: the 1999 Sondage assemblage contains various flakes of hyaline quartz, described as very striking for the Magdalenian III assemblage by Peyrony and Peyrony (1938). Likewise, thick scrapers and flakes with an abrupt retouche (*raclettes*) are very rare.

The 1999 Sondage yielded a few unambiguous Solutrean tools, in the middle of what looked like a “classical” middle Magdalenian assemblage. They include a fragment of a *feuille de laurier* recorded during the excavation (Square 8C/D2, no. 5101). Comparable observations have been made for the Magdalenian III couche 2, excavated by Francois Bordes in 1955, which likewise contained three fragments of *feuilles de laurier* (Bordes 1958, 214).

Faunal remains.
The find level contained a large amount of faunal remains, including lower jaws of horse and reindeer, skulls and skull fragments as well as antlers (mainly of red deer). Some remains, e.g. vertebrae, were in anatomical connection. In the field the number of astragali and fragmented parts of metacarpals and metatarsals was striking. Detailed analyses of the faunal complex showed that cranial parts and bones from front- and hind leg dominate the assemblage. Vertebrae and costae are poorly represented. Table 5 gives an overview of the smaller mammals remains recovered during wet sieving of the sediments, table 6 lists the large mammal species identified deriving from the find horizon D1_2.

Small mammal remains (N=538)
The small mammal assemblage (table 5) consists of species that are extant in the region. The assemblage includes species indicative for the presence of forest vegetation (*Eliomys quercinus, Apodemus* sp., *Clethrionomys glareolus*), but taxa that are semi-aquatic (*Arvicola terrestris*) and those that inhabit more open landscapes (*Microtus agrestis* and *M. arvalis*) dominate. Small mammals that prefer a dry steppe habitat (e.g. hamsters and ground squirrels) as well as those that tolerate cold climate conditions (e.g. tundra dwellers such as lemmings) are absent.

Large mammal remains (N=452)
The larger mammal fauna (table 6) is dominated by horse (*Equus* sp.) and reindeer (*Rangifer tarandus*). Both species are represented by at least 3 adult individuals and one juvenile based on the occurrence of a milk molar. Red deer (*Cervus elaphus*) and *Bos/Bison* are less frequent. Typical steppe dwellers (e.g. *Saiga tartarica*) and species characteristic for the Pleistocene Mammoth Steppe faunal community (e.g. *Mammuthus primigenius* and *Coelodonta antiquitatis*) were not observed. The mammal assemblage is characteristic for a post-glacial period in which only remnants of the previous cold stage fauna that are able to adapt to milder climate conditions (e.g. reindeer) still occur in the area.

Peyrony and Peyrony (1938) described the sequence exposed at Laugerie-Haute Est and presented data on the mammal fauna they recovered from their levels B-K. According to Peyrony and Peyrony (1938) smaller mammals are only known from the levels F and I'. The small mammal associations from both levels hardly differ from the one from the 1999 Sondage. Remarkable is that the garden dormouse *Eliomys quercinus*, a forest dweller, occurs in both small mammal associations.

The larger mammal fauna in all levels described by Peyrony and Peyrony (1938) is dominated by *Rangifer tarandus*. In the lower levels (B to H), of Gravettian and Solutrian age, *Mammuthus primigenius* occurs (although the amount of remains was small). The woolly mammoth is, together with *Coelodonta antiquitatis* (Level B) and *Ovibos moschatus* (level H'''), indicative of more glacial conditions during deposition of the lower part of the sequence. In the absence of these species, the 1999 Sondage fauna can best

SPECIES	NISP
Insectivora	
Sorex araneus	2
Sorex sp.	2
Talpa europaea	5
Lagomorpha	
Leporidae indet.	1
Rodentia	
Eliomys quercinus	1
Clethrionomys glareolus	5
Arvicola terrestis	97
Microtus (St.) gregalis	
Microtus oeconomus	16
Microtus agrestis	9
Microtus arvalis	7
Microtus agrestis/M.arvalis	68
Microtus sp.	319
Apodemus sp.	6
Total number of specimens	538

Table 5 Survey of the small mammal species recovered from the top of the abri deposits during the 1999 Sondage (NISP: Number of Identified Specimens).

SPECIES	NISP	MNI
Perissodactyla		
Equus sp.	99	3
Artiodactyla		
Cervus elaphus	16	1
Rangifer tarandus	78	3
Cervidae indet.	75	
Bos/Bison	9	1
INDET	175	
Total Number of Specimens	452	

Table 6 Survey of the large mammal species recovered from the top of the Laugerie Haute Est abri deposits during the 1999 Sondage (NISP: Number of Identified Specimens, MNI: Minimum Number of Individuals).

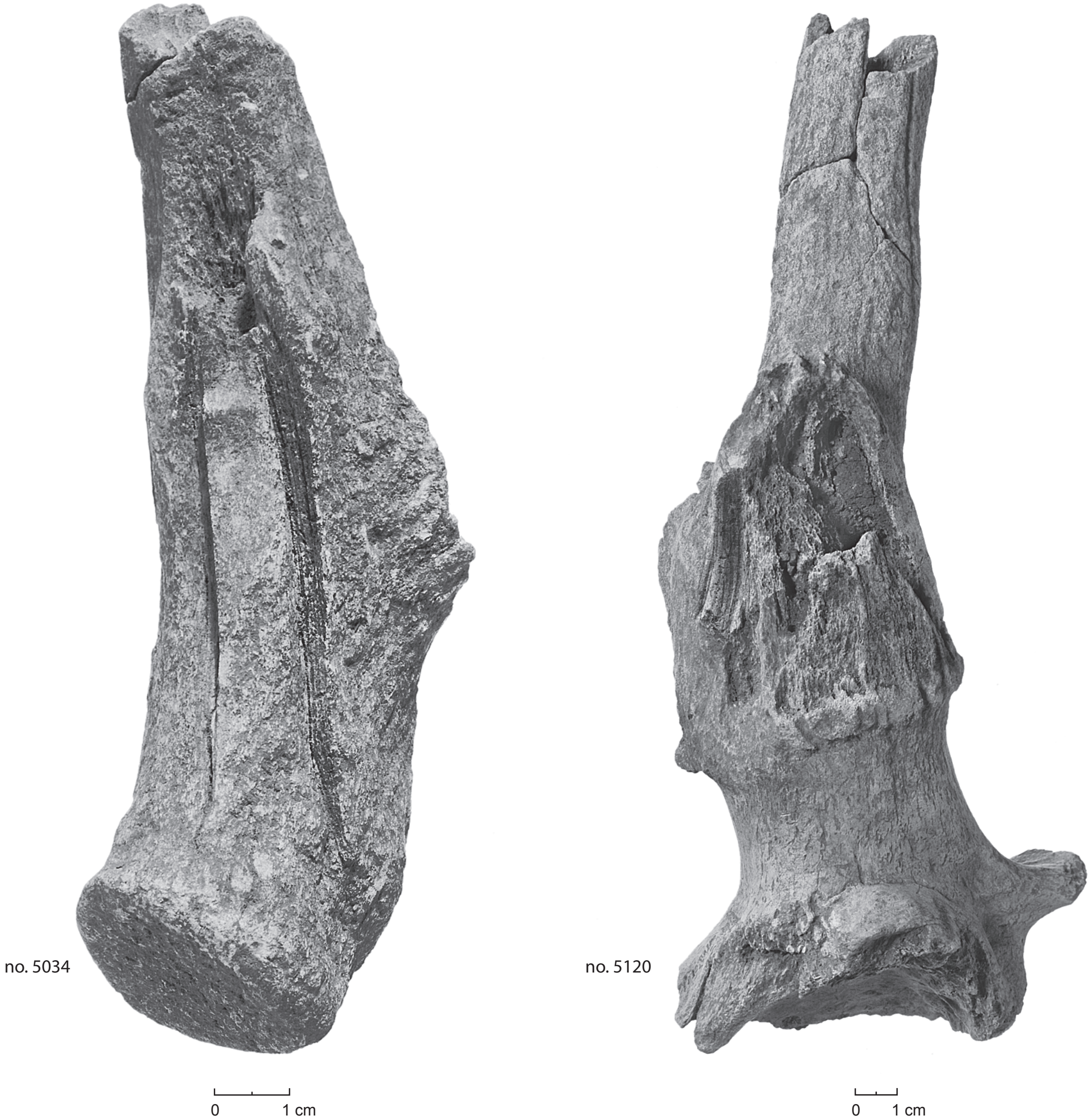


Figure 15 Fragment of shed antler with signs of groove and splinter technique (no. 5034) and antler attached to skull showing signs of working (no. 5120).

be correlated to the ones from the Magdalenian levels. The sample from our (very limited) sondage displays some differences with the Magdalenian fauna uncovered by Peyrony and Peyrony though. For instance, we did not recover remains of the saiga antelope (*Saiga tartarica*) and in the 1999 Sondage horse is one of the dominant larger mammals whereas in the Laugerie-Haute Est levels the reindeer/horse ratio is often greater than 5/1 (Boyle 1990; Madelaine 1989). Reindeer dominates the late Upper Palaeolithic larger mammal fauna and only disappears from the region at the very end. The fact that reindeer does not dominate the fauna from the sondage could be seen as an indication that we are dealing with a late- or post-Magdalenian association. However, given the very limited size of the sondage and of the resulting faunal assemblage compared to Peyrony's work, it is probable that the differences can be explained by differences in sample size.

Non-stone artefacts

A remarkable find category in the 1999 sondage consists of a few red deer antlers displaying traces of the groove and splinter techniques (fig. 15). During D. Peyrony's excavations at Laugerie-Haute Est, the Magdalenian III layer yielded a large number of worked deer antler, as in our small *sondage*, much more than reindeer, to the degree that: "On dirait que les troglodytiques avaient une prédilection pour cette matière, alors qu'elle est plutôt rare dans les autres niveaux" (Peyrony and Peyrony 1938, 58). The sieve residue of square 9B contained various incisors and canines of reindeer, "cut" off about halfway of the root in a comparable way. We were able to conjoin a set of 6 incisors and 2 canines of a reindeer calf (fig. 16). Comparable finds are known from other Magdalenian sites, for instance, Gönnersdorf and Andernach in the Neuwied Basin in Germany (Alvarez Fernández 1999; Bosinski 1992; Poplin 1972; 1983), Petersfels, Baden-Württemberg, Germany (Albrecht *et al*. 1994), Neuchâtel-Monruz in Switzerland (Affolter *et al*. 1994; Egloff 1995) and at a number of French Magdalenian sites, such as Pincevent, Sergerac and Mas d'Azil (Poplin 1983). The sieve residue furthermore yielded a pierced premolar of a fox (fig. 17) and a decorated piece of bone, resembling a fragment from Peyrony's Magdalenian III level interpreted as a "poignard" (compare fig. 18 with Peyrony and Peyrony 1938, fig. 45-4).

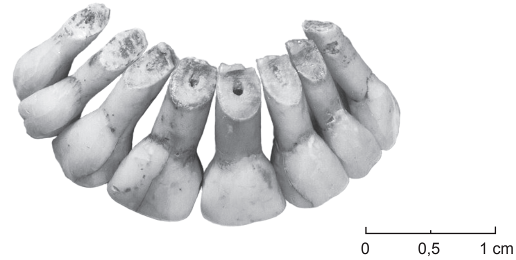


Figure 16 "Refitted" incisors (6) and canine teeth (2) from lower jaw of reindeer calf, retrieved from the wet sieving debris (see text for explanation).

Figure 17 Fragment of a pierced premolar of a fox.

Figure 18 Worked bone fragment, possibly a fragment of a bone "dagger" (see text for explanation).

4.5 Site formation

In view of the angle of slope of the deposits, we expected the archaeological material to have undergone some horizontal displacement towards the Vézère, and that hence the finds were not in a primary archaeological context (Butzer 1982; Schiffer 1983). The degree of reworking is difficult to quantify though. As a minimum statement, the fact that some faunal remains, e.g. vertebrae, were found in anatomical connection indicates that we are not dealing with a heavily reworked assemblage. The fact that the eight 'conjoining' reindeer teeth described above were found in the sieve residu of one quarter of a square metre also indicates that displacement may have been limited. As all size classes are represented both in the sediment matrix and in the finds, displacement, if any, may have been of a 'mass flow' character.

To study the character of the possible reworking of the assemblage, the location of all finds was registered with a Total Station, with the x, y and z coordinates entered along with a code for the type of find and, for finds more than twice as long as wide, slope angle and slope direction (see Kamermans *et al*. 2003, for details). These last two variables were used to shed light on the mode of genesis of the assemblage. Fluvial transport or mass movement would have oriented the finds according to a specific pattern (Texier *et al*. 1998) and these measurements could help us to establish possible patterns. The orientation of 54 finds from level D1_2 was measured, and figure 19 and table 7 show a preference in orientation of these finds. This preference has the same direction as the slope. Almost 50% of the artefacts are oriented towards the slope.

Experiments in periglacial settings (Texier *et al*. 1998) and observations elsewhere in France (Texier 1997) show that slope processes such as solifluction result in an orientation of the main axis of artefacts perpendicular to the direction of the slope – although subsequent studies have shown that these results might need to be qualified (Lenoble and Bertran 2004; Lenoble, Bertran and Lacrampe 2008; McPherron 2005). However, looking at the orientation of the artefacts from the sondage, our tentative conclusion is that the archaeological layers are not heavily disturbed and that the orientation is probably the result of a very moderate mass movement.

Of 45 artefacts from layer D1_2 the dip was measured and figure 20 and table 8 show that all artefacts dip between the horizontal and 40 degrees. 67% of all the artefacts are lying flat or parallel to the slope between 12 and 18 degrees. The orientation diagram (fig. 21 right) summarizes this information. Only the artefacts with both orientation and dip (N=45) were used (table 9). The mean orientation is 108.8 degrees. The spherical variance (s.var.) equals 0.688. Low values (towards 0) indicate a strong preferential direction; high values (towards 1) are an indication of no preference.

Given the fact that we found archaeological material from all size classes, very small stone pearls, reindeer teeth that once formed a necklace lying close together, as well as burin spalls and flint cores, the archaeological material in front of the rock shelter as encountered in the D1_2 level is most probably in primary context.

If we compare our findings with the results of Texier's work in Laugerie-Haute Ouest (Texier 2009, 132) we see a difference. Texier has clear indications for solifluction while we have not. His analysis of the orientation of 40 elongated objects, originating from the Solutrean layers (unpublished geological research in 1998), produced a mean orientation of 197.1 and a spherical variance of 0.449 (fig. 21 left). The

Orientation	Number of finds
N – NE	5
NE – E	5
E – SE	13
SE – S	12
S – SW	4
SW – W	8
W – NW	3
NW – N	4

Table 7 Orientation of 54 finds from the 1999 Sondage (general slope direction ESE). (Kamermans *et al*. 2003).

Dip	Number of finds
0-10 degrees	15
10-20 degrees	15
20-30 degrees	9
30-40 degrees	6

Table 8 dip of 45 finds (general slope between 12 and 18 degrees) (Kamermans *et al*. 2003).

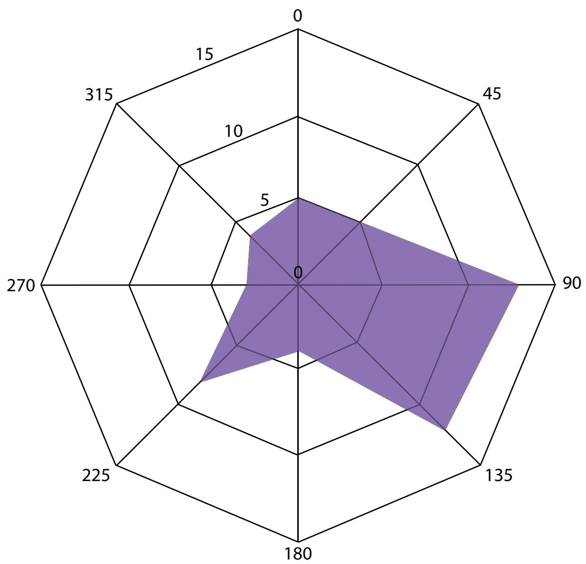


Figure 19 Rose diagram (in degrees) of the orientation of 54 finds. The number of finds is indicated along the Y axis. (Kamermans *et al.* 2003)

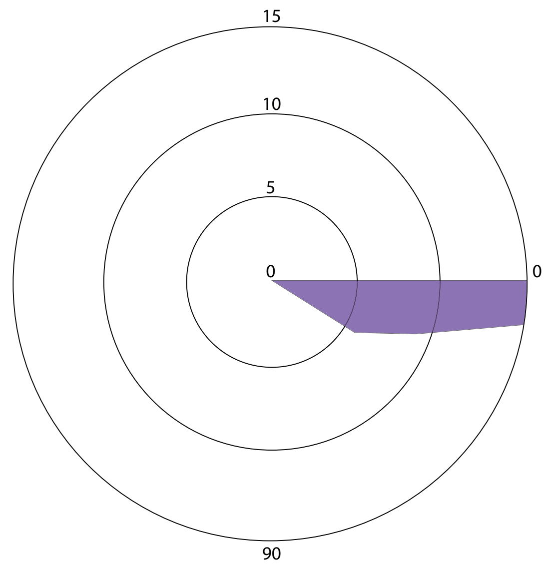
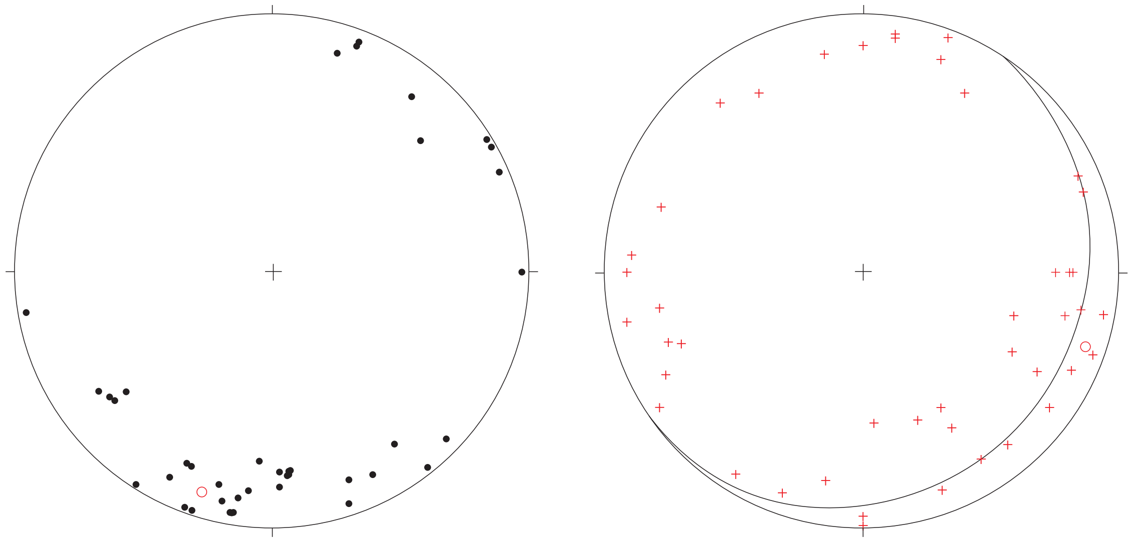


Figure 20 Graph indicating the dip (in degrees) of the finds (N=45). The number of finds is indicated along the Y axis. (Kamermans *et al.* 2003)



Data	Schmidt Equal Area Projection	Statistics
• Laugerie-Haute Quest (Solutréen moyen)	N = 40	○ Mean Lineation Vector 197.1 9.6 E1 = 0.748 E2 = 0.218 E3 = 0.034 r1 = 1.23 r2 = 1.86 K = 0.66 s.var. = 0.449 Rbar = 0.551

Data	Spherical Gaussian Function	Statistics
+ Laugerie-Haute Est: Sondage 1999	N = 45	○ Mean Lineation Vector 108.8 8.3 E1 = 0.511 E2 = 0.405 E3 = 0.083 r1 = 0.23 r2 = 1.59 K = 0.15 s.var. = 0.688 Rbar = 0.312

Figure 21 On the left the orientation diagram for Laugerie-Haute Ouest with objects dating from the Middle Solutrean (Texier 2009: 138). The spherical variance (s.var) indicates solifluction in a South Western direction (mean orientation is 197.1 degrees).
On the right the tentative orientation diagram for Sondage 1999 in front of Laugerie-Haute Est. North is pointing upward. Mean lineation vector is the mean orientation of the artefacts. A low s. var. indicates a strong preferred direction.

Find no.	X coordinates	Y coordinates	Z	Direction in degrees	dip in degrees
995039	494734.115	3295555.878	61.715	180	0
995057	494734.161	3295555.726	61.714	330	20
995058	494734.664	3295555.531	61.628	160	10
995059	494734.729	3295555.532	61.616	150	30
995071	494733.512	3295554.407	61.567	90	25
995072	494733.664	3295554.084	61.510	115	10
995074	494733.869	3295554.605	61.559	30	20
995083	494734.346	3295554.289	61.490	90	20
995084	494734.437	3295554.142	61.453	350	14
995085	494734.281	3295554.173	61.490	0	12
995088	494733.972	3295553.991	61.494	70	8

Find no.	X coordinates	Y coordinates	Z	Direction in degrees	dip in degrees
995092	494734.087	3295553.949	61.504	250	20
995094	494734.082	3295553.437	61.426	66	8
995097	494734.835	3295555.266	61.567	106	38
995099	494734.499	3295554.921	61.561	180	4
995102	494734.553	3295554.862	61.544	274	10
995103	494734.576	3295554.873	61.554	118	34
995111	494734.564	3295554.535	61.508	288	18
995114	494735.012	3295554.337	61.439	320	14
995115	494734.793	3295554.365	61.471	102	20
995116	494735.24	3295554.171	61.360	110	4
995123	494735.311	3295551.891	61.168	236	4
995124	494735.388	3295551.854	61.190	242	14
995125	494735.344	3295551.874	61.161	120	22
995127	494735.513	3295552.418	61.218	20	12
995128	494735.348	3295552.597	61.231	176	40
995140	494735.786	3295552.159	61.189	212	6
995141	494735.81	3295552.156	61.181	200	8
995144	494736.22	3295552.896	61.218	270	8
995150	494736.414	3295552.492	61.175	20	2
995152	494736.308	3295552.406	61.176	140	12
995153	494736.279	3295552.337	61.194	148	14
995154	494736.122	3295552.234	61.218	248	24
995155	494736.699	3295552.566	61.117	260	20
995160	494733.476	3295555.652	61.74	8	8
995161	494733.435	3295555.251	61.686	100	14
995162	494733.395	3295555.087	61.681	190	18
995163	494733.475	3295555.007	61.667	270	8
995164	494733.548	3295555.088	61.675	160	38
995165	494733.674	3295554.859	61.600	90	18
995166	494733.98	3295554.837	61.580	258	6
995167	494734.104	3295554.737	61.561	100	4
995168	494735.022	3295555.073	61.501	150	38
995169	494734.416	3295554.468	61.499	126	10
995170	494733.816	3295554.033	61.476	8	6

Table 9 Findnumber, x and y coordinates (French coordinate system), z values (above mean sea level), orientation (degrees) and dip (degrees) of artefacts from the trial trenches in front of Laugerie-Haute Est. N = 45 (Kamermans *et al*. 2003).

solifluction has deformed the find layer and created a number of pseudo archaeological layers (Texier 2009, 137). In our small *sondage* in Laugerie-Haute Est we do not find this phenomenon. This clearly shows the different processes at work in different parts of this vast rock shelter.

4.6 Interpretation

In terms of our main research question, i.e. the relationship between the *abri* deposits and the Vézère sediments at the foot of Laugerie-Haute Est, our preliminary conclusion is straightforward: the Vézère deposits encountered in our sondage and in our hand-augered boreholes are (in all probability significantly) later than the Pleistocene infill of the *abri*. The Vézère loamy silts wedging against the slope of the abri in our *sondage* are part of the current floodplain and hence of (late) Holocene age. This assessment is confirmed by a 1999 observation in an exposure made by the SOGEDO water company in the very same field of our *sondage*, at about 60 m south of our *sondage*. At a depth of about 2 m below the present surface remains of iron ore processing were encountered here, underlining the late Holocene age of the upper part of the Vézère deposits at this location.

The presence of small flint artefacts and faunal remains in our 1998 and 1999 boreholes, up to 3.5 m below the present surface of the floodplain at Laugerie-Haute Est, is therefore very probably caused by erosional activities of the Holocene Vézère, occasionally reaching up to the cone of abri deposits and displacing artefacts and faunal remains, eventually incorporating them in its loamy silts and sands. The steep erosional talus of more than 2 m high encountered in our second trench suggests that a phase of erosion of the abri deposits by the Vézère, possibly by a high water level, *occurred at its earliest* after the formation of the Magdalenian III layer, but probably significantly later, during the last two to three thousand years of the Holocene.

Does this mean that we have to infer that no primary context Palaeolithic site is to be expected in the uppermost two to three metres of the fluvial deposits at the foot of Laugerie-Haute Est? All that we can state positively is that this indeed seems to be the case for the areas surveyed by our hand augering. It is, of course, possible, that small remnants of older fluvial deposits are still preserved, even close to the surface (Chadelle 1994), but we did not find evidence for this. Chadelle (1994) furnished some indications, which point in such a direction though. Presenting the preliminary results of the study of a series of small trenches made close to the *Route Départementale* in 1994, about 200 m east of our *sondage*, he discusses the possible presence of primary context Solutrean finds in the field of our sondage, in brownish-reddish loamy deposits at a depth of 61.07 to 60.50 m, i.e. at about the same level as the fluvial deposits in our trench (Chadelle 1994, Sondage 94-3 and 94-4). Chadelle explicitly mentions that it is impossible to decide whether the Solutrean material is in primary context or displaced by the Vézère's activities: "S'il y a eu déplacements, ce qui est probable vu la situation de ces niveaux, ils ont dû être relativement limités" (Chadelle 1994, 17). Our interpretation of the 1999 *sondage* evidence, with the Vézère gradually eroding artefacts from the *abri* cone, would agree with this last interpretation, of the artefacts in the Vézère sediments there having been reworked from the abri deposits into a (Holocene) fluvial matrix, resulting in some displacement over a very short distance only.

A positive outcome of the 1999 fieldwork at Laugerie-Haute Est is that it has shown the vastness of the archaeological debris cone from this classical site. Whereas earlier workers have repeatedly stressed the large lateral and vertical extension of the deposits along the *falaise* at Laugerie, our work unambiguously demonstrated that the cone of abri deposits has an extension into the floodplain in front of the abri, which gives the deposits there a rough north-south extension of about 70 m, the later erosion of the deposits – and hence an earlier much wider extension – even not taken into consideration. With such large areas it might become interesting to compare in future studies archaeological remains collected from the back of the abri with those excavated close to the distal part of the debris cone closer to the river, especially as far as faunal remains are concerned.

5 Raw material sources in the Vézère valley

5.1 Introduction

Despite of some stable features, such as the location of the impressive rock faces, the fords and, to some degree, the rock shelters, Palaeolithic landscapes were different from the present-day ones. As described above, the tributary valleys were incised much deeper and some of them may have looked like canyons, with the gravelly infill of their valley floor channels constituting virtually inexhaustible flint resources. Nowadays, flint materials are present in a wide range of settings, from still in primary context in their limestone parent material up to having been transported into coarse grained river deposits (fig. 22).

The flints in primary context as well as the alterite sources have been the subject of several studies (Chadelle 1983; Demars 1980; Geneste 1985; Horan 1977; Larrick 1983; Platel 1989; Rigaud 1982b; Seronie-Vivien 1972; Seronie-Vivien and Seronie-Vivien 1987; Turq, Antignac and Roussel 1999) and are hence well documented as far as their stratigraphical and geographical position is concerned. However, little is known about their morphology and their flaking characteristics (Turq 2003; 2005). Moreover, even though the Vézère valley has been famous for its richness in flint for a long time (Lartet and Christy 1865-1875), the

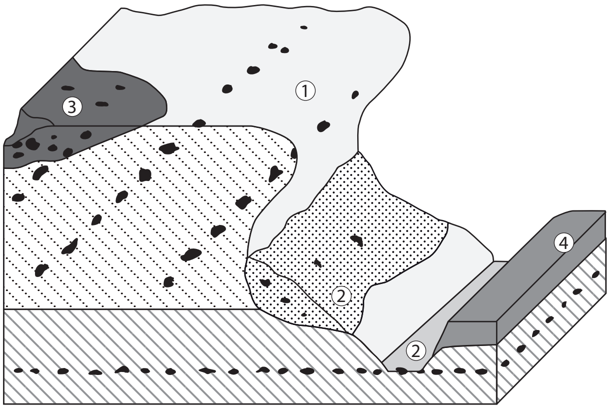


Figure 22 Schematic representation of the various type of flint sources: 1. in primary context in the parent material; 2 secondary autochthonous position (in slope deposits); 3 sub-allochthonous or residual (alterites or "siderolithique" colluvial deposits); 4 allochthonous (having been transported by fluvial processes).

river deposits themselves have never been studied from this perspective. That was a reason to focus on the Vézère deposits in this project, especially on the gravels from the current riverbed.

5.2 *Methods*

We focused on 26 observation points in the current bed of the river, between Aubas and Limeuil (fig. 23 and table 10). There, systematic counts of pebbles larger than 4 cm were carried out within a one meter square, which yielded a good overview of the lithological composition of the coarse-grained river deposits. All flints were tested for their flaking properties (see below). A second sampling activity consisted of the systematic collecting of all flint nodules at the location (duration: 15 minutes, every gravel beach revisited to refine the first observations). Of this flint nodule sample, dimensions, morphology, type of flint as well as flaking properties were consistently documented.

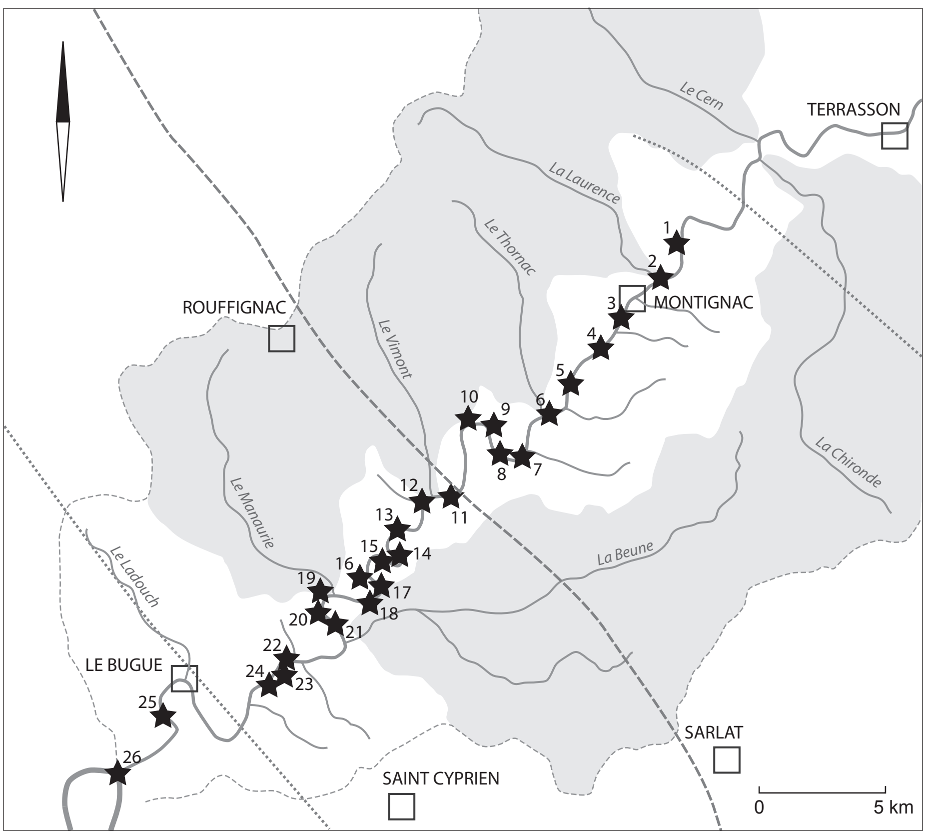


Figure 23 Position of the sampling locations in theVézère valley. In dark grey the drainage basins of the main tributaries. The two dotted lines indicate the two main fault lines bordering the syncline that is traversed by the Vézère. The dashed line indicates the axis of this syncline.

N°	Type of exposure	Village	Coordonnées Lambert III X	Coordonnées Lambert III Y
1	beach	Aubas	509,675	3310,725
2	beach		509,375	3308,900
3	beach	Montignac	508,075	3308,150
3b	beach	Montignac	507,1	3307,075
4	beach	Montignac	506,425	3305,900
5	beach	Montignac	505,225	3304,925
6	beach	Thonac	503,900	3303
7	beach	Saint Leon	502,850	3301,050
8	island	Saint Leon	502,150	3301,150
9	island	Saint Leon	501,600	3302,050
10	island	Saint Leon	500,775	3302,550
11	island	Le Moustier	499,550	3299,800
11b	dead arm	Le Moustier	499,350	3299,775
12	island	Le Moustier	498,800	3299,200
13	island	Tursac	497,950	3298,250
14	island	Tursac	497,525	3297,200
15	beach	Tursac	497,550	3297,150
16	island	Tursac	496,475	3296,675
17	island	Les Eyzies	496,700	3296,100
18	island	Les Eyzies	496,150	3295,200
19	beach	Les Eyzies	494,650	3295,400
20	beach	Les Eyzies	494,525	3294,700
21	island	Les Eyzies	494,775	3294,325
22	island	Saint Cirq	492,600	3292,300
23	island	Campagne	491,425	3291,225
24	island	Campagne	491,425	3291,225
25	island	Limeuil ?	488,325	3291,875
26	beach	Limeuil	485,675	3287,950

Table 10 Position of the sampling locations in the Vézère valley.

5.3 *General results*

All the one metre square samples were dominated by metamorphic rocks from the Massif Central, mainly quartz. Limestone and flint take second and third position (table 11) and seem to be more frequent in the downstream part (for comparison with the Dordogne valley see Turq 2005). The second sampling activity yielded a large sample of 1100 flint nodules, which allowed us to obtain a good overview of the general composition by raw material type (table 12).

Main types of flint encountered

The grey or black and the beige Senonian flints dominate. They are present in almost equal proportions, with the grey-black group slightly dominating the beige one (51.5% against 48.5%). The grey or black flints dominate in 11 cases, the beige ones in 10 and in 3 cases they were present in comparable numbers. Next are the flints of chalcedony type which can be of Cretaceous origin (Turq 2003) or derive from the Massif Central (around 1%), followed by some Jurassic flints (less than 0.5%) and finally some jaspers and argilites.

One of the striking observations is that the samples do not reflect the total potential of the substrate of the slopes and basin. There is a marked under-representation of flint from the alterites on the right bank of the river (around Thenon, Rouffignac, Mauzens, Miremont), in particular of banded flints or flints with red bands directly under the cortex and Sainte-Foye type flint, characteristic for the basis of the

Site	Number of samples	Quartz	Other metamorphic rocks	Limestone	Flint
1	127	46 (36.2%)	43	37 (29%)	1 (0.8%)
2	106	34 (32.1%)	51 (basalt 2)	21 (19.8%)	–
3	139	37 (26.6%)	92 (basalt2)	10 (7.2%)	–
4	101	42 (41.5%)	44 (basalt 2)	13 (12.9%)	2 (2%)
4	117	34	73 (basalt 2)	10 (8.6%)	–
5	120	45	68	–	7 (5.9%)
6	102	31	65	3 (2.9%)	3 (2.9%)
7	116	29	84	2 (1.7%)	1 (0.9%)
8	129	46	78	4 (3.1%)	1 (0,8%)
9	111	42	50	11 (9.9%)	8 (7.2%)
10	135	58	75		2 (1.5%)
11	108	65	38	5 (4.6%)	–
12	144	58	75	7 (4.9%)	4 (2.8%)
13	99	60	27	4 (4%)	8 (8.1%)
14	225	126	88 (basalt 5)	3 (1.3%)	8 (3.6%)
15	92	30	62 (basalt 2)	–	–
16	124	50	69 (basalt 1)	2 (1.6%)	3 (2.4%)
17	251	95	144 (basalt 24)	1 (0.4%)	11 (4.4 %)
18	435	240	161 (basalt 1)	4 (0.9%)	30 (6.9%)
19	180	119	34 (basalt 2)	5 (2.8%)	22 (12.2%)
20	111	71	31 (basalt 2)	1 (0.9%)	8 (7.2%)
21	159	83	62	5 (3.1%)	9 (5.66%)
21	161	72	74	–	15 (9.3%)
22	111	62	35	5 (4.5%)	9 (8.1%)
23	97	55	21	6 (6.2%)	15 (15.5%)
24	125	65	46 (basalt 1)	6 (4.8%)	8 (6.4%)
25	105	46	38	6 (5.7%)	15 (14.3%)
26	110	47 (42,7%)	39	2 (1.8%)	22 (20%)

Table 11 Composition of the samples

Campanian (Turq 1992). How to explain this? Observations made in the working area on present day exposures (Turq, Detrain and Vigier 2000), on the river catchment area, on changes in the landscape and the development of the drainage system in the final Pleistocene and the Holocene (Donner 1969; Leroyer *et al*. 1997; 1998; Turq, Detrain and Vigier 2000) lead to an explanation in terms of diachronic changes in exposure of various types of raw materials. Areas, which contain in a primary context or in alterites the flints that are underrepresented or even completely absent in the extent alluvial gravels, are simply not exposed anymore. Hence, these materials can only be brought in by erosion and slope processes, phenomena which have considerably lost importance or even completely disappeared as a result of vegetation cover and changes in the drainage system. Since the final part of the Pleistocene or from the Holocene onward, the transport potential of the tributaries has diminished – nowadays they only transport sands and silts – and their river valleys have been filled up.

Flaking properties

The exterior of a flint nodule is not a good guide to its flaking quality (Tixier, Inizan and Roche 1980) and the significant variability within one and the same type of material makes the experimental approach indispensable. However, quality estimates of flaking properties are always subjective. Every knapper has his own experiences and his particular habits, which does not facilitate objective

N° site	Number of samples	*blond du Sénonien*	*noir du Sénonien*	jaspe	*silex calcédonieux*	*silex jurassique*	argilite
1	1					1	
2	3					3	
3	7	3	3		1		
4	8	5	2				1
5	19	14	3		1		1
6	3	3					
7	1		1				
8	32	16	16				
9	8	4	4				
10	51	21-41,2%	30-58,8%				
11	10	1	9		1		
12	99	51-51,6%	46-46,5%	1-1%		1-1%	
13	8	5	3				
14-15	92	32-34,8%	59-64,1%		2-2,2%		
16	63	25-39,7	35-55,6%		1-1,6%	2-3,2%	
17	79	35-44,3%	42-53,2%		1-1,3%		1-1,3%
18	103	52-50,5%	50-48,5%		1-1%		
19	170	83 – 48.8%	85 – 50%		2		
20	8	6	2				
21	182	86-47,3%	96-52,7%				
22	37	17	19		1		
23-24	79	43-54,4%	35-44,3%		1-1,3%		
25	15	7	8				
26	22	13	9				
	1100	521-47,4%	557-50,6%	1-0,09%	11-1%	7-0,6%	3-0,03%

Table 12 Main flint types encountered at the different sites (see text for explanation)

characterization. Developing a reliable regional reference set would call for a group project, and hence the observations presented here can only be seen as preliminary ones. In the context of this study, tests were carried out with hard hammer percussion. Three groups could be discerned:

- A group of low quality, very heterogeneous flints (vacuolar or saccharoidal), with many fractures. Not suited for proper flaking, although a few flakes might occasionally be produced
- Good quality blocks are more homogeneous. They allow the production of series of flakes and of handaxes. Their quality does not allow a consistent production of Levallois flakes, of blades or the *façonnage* of Solutrean *feuilles de laurier*
- Very good materials allow the application of all direct flaking methods and the production of flakes and bifacial tools, and probably also pressure flaking.

The results regarding the argilites, limonites, jaspers, Jurassic or chalcedony types of flint are not relevant in view of the very small size of the sample. As far as the Senonian flints are concerned, the grey and black group displays better flaking properties than the beige one (table 13), independent of morphology and dimensions of the nodules. As the majority of these flints are from Coniacian and Santonian strata, these data reflect observations made over the whole of the drainage basin.

During this study, other observations were made. Important differences have been noted between gravel beaches where the majority of the nodules had a diameter smaller than 10 cm, and the other ones. For the first group, the flint percentages are much smaller. Near Saint-Cirq-du-Bugue, at a location where samples were taken from two banks of different granulometry, the small-pebble beach yielded a flint percentage of 6.4%, the other one 15.5%.

	low		high		excellent		total	
noir du S	127	(23,3%)	240	(43,3%)	177	(32,5%)	544	(50,8%)
blond du D	315	(63,5%)	144	(28,5%)	45	(8,9%)	504	(47,1%)
argilite, limonite	3						3	(0,3%)
jaspe					1		1	(0,09%)
Jurassique	7						7	(0,7%)
calcédonieux	6		2		3		11	(1%)
Total	458	(42,8%)	386	(36,1%)	226	(21,1%)	1070	

Table 13 Quality estimated per flint type.

Some remarks on the Senonian flints

Given the major role of this raw material in the Palaeolithic record of the Vézère valley the issue of the dimensions and morphology of this flint type was studied in somewhat more detail. As far as morphology is concerned, apart from the ubiquitous artifacts, the flints were classified as *plaquettes*, contorted, oblong, globular or "potato-like" and branch-like. As illustrated in figure 24, there are no major differences between the two types of flint. Their dimensions range mainly between 9 and 16 cm (fig. 25), with some blocks larger than 40 cm (the size of the blocks in these river deposits is determined by the dimensions of the nodules in the natural environment and by the force of the river transporting these nodules. Nowadays, the rivers transport potential is much smaller than during the Pleistocene).

5.4 *Overview of the lithic raw materials*

The data presented here concern raw material sources in the alluvial deposits of the Vézère that are currently accessible. They yield an indication only, as shown by the inter-annual variation observed in this study. This preliminary synthesis shows the kinds of factors one needs to take into consideration when discussing raw material availability. Our limited study shows again that data collected on raw material availability in the present cannot be directly applied to the Pleistocene past (Turq 1999; 2003; 2005). A detailed study of (well-dated) terrace bodies, coupled with a geomorphological study of the valley floor and the valley slopes could yield a much more precise image of the raw material sources available at a specific moment in time.

6 On the history of the Vézère river

6.1 *Introduction*

If we try to integrate the data from our geological mapping activities (section 3) and from the 1999 *sondage* at Laugerie-Haute Est (section 4) into the larger history of the Vézère valley, we are confronted with the fact that the various studies that deal with this issue yield an altogether confusing picture. To some degree this is the result of very practical limits of most of such studies, where sediments are only very rarely recorded in height above sea level; usually in rather vague phrases such as "the abri is at 12 m above the normal level of the Vézère", or "7 m above the *thalweg*", or "the cave dominates the valley bottom with a height of six metres". The early 20th century maps of the Vézère valley and the site plans published by the infamous Otto Hauser (1911; 1916) still rank among the rare exceptions in this respect.

Inconsistencies in terms of the relative height of crucial fluvial deposits between various authors add to the confusion, as do inconsistencies between publications by one and the same author. To some degree this is certainly the result of the long and complex research history of the area with its high number of prestigious sites, whose excavations have become extremely time consuming enterprises: hence, the development of approaches focussing on the analysis of one specific site rather than on a regional integration of the data from individual sites. There have been various attempts in such a synthesizing direction though, e.g. the recent important volume by Texier (2009) and some studies specifically dealing with the fluvial deposits, e.g. by Peyrony (1947b), Bouvier and Mémoire (1992), Texier and Bertran (1993) and Konik (1999).

The aim of this chapter is *not* to develop an integrative framework for the Vézère valley – that is beyond our competences and beyond the limited investment in fieldwork there -, but rather to chart where the actual discrepancies and problems in this respect lie, as these can tell us very specifically where we can learn most about these issues. In order to do this, we will focus on the small number of sites where we have reasonably good data on both altimetry and the fluvial character of find bearing sediments. We will give a very short description of the fluvial part of the site sequence for each site, mainly based on study of the literature and occasionally our own altimetric data. We will start with a group of sites around Les Eyzies, and then move stream upward, up to Le Moustier.

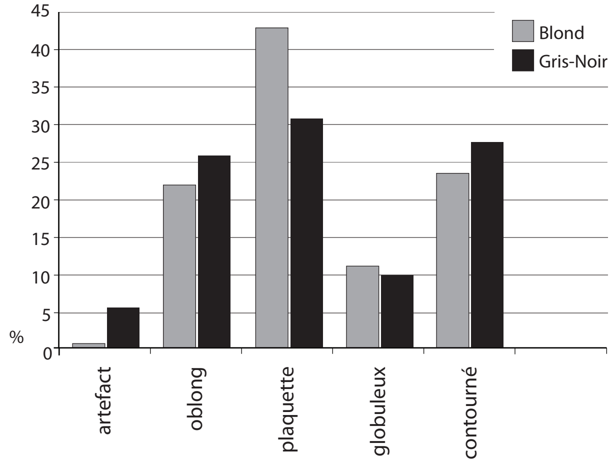


Figure 24 Alluvial deposits of the Vézère river valley floor: morphology of grey or dark and of beige Senonian flints (731 blocks).

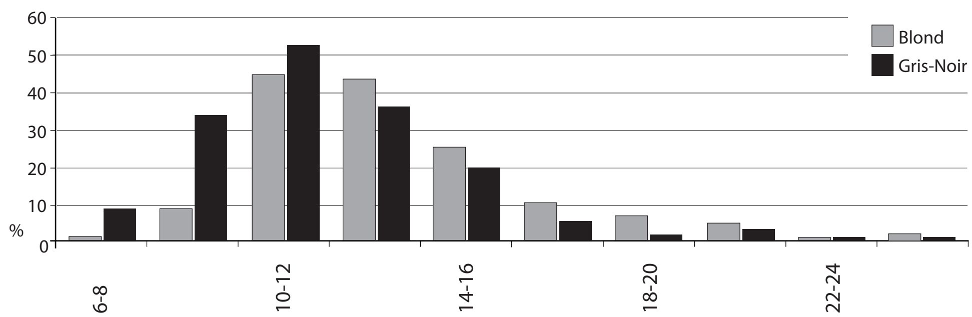


Figure 25 Alluvial deposits of the the Vézère river valley floor: dimensions (in cm) of respectively grey or dark and of beige Senonian flints (731 blocks).

6.2 The Key Sites

Abri du Musée

During excavations in the context of the extension of the Museum at Les Eyzies an important Middle Palaeolithic site was found, covered with fluvial deposits of the Vézère and its tributary, the Beune (Detrain *et al*. 1991; 1996). The *abri* is at an altitude of 73 N.G.F. and the unambiguous fluvial sequence dominates the actual confluence of Vézère and Beune with 12 to 14 m. The height relative to the present *thalweg* of the Vézère river is about 12 m (Konik 1999, 364). Study of the cold adapted fauna from the sediments and correlation to the inferred fluvial layers I and K of Le Moustier, at a relative height of 9 m (see below), led Detrain *et al*. (1996) to date the Middle Palaeolithic 'Micoquian' related industry to the end of MIS4 or the beginning of MIS3, without excluding a higher, possibly MIS6, age. The sediments from the neighbouring Abri Vignaud, at 200 m from the Abri du Musée, play an important role in opting for a "short" or a "long" chronology for the Abri du Musée, as we will see below.

Abri Pataud

This site is at about 300 m northwest of the Abri du Musée, in the same limestone cliff. In the context of geological work at and around Abri Pataud, Judson (1975) discussed the relationship between the archaeological stratigraphy of the Abri Pataud and the history of the Vézère. The archaeological sequence at Pataud starts with an early Aurignacian layer, dated at 33.3-34.4 C14 Kyr bp (Bricker *et al*. 1995). This Level 12 is situated at about 67.75 m asl. Fluvial deposits exposed in a 1953 *sondage* underlay these early Aurignacian layers. The top of these fluviatile sands is situated at 61.40 m. Extrapolating from the current floodplain sequence, Judson has suggested that the ancient floodplain prior to the early Aurignacian deposit was at minimally three metres higher than the sand and a minimum of four metres above the present floodplain, i.e. at about 64.40 m (Judson 1975). The 100 yr flood level then would be at about 66.0 m. More important than these interesting speculations is the detailed attention Farrand (1975; 1995) devotes to the provenance of the sandy matrix of some of the layers in the Abri Pataud: certain strata are conspicuously sandy, the sand being composed predominantly of quartz and mica, with also mineralogical analyses clearly pointing to the Vézère floodplain as the source of these deposits. In spite of this, Farrand emphatically rejects a fluvial explanation for the presence of these sands in the *abri*, in his 1975 publication as well as in the updated (Farrand 1995) version of his original study: "...there is certainly no evidence in the Abri Pataud that the Vézère was ever significantly higher during the past 35,000 years than it is today. None of the Abri Pataud deposits that lie at an altitude higher than that of the present floodplain show any characteristics of fluvial deposition, nor is there any evidence of an erosional interval that could be attributed to scouring by the waters of the Vézère" (1975, 28).

Abri Vignaud

Rescue excavations carried out by J.-M. Geneste between 1981 and 1983 showed an alternation of calcareous abri-type sediments with sandy deposits over a thickness of about 7 m (Ajoulat *et al.* 1991; Rigaud 1982a). Layer 13 yielded an Aurignacian lithic industry, associated with remains of horse and reindeer. These finds were contained within sands rich in mica, deposited about 30,000 years ago between the rockfall of the abri, and currently situated at 10 to 15 m above the *étiage* of the Vézère (Rigaud 1982a) (8 m according to Konik 1999, 367). Peyrony, who studied exposures at and near the Abri Vignaud, mentions the presence of a Mousterian industry below fluvial sands, at a height of approximately 10 m above the actual course of the Vézère (Peyrony 1930, 156). He assigned the fluvial sequence to the 5 metre terrace, "dont on remarque les restes sur divers points de la vallée, notamment aux cimetières des Eyzies et Tursac" (Peyrony 1947a, 182). They have been interpreted (Movius Jr. 1995) as part of the 6 to 7 m terrace, of which Movius encountered sands in his 1953 *sondage* at Abri Pataud, 40m west of the Abri Vignaud, with their top at 61.40 m asl (1995, 262) (see also above).

The Abri Vignaud provides us with an interesting problem. As mentioned above, the Abri du Musée deposits are at 12 m above the *étiage* of the Vézère, the Vignaud couche 13 at 10 m. If the Abri du Musée fluvial deposits are at 71 to 73 m (as suggested by Detrain *et al.* (1996), the Aurignacian layer at Vignaud should be situated at around 69 m asl. Following Rigaud (1982b), the fluvial deposits are at 10 to 15 m above the present low water level (55 m, cf. Judson 1975), which would situate them at 65 to 70 m asl i.e. exactly in the height range of the Aurignacian levels of the Abri Pataud, where according to Farrand the Vézère sands were brought in by aeolian activities. The interpretation of the Vignaud sediments containing the Aurignacian as Vézère deposits is thus at odds with Farrand's assessment for the neighbouring Abri Pataud, where he sees no evidence for the Vézère having reached higher levels than the current ones during the last 35,000 years. It is difficult, if not impossible, to reconcile the interpretation of Abri Pataud by Farrand (1975; 1995) with those published for Vignaud (Rigaud 1982b; Ajoulat *et al.* 1991; Detrain *et al.* 1996; Konik 1999), provided our altimetric 'reconstructions' are right. There are at least three possible solutions to these discrepancies:

1) The heights ascribed to the various deposits are incorrect
2) Farrand's (1975; 1995) interpretation of the sands in the Pataud sequence as an aeolian deposit is incorrect
3) The interpretation of the Vignaud sands as fluvial deposits is questionable.

We will return to this issue later.

Laugerie-Haute Est

The limestone bedrock of the important sequence at Laugerie-Haute Est is at approximately 62.75 m, which situates the oldest archaeological level there, Peyrony's *Périgordien III*, at around 63 m. Later studies assigned this earliest level to the final phases of the Perigordian, comparable to the Perigordian VI of the Abri Pataud, dated around 23 to 24 C14 Kyr bp (Bricker *et al.* 1995). With the infill of the vast Laugerie-Haute Est *abri* starting at its latest around 24 C14 Kyr bp, no fluvial influx has been encountered in the 10 m high sequence (62-72 m asl), which ends with a late Magdalenian occupation. The Laugerie-Haute evidence seems to corroborate Farrand's aeolian interpretation of the sands at Pataud; it is indeed difficult to imagine that if the Vézère had deposited the Eboulis 3/4 Red sandy matrix at a height of 72 m asl 25,000 to 26,000 years ago at Pataud, the river would not have left any traces of its activities at Laugerie-Haute Est, where the abri deposits started *10 m lower* only 1000 to 2000 years later. Likewise, Texier's (2009) recent study of the Laugerie-Haute Ouest sequence did not record any signal of fluvial activity there.

La Micoque

The site of La Micoque is situated on the left bank of the Manaurie, the small tributary of the Vézère, close to its confluence. The 10 m high La Micoque sedimentary sequence is situated at 75 to 85m above sea level. New studies of the stratigraphy of this famous site yielded important data on the history of the Vézère valley (Texier and Bertran 1993; Texier 2009). Texier and Bertran conclude that both the *ensemble inférieur* (2.4 m thick) and the 7m thick *ensemble moyen*, situated approximately between 75 and 82 m, are unambiguously of fluvial origin. Their coarse-grained character and sedimentary structures indicate that they were deposited under high-energy transport by a braided river system. The two ensembles represent two terraces, separated from each other by a major linear incision phase of an estimated 4 to 5 m. Texier and Bertran propose a correlation of the older terrace with Texier's Fw1 Vézère terrace (MIS12), and the of the *ensemble moyen* with Fw2 (MIS10). The series of 40 ESR and U/Th dates for the *ensemble moyen* (Falguères, Bahain and Saleki 1997, Schwarcz and Grün 1988) are in agreement with such an interpretation, which situates the incision phase in MIS 11 (Texier 2009).

La Madeleine and environs

The excavations by J.-M. Bouvier at La Madeleine have demonstrated the importance of the Vézère deposits in the infill of this large *abri*. The base of the calcareous basement is situated at 40 cm above the low water level (Bouvier 1973, 2628). On top of this limestone, cryoclastic deposits and fluvial sands with gravel are present. The earliest archaeological level is a Magdalenian IV, in the basal part of the fluvial sequence, which is up to 3 m thick and starts at 1.2 m above the low water level. The Magdalenian IV is deposited at about 2.45 m above the Vézère's present low water level (Bouvier 1973, 2627).

These Magdalenian dates correlate well with the luminescence dates of the terraces found upstream, in transect Lespinasse. The oldest (highest) sandy fluvial deposits found in transect Lespinasse are located at a similar height and an OSL date suggests a Late Glacial age (though the dates may be disputable).

Situated at about 100 m downstream from the centre of the La Madeleine *abri*, in the same *falaise*, is the Abri de Villepin, where Peyrony (1936) excavated two Magdalenian VI layers, situated in deposits of the Vézère. It is very well possible that these constitute only the final part of a much more important fluvial sequence, as demonstrated at La Madeleine by Bouvier (1977, 77).

As the crow flies at 700 m downstream from La Madeleine is the Abri Bout-du-Monde. The limestone bedrock of the *abri*, situated approximately 40 cm above the low water level of the Vézère (Peyrony 1947a, 182) is covered by about 1.55 m of sandy Vézère deposits which yielded a reindeer antler. These are covered by 0.5 m of calcareous *eboulis* from the disintegration of the rock shelter's roof mixed with fluvial sands, on top of which a Magdalenian assemblage was uncovered, from "sables fluviatiles abandonnés par la Vézère" (Peyrony 1947b, 184-186). The assemblage contained various Magdalenian facies, with late Magdalenian elements being the most important ones.

Le Moustier

Our altimetric studies at the lower *abri* of Le Moustier showed that the limestone bedrock at the base of the sequence is at 65.60 m, with the top of the fluvial deposits at Le Moustier (Layer F) being situated at 68.29 m. Layer F is overlain by a series of cryoclastic deposits, G to K (Valladas *et al.* 1986), in which Peyrony (1930) has mentioned the presence of a 20 cm thick layer of sands (*sable fluviatile, couche I*). This is situated about 2 m above the top of the lower fluvial sequence, i.e. at a height of approximately 70 m (see also Hauser 1911, Plan 5). Peyrony's fluvial origin interpretation has been corroborated by Laville (Laville 1975; Laville and Rigaud 1973), though on the basis of mineralogical studies only. Alternatively, one could interpret the *Couche* I sands with their typical Vézère mineral association along the lines suggested by Farrand (1975; 1995) for the Abri Pataud sequence. There the sandy matrix of some stratigraphical units clearly derived from the Vézère floodplain, likewise on the basis of heavy mineral analysis. Farrand attributed their presence to aeolian activity, as there was no evidence of the action of running water in the abri (1975). Thermoluminescence (TL) dating of burnt flints from the cryoclastic sequences (*couches* G to K) shows that the fluvial units A to F are older than 55.8 ± 5 ka, while *couche* I has a TL age of 40.9 ± 5 Kyr bp (Valladas *et al.* 1986).

6.3 Discussion

Combining the evidence from the sites discussed above, and focussing on the unambiguous fluvial deposits only, one can construct a straightforward picture of the archaeology-related development of the Vézère valley. The oldest fluvial deposits containing Palaeolithic artefacts are those from La Micoque, where two subsequent terraces (Fw1 and Fw2) have been documented, at about 20 m above the current floodplain. The "classic" archeological levels from the *ensemble moyen* (MIS 10) have been described as Tayacien by Breuil (1932) and as pre-Mousterian by Bordes (1984). While the *ensemble inférieur* has been said to contain no archaeology, one of us (A.T.) recently retrieved a small number of flakes from this fluviatile unit, which has been correlated to MIS 12 (Texier 2009, 25).

The next youngest body of fluvial sediments is about 8 m lower in the landscape, contains a Middle Palaeolithic industry and has been documented during the excavations at the Abri du Musée, at about 12 m above the Vézère's low water level. These deposits probably correlate with deposition of terrace Fx. The Abri du Musée Vézère deposits dominate the fluvial deposits documented by Peyrony (1930) at Vignaud and by Movius (1995) at Pataud by approximately 6 m. The fluvial sands encountered in the 1953 excavation at the base of Pataud were archaeologically sterile, but these sands covered a Mousterian layer in the 1941 exposure described by Peyrony (1947a). It is very well possible, even probable, that these sands, part of Peyrony's 5 m terrace, correspond to the fluvial sequence at the base of the lower abri of Le Moustier. If so, they should be older than 55.8 ± 5 Kyr bp. If the mica containing sand deposits of layer I at Le Moustier are indeed of fluvial and not of aeolian origin, this would imply that the Vézère still reached a 7 m level at 40.9 ± 5 ka.

From 35,000 bp onwards, one could follow Farrand's suggestion that there is no evidence for the Vézère ever reaching higher levels than the present day ones, but in order to do so one would have to reject the fluvial character of the sandy matrix of the Abri Vignaud Aurignacian, discussed above. In any case, the absence of any indication for a fluvial influx in the long sequence at Laugerie-Haute Est, which starts at a considerably lower level than the Vignaud Aurignacian is situated (see above), strongly supports Farrand's assessment. In that case, there would not be any Vézère deposits known contemporaneous with the Upper Palaeolithic before the Magdalenian IV encountered at La Madeleine. A large hiatus and probably a major incision phase would separate the final Middle Palaeolithic Vézère from the first deposits encountered at La Madeleine. The data from our small *sondage* fit very well into such a scenario, with the erosion of the long *abri* deposit talus by fluvial activities having occurred at the earliest during the later Magdalenian and probably significantly later only.

7 Conclusions

Our survey focused on a part of the Vézère where the river is encased between large cliffs sometimes creating a very narrow valley, only a few hundreds of metres wide. The trajectory between Le Moustier and Les Eyzies has been chosen because it has the advantage that many of the excavated key sites such as Le Moustier, La Madeleine and Laugerie-Haute, are situated at a short distance from the current river, and some of these were said to contain fluvial deposits. Our survey, including field- (and laboratory) work, was a very limited one and our tentative conclusions are that:

1) The major part of the deposits in the current floodplain of the Vézère river in the trajectory sampled in our survey is very probably young, i.e. mostly Holocene in age.
2) Various erosional phases have destroyed major parts of the Pleistocene deposits, but in some of our transects Holocene deposits do seem to cover sandy sediments of Pleistocene age (e.g. Transect Bout-du-Monde, Transect Lespinasse), which have been preserved in the form of terrace bodies with remnants of older sandy flood deposits on top. Future studies of these transects may yield data relevant to the history of the river valley. One way to approach this would be by starting a systematic luminenscence sediment-dating program, in which the sandy intervals are dated at various levels to obtain a better chronological control over the sedimentation and erosional history of the river. Moreover, comparing dates for the sediments with dates obtained for the archaeological levels from within the rock shelters would yield independent chronological control for some of the interpretations given here. In the course of our fieldwork we increased our coring density each year, which resulted in more detailed and better data. Some of the older transects might benefit from resampling at smaller intervals, which may yield extra dating possibilities (e.g., Bout-du-Monde 1998 and Le Moustier 1997).
3) The results of our *sondage* at the foot of the rock shelter complex of Laugerie-Haute Est suggest that archaeological material from the distal talus of the abri deposits was reworked into the Vézère deposits during deposition of the Holocene infill of the current floodplain. The *sondag*e has also shown the vastness of the archaeological debris cone from this classical site. While the large lateral and vertical extension of the deposits along the cliff at Laugerie is well known, our limited work demonstrated that the cone of abri deposits at Laugerie-Haute Est also has a significant extension into the floodplain in front of the *abri*. The deposits there have a rough north-south extension of about 70 m, the later erosion of the deposits – and hence an earlier much wider extension – even not taken into consideration. Our observation of a significant water pipe trench having been cut through these rich deposits illustrates that cultural heritage management protocols for this part of the Vézère record still need to take this significantly wider spatial extant of these and comparable deposits elsewhere in the valley into consideration.
4) The preliminary study of lithic raw material quality and availability in the Vézère raw material sources in the alluvial deposits of the Vézère currently available shows the kinds of factors one needs to take into consideration when discussing raw material availability. It also shows that data collected on raw material availability in the present cannot be directly applied to the Pleistocene past

Our survey has only scratched the surface of this interesting fluvial domain yet.

The fieldwork yielded a number of interesting results, based on a study of the river regime during the last glacial. During the Pleistocene the river regime had predominantly an erosive nature, in which downcutting and erosion dominated. Sand was deposited during floods that covered the channel gravels. Most of these sandy deposits have been eroded later, although at several locations they have been preserved below a pile of Holocene overbank loams. Several phases of downcutting could be established. At least two buried terrace levels have been identified, of which the highest one may be correlated with terrace Fy2.

In the Holocene the landscape changed dramatically to a depositional setting: loamy overbank deposits dominated and covered the older, gravelly channel deposits, thus conceiling the height differences between youngest terraces. Taking the thickness of these Holocene sediments into consideration yields a picture of a vastly different last glacial landscape. Deeply incised valleys, as those of the Beunes, were even deeper then, while some archaeological sites that nowadays are more or less at the level of the river valley, e.g. La Grotte des Combarelles, Cro le Biscot or Commarque were several metres *above* the valley bottom during the (Late) Weichselian.

Our limited survey has yielded data relevant to the Late Pleistocene development of the Vézère-valley and some information on the archaeological potential of the Vézère-deposits. Our study has also pointed out where some — potentially very informative – discrepancies exist within the current range of interpretations of the Vézère history and its associated archaeological sites. However, in retrospect our project should have been more focused on obtaining dates (especially: OSL) for the relevant Vézère deposits. Future studies focused at obtaining a more reliable chronometric framework for the fluvial deposits could set important constraints on the range of possible interpretations sketched above, and thus contribute significantly to our understanding of the (neglected) "fluvial" part of the unique archaeological record of this key area of world prehistory.

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Notes

1 Additional to the sondage itself, we dug four 50×50 squares between 35 and 50m NE of our trench (SW coordinates 494.769/3.295.564 ; 494.774/3.295.568 ; 494.779/3.295.575 ; 494.782/3.295.576) to check a local amateur's story (communicated to one of us, A.T.) of finding a 'pebble floor' at 40 to 50 cm below the surface of the field. The small pits were up to 1m deep and did not record any pebble at all. We do have a straightforward explanation for the presence of pebbles in the field though: on a early 20th century map produced by Otto Hauser of the area of Les Eyzies and Font de Gaume, part of which is reproduced in this article in figure 9, there is a large (35 by 20 m) rectangular structure visible in the field where our *sondage* was located, somewhat north of our test pits. The structure was linked by a small road to the *Route Départementale*. Though the character of the structure is unclear (it does not have the ink infill that houses have on his maps, it could be a wooden barn), it might explain the presence of this – yet elusive – pebble floor in the field. The map is displayed in the Forschungsstelle Altsteinzeit of the Römisch-Germanisches Zentralmuseum at Monrepos, Germany (Übersichtsplan der prähistorischen Fundstätten No. 1-41 und Font de Gaume in der Umgebung von Les Eyzies im Tale der Vézère. Plan de Stations Préhistoriques Nos. 1-41, et Font de Gaume dans les environs des Eyzies. Vallée de la Vézère. Dordogne, France 1908. Aufgenommen u. gezeichnet April 1907-Mai 1908 von Th. Baumgartner, Ingenieur u. Konkordatsgeometer Seebach-Zürich).

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