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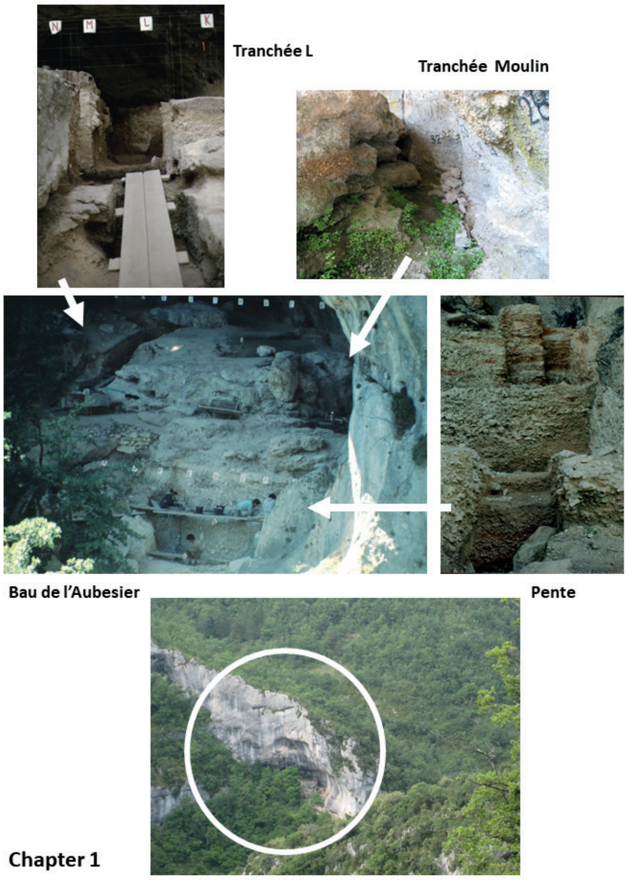
Introduction and Context



1.1. Introduction

This book is about a rock shelter in the south of France, called the Bau de l'Aubesier (hereinafter the Bau) (Figure 1.1). It is about the place, its geographic context, what it is, how it evolved through time, and how people used it from time to time over a period of about 300,000 years. It is not about the excavations of the site, but of course almost all of what I know about the Bau stems from excavations, particularly those started in 1987, in which I participated. I sometimes want to write stories or relate details of those excavations. If the reason for that is to explain how our techniques influence the knowledge I have of the site, I include that material in the main body of the text. If it is more that I feel the need to get something off my chest, then those stories are asides, called "From The Chest", which do not need to fit in with the flow of the main text.

The book is primarily written in English, but figure and table captions are in both English and French, and excerpts from site reports, my own excavation notes, etc., have generally been left in French. The different parts of the site are often referred to using their French names, *e.g.* the tranchée L (tranchée means trench) and the couche 4 (couche means layer). Each chapter has a "Sommaire du chapitre" section at the end, for French-only readers.

Often, books like this about an archaeological site (or project) have a series of individual papers by various experts, and one chapter synthesising the collection. This book is not like that. Many people have contributed their expertise to the analysis of the finds and the site. However, years have passed since we stopped excavating and people have moved on. I cite their reports, use their results and appreciate their contributions, but my goal is to produce a synthesis of all available data, not a compartmentalised series of summaries of different aspects. The Bau *is* a very special place. People used it, over and over. They left so much behind that we can learn a lot about what they did and why they did it. That is what I want to show in this book.

One of my main reasons for doing prehistoric archaeology is that I wonder what people in the past were like. I use the word "people" because I have to call them something, but what I mean are pre-modern hominins. I am not particularly interested in the archaeology of modern humans, because they are modern: they have all modern capabilities. Humans are, of course, intrinsically interesting, even modern ones, but what I am *particularly* interested in is figuring out the capacities of pre-modern humans/hominins. No such people exist today, and we can not understand them just by analogy with modern humans or with other primates such as chimpanzees. Pre-modern people were not modern: they did not have our capabilities and behaviour patterns, or at least not all of them. But which did they have and when did they get them? And what did they do or could they do which was different from us? They also were not apes or other primates. Although there are commonalities between all primates, and between apes and hominins especially, there is no simple line from monkeys-to-apes-to-hominins-to-humans, with upgrades added at each step along the way. We are all unique, with some shared characteristics and some entirely our own. Thus, although I recognise that ethnographic and primatological information provide very useful contexts for our interpretations, what I have always tried to work on is figuring out how to find out what prehistoric people actually did, in order to see if I can figure out how and why they did it. What were *their* capabilities, whether or not some of them were like ours? The Bau is such a rich site that it contributes real data towards solving those questions, which is another reason that it is a special place.

Mostly, though, it is a special place because of the feeling that people get when they are there: it is majestic and welcoming. It has a spirit. It has been a refuge and a

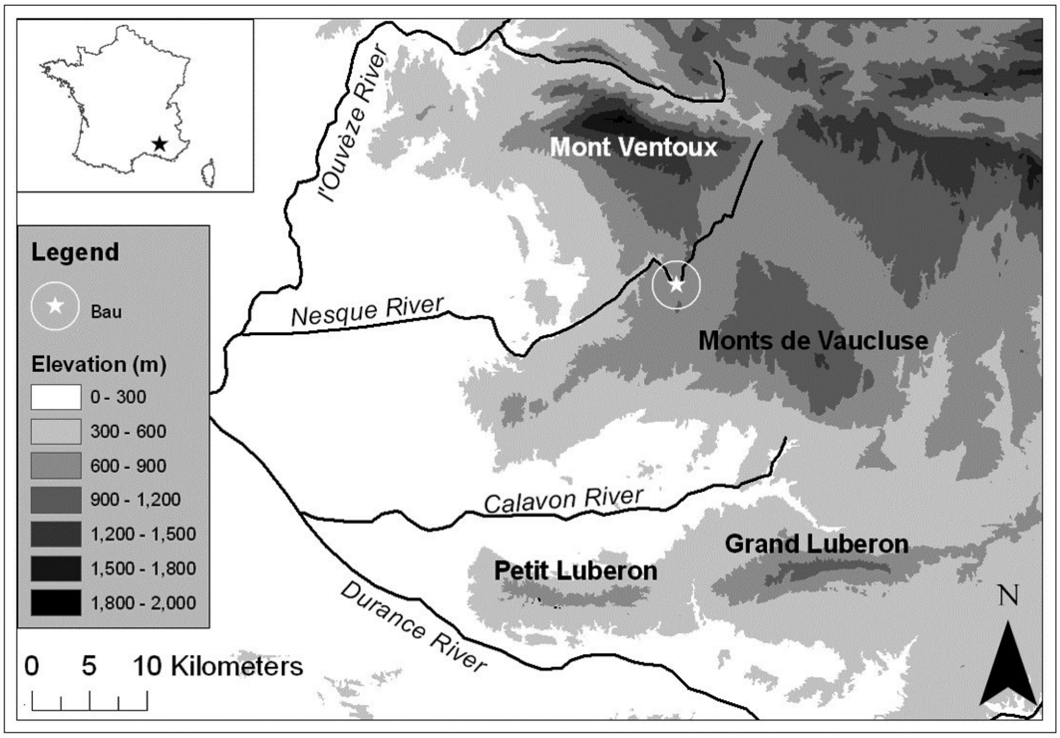


Figure 1.1. Map of the study area, showing the location of the Bau de l'Aubesier, and other important regional geographic features. ***Carte de la région d'étude, avec la localisation du Bau de l'Aubesier, et la géographie régionale.***

home, even if only a temporary one, for hundreds, even thousands of generations of hominins, including modern archaeologists. I do not know if I can explain that well enough for readers to feel it: maybe you have to go there. But I do try.

I start by describing the rock shelter and its location. Then I begin at the base, and work my way up through the stratigraphy, describing the sediments (and how they accumulated), the environment at the time of each level, human occupation and what they left behind (fauna, tools, in some cases hearths), and what these tell us. My own research concerns stone tool raw materials, so I include not only what types of tools there are, but also what they are made of, where that came from, and what the use of raw materials and fauna can tell us about use of the landscape: what strategies each group or groups (since most layers are palimpsests created by an unknown number of people over an uncertain length of time) used to live their lives. The book includes plenty of photographs, maps and other figures to help people envisage the site, its environs, and its contents. Some photographs were taken under field conditions and are not very clear; I apologise for this. They are all I have. I also apologise for not having any scientific drawings of the stone tools, although they would add clarity to the presentation of the tools. Given the recent circumstances, I have not been able to go to France since 2019, and have had to work with what I already had.

1.2. Why is the Bau a special place? What IS the Bau?

The Bau is a large rock shelter, approximately 25 to 30 metres wide, with deposits extending approximately 26 or more metres from the back wall to the front opening, although not all of that area is currently covered by the rock overhang. Part of the current surface of the deposits is covered by huge boulders, chunks of the rock shelter roof, which fell down during either late glacial or post-glacial times. They have had time to become partly buried in sediments, but the archaeological layers are safely underneath them. Within the site there are sediments which accumulated in roughly horizontal layers; these are known to be at least 13 metres deep, but the actual bedrock base of the site has not been attained. One striking aspect of these sediments is that they are, in many places, very strongly cemented, forming a tough breccia which both preserves the archaeological material, and makes it very difficult to dig that material up!

One apparently odd thing about the Bau, in terms of it being a place that people would choose to live at, over and over again, is that it faces north. It gets very little sunlight even in summer today. In the past, when the overhang was more extensive, no sunlight would have reached even the front of the deposits. This might be an advantage during a heatwave in an interglacial, but during glacial periods? It does seem strange that people would choose to live in the shade when it was cold, but they did.

The front of the deposits is presently sloped, the exposed parts of the walls of the rock shelter are irregular, and there may well be bedrock steps underneath parts of the site, so the total content is impossible to calculate. Nonetheless, it must contain hundreds of cubic metres of sediments. Even though all excavations combined have probably removed (as a rough but conservative estimate) over 160 m^3 of sediments from the site, there is still a lot of sediment there. Within that sediment, we have identified a number of archaeological layers, as will be described below. Dates for the deposits will also be described below, but the sediments cover the period running from the later part of the Middle Pleistocene through the Upper Pleistocene; the oldest known archaeological layer is probably around 250,000 years old, and the youngest main archaeological layer is probably younger than 80,000 years old (and may be considerably younger than that, but still Pleistocene). That is excluding hearsay accounts of occasional Neolithic potsherds found on top of the deposits by early excavators (corroborated by personal observation of some old collections).

The Bau is tucked away in the corner of a huge semi-circular escarpment (Figure 1.2), with a vertical cliff of about 50 m height above it, and a steep wooded slope, also about 50 m in height, below it. It is in the gorge of the Nesque river (Figure 1.1), near Monieux, in the northeastern part of the Vaucluse. The Nesque is presently an intermittent river, with most of its course through the gorge containing water only in periods of sufficient rainfall or snowmelt. Some areas do retain water longer, but turn into more or less deep stagnant puddles in the summer, or dry up completely. The intermittent nature of the river has three causes: the fact that a lot of the water is captured upstream to supply local villages and farmers; a relatively warm, dry Mediterranean-type climate with seasonal precipitation; and the influence of karst phenomena. The gorge carves through the Lower Cretaceous (Bedoulian) limestone which underlies much of the region. Over time limestone dissolves in water, giving characteristic karst topography including sinkholes, disappearing streams, springs, and so on. In such areas, the bedrock is riddled with solution channels which take surface water underground, and lead it through intricate pathways until it finds an outlet at some lower elevation. In this case, that outlet is partly about 18 km away at Venasque, where the Nesque reappears, and partly at the Fontaine de Vaucluse, about 28 km from the Bau in a straight line, but much farther by the underground channels (du Merle & Guende 1978).

Figure 1.2. Photo of the Bau in its geographic context, in the gorges of the Nesque. The arrow is pointing to the position of the rock shelter. ***Photographie du Bau dans son cadre géographique, dans les gorges de la Nesque. La flèche montre la position de l'abri sous roche.***

The action of water flowing through the gorge, and the dissolution of the limestone by the water, are, however, only contributors to the current size and shape of the gorges, as is mass wasting of the steep rocky walls. The origin of the structure is a zig-zagging series of faults that ripped the land open, as part of the tectonic activity that created the Mont Ventoux and the Monts de Vaucluse.

1.3. Geologic history of the region

Some time before about 200 million years ago the single continent, Pangaea, started separating into two large pieces, Laurasia and Gondwana. Even when these were still connected, a branch of the ocean formed a new sea, the Tethys sea, between them. The Massif Central of present-day France represented the continental edge of Laurasia at that time, and what is now Provence, in the south of France, was a shallow marine basin (Truc 2012, Ughetto & Ughetto 2007). The area was located about 1000 km farther south than it is now, and the climate was hot and arid. During the last 30 million years of the Triassic, a repetitive cycle of climatic variation, from more to less arid, resulted in the accumulation of 600 m of sediments in this basin. These sediments consist of layers of salt (deposited in times of extreme aridity), layers of gypsum and limestone (when it was somewhat less arid), and layers of clay and fine sands deposited during wetter periods, when there was enough rainfall to support vegetation and rivers on land, so that sediments were carried out to sea (Truc 2012).

In the Jurassic, in a humid tropical climate, well over 1000 m (possibly more than twice that amount) of clays and calcite accumulated in the subsiding basin (Truc 2012), resulting in the marls now known as the *terres noires*. In the later Jurassic these passed progressively into bedded limestones, as increased vegetation on land reduced the input of terrigenous sediments. Moving into the Cretaceous, a subsiding chunk of crust under this area resulted in what is known as the *bassin vocontien* or *fosse vocontienne*, which accumulated hundreds of meters of limestones, at first mixed with marls, but through much of the Lower and mid-Cretaceous purely marine and very fossiliferous (Masse 1993, Truc 2012). These are the rocks within which we find the gorges of the Nesque.

These Lower Cretaceous (especially Bedoulian) limestones are important to the story of the Bau de l'Aubesier not only because the rock shelter formed (much later) as a cavity within them, but also because they contain abundant flint nodules. As sediments accumulate and get buried deeper and deeper, they get subjected to higher and higher pressures and temperatures. This compacts them and turns them into rocks, and it also changes the solubility characteristics of the minerals in them, as well as of the ions dissolved into the interstitial liquids that circulate through the deposits. A complex series of diagenetic changes occurs, whereby minerals change their structures and compositions, or dissolve and are replaced by new minerals, often more than once. In the process that interests us, the circulating liquids have silica dissolved in them. This may be of terrestrial or biogenic origin, derived either directly from weathering of terrigenous minerals, or from the dissolution of siliceous body parts such as sponge spicules. Under the right conditions, the silica precipitates, replacing calcite wholly or in part in certain areas, and thus forming flint nodules. The flint can contain textures and structures, such as fossils, that were part of the original limestone; calcareous fossils can still be in their original mineral form, can be partly replaced or infilled, or can have been completely converted to silica, depending on the circumstances (Wilson et al. 2010).

By the late Cretaceous subsidence stopped and the sea became shallower. Terrigenous inputs plus strong currents led to the formation of undersea sand dunes (Truc 2012), and a mineral called glauconite formed from alteration of silicate minerals in the warm shallow sea. These sands eventually became glauconitic sandstones (sometimes known as greensands), which later were exposed and highly weathered, causing the glauconite to break down and leave behind kaolinite (a very pure clay) and iron oxides and hydroxides: ochre deposits (Figure 1.3). Small deposits of these exist today scattered throughout the region, with major deposits in Mormoiron (about 11 km west of the Bau), Roussillon (18 km southwest) and Rustrel (about 21 km southeast of the Bau), among other localities.

Tectonism came back into play in the Eocene. The situation in Provence was inherently unstable: hundreds of meters of limestone beds on top of hundreds to thousands of meters of marls and evaporites. Limestone is rigid. Marl and evaporites are soft and flexible. As the African plate moved northward again and affected the European plate (the *plissement pyrénéo-provençal*), the rocks of the Vaucluse folded into asymmetrical to overturned anticlines – but since the softer rocks underneath were better at folding than the more rigid rocks on top, the folds sometimes broke into what are more like monoclines. That is the case for the Mont Ventoux: it is a huge slab, corresponding to the more gently-sloped southern limb of the anticline (Figure 1.4). On its northern side we can see the series of strata that make up the limb, with the oldest rocks at the bottom. The original crest of the fold has been eroded away, and the remnants of the overturned, steeper limb are on the other side of the valley.

This compressive phase was followed in turn by a phase of extension, where the crust became stretched instead of squeezed. Intersecting sets of faults running either NE-SW

Figure 1.3. Photo of kaolinite and ochre deposits in Mormoiron, about 11 km west of the Bau. Photo by P. Mears.
Photographie des kaolinites et ocres de Mormoiron, à environ 11 km à l'ouest du Bau. Cliché P. Mears.

Figure 1.4. Photo of the Mont Ventoux from the eastern side, showing its asymmetrical slopes. ***Photographie du Mont Ventoux de l'est, avec ses versants asymétriques.***

or NW-SE were created or reactivated, and slabs of crust split apart or sank. The gorges of the Nesque follow some of these faults (see Figure 1.1).

In the Oligocene, the area became a shifting series of lakes and lagoons, sometimes freshwater, sometime brackish, sometimes hypersaline. More limestones were laid down in these, generally in thin layers, and more flint formed within these limestones. The Oligocene beds are preserved now in downfaulted blocks which protected them from later erosion, so in many cases they are at the same level, or lower, than the Cretaceous rocks.

During the Miocene the sea re-invaded southern France, and the Mont Ventoux became an island for a few million years. At the end of the Miocene, however, the compressive forces started again, in what was finally going to cause the creation of the Alps (the Mont Ventoux having been a solitary mountain for many years by then). The rest of southern France also rose as the Alps did, and Provence became dry land. Rivers started to flow, taking advantage of cracks caused by the faults, where available. As tectonic plates moved around, slabs of them changed their orientations relative to each other, and, for a few hundred thousand years (approximately 5.9 to 5.3 million years ago) the Mediterranean Sea periodically became cut off from the Atlantic Ocean (Triat 2015). During this time, known as the Messinian Salinity Crisis, the sea partially evaporated away. Sea level declined by 3 to 5 km below present-day levels. The rivers on the continents suddenly had to try to flow down to this drastically lower sea level. They did so by carving deep valleys. Many of those valleys are now obscured by later sediment deposits, or are under the sea, but the Nesque's deep gorge, up to 350 m deep at the Rocher du Cire (Figure 1.5), still stands as testament to the energy of a down-cutting stream.

The landscape as we know it now was pretty much in place by the end of the Miocene or the beginning of the Pliocene: the Mont Ventoux standing in solitary splendour, dominating the surroundings hills and plateaus, the deep gorges of the Nesque. . . all this in time for the Pleistocene ice ages, just after 2 million years ago. This area was never glaciated (Legal 2007), but glaciers extended down from the Alps to within a few tens of km of the Bau, at times, in the valley of the Durance river. Even without actual glaciers, during the cold periods the action of periglacial processes, such as erosion and cracking of rocks by frost, was very important. We see this in the deposits in the Bau, as well as even now on the slopes of the Mont Ventoux.

Figure 1.5. Photo of the Rocher du Cire, near the Bau in the gorges de la Nesque. ***Photographie du Rocher du Cire, près du Bau dans les gorges de la Nesque.***

This, then, is the landscape within which the people who occupied the Bau lived: hilly, with elevations ranging from 300 m above sea level (asl) on the lowest plains, to 650 m asl at the Bau, to around 1000 to 1100 m asl on the high plateaus, and culminating at the summit of the Mont Ventoux, 1909 m asl. The landscape is dissected by gorges and steep valleys, making the terrain difficult to hike across in many areas. The limestone bedrock would have always made it difficult to retain water on the surface, although during wetter climatic periods it is likely that the Nesque was a perennial stream. The elevations would have meant that winters were cold and windy; even today, snow occasionally falls in this area, and during a glacial period the mountains and plateaus must have been snow-covered for months at a time.

Although pre-modern hominins surely did not care how old the rocks were, the variety of geologic formations in this region must have mattered to them. For one thing, some layers contain flint; others do not. Also, some layers are less permeable than the karst-affected limestone, and surface water can flow across them, rather than sinking in. This explains why the Nesque does exist as a channel of surface water for several km, flowing from its source near Aurel, across the valley of Sault and Monieux, until it meets the limestone at the beginning of the gorges. The mineralogical nature and the permeability characteristics of the rocks also affect what plants can live in which places, which in turn affects which animals can live in which places. And finally, in limestone we can find caves.

The Bau was created by a combination of several forces: dissolution by groundwater, mechanical erosion by flowing water, and frost-cracking. Even before the gorge had been created and lifted to its current height, water must have flowed through the limestone, dissolving channels both downward and horizontally: water flows down until it reaches the level of groundwater, then it flows nearly horizontally until it finds an outlet. As the land rose, the groundwater level sank, so the higher horizontal channels would be abandoned. Tectonic action split the land open and exposed those old channels as caves and rock shelters. It is also possible that streams flowed in the channels, carrying rocks with them and wearing away the rock walls even further. Finally, when the Bau had been created and was exposed to the open air, water percolating through the roof and walls would freeze during cold periods. The limestone acts like a sponge, absorbing then giving up rainwater. Water expands when it converts to ice, so the rocks cracked, and smaller or larger chunks fell off.

Over time, the ceiling and floor of the rock shelter both moved upwards, as chunks of ceiling rained down and accumulated. When we excavated there, we knew that on rainy days we were safely sheltered and could stay dry – but four days later water would start dripping out of the ceiling. Luckily for us, in the summer there is no chance of that water freezing and knocking rocks off!

1.4. Excavations at the Bau

The Bau was identified as an archaeological site at least as early as the beginning of the 20th century. It was first dug from about 1901 to 1904 by Franki Moulin, who uncovered a rich lithic industry, faunal remains, and one Neandertal tooth (a deciduous second molar). Moulin published his findings in the first issue of what would become the *Bulletin de la Société préhistorique française* (Moulin 1904). Moulin worked only in the upper part of the deposits, next to the western wall of the rock shelter, leaving a trench that by the 1980s was about 2 m deep, 2 m wide, and 10 m long (Figure 1.6).

Even at that early date, it was evident that the site was exceptionally interesting. Moulin stated that the finds came from a single, pure layer, protected between two stalagmitic layers, but his description of the lithic industry made it clear that although it included abundant characteristic Mousterian pieces (such as Mousterian points), there was also a large proportion of elongated forms, including blades. Since blades were thought to be an Upper Palaeolithic tool type, other commentators suggested that either the finds came from a mixture of layers, or they were due to a transitional phase between the Mousterian and the Solutrean (de Mortillet in Moulin 1904, p. 20).

Despite this evident promise, the site received only occasional attention in subsequent decades. A group of amateurs spent some time in the 1950s sifting through Moulin's debris piles, and in the 1960s B. Mary both excavated and sifted more of the others' debris. During this time a second Neandertal tooth was found, subsequently studied and published by M.A. de Lumley (de Lumley 1973). Henry de Lumley also studied the site very briefly in the 1960s, publishing a short description and a stratigraphic section in his monograph concerning the Palaeolithic in southern France (de Lumley 1971). He described the lithic industry as an "evolved" Mousterian, with precursors of Upper Palaeolithic industries, and named it the "complèxe du Bau de l'Aubesier".

Large-scale, serious, multi-disciplinary scientific investigation of the Bau started in 1987, directed by Dr. Serge Lebel, then of the Université du Québec à

Figure 1.6. Photo of the tranchée Moulin. ***Photographie de la tranchée Moulin.***

Montréal (UQAM). This was a major undertaking, and Serge deserves all credit for those excavations. Serge is a Canadian, and did his doctorate in France, defending his dissertation in November 1984. By then he had decided that he wanted to excavate a site of his own, and after checking out several possibilities, settled on the Bau. I am also a Canadian, and was a fellow student of Serge's, but several years behind him (I defended in June 1986). Serge asked if I would like to participate in his excavation, and I agreed enthusiastically. Serge moved back to Canada but nonetheless managed to convince the authorities in France to give a Canadian permission to excavate a French site (co-led by Robert Brandi of the Direction régionale des Antiquités in Aix-en-Provence for the first two years). Serge obtained all of the necessary permissions, got together the funding, found willing scientists to study aspects such as the faunal remains, recruited students to serve as excavation teams (and for many years ran the dig as a field school for UQAM), found affordable lodging near the site during the excavations (no small feat in an area very popular with tourists), and arranged to get all of the necessary equipment, from jackhammers to brushes and plastic bags.

Serge also was the visionary who directed the day to day and year to year planning of how to extract information from the site. None of this was easy. The Bau is a difficult site: the deposits are mainly highly cemented, requiring heavy equipment, and the rock shelter is halfway down a one-hundred metre high slope/cliff. Access to the site involves a steep, narrow path into and along the gorge, which makes it difficult to bring in equipment. To overcome that, after our first excavation season Serge designed a hoist system, which we installed on the plateau above the site in 1988. When that system turned out to be dangerous (he received a serious blow to the head), he designed a much better system which we installed in 1989 (Figures 1.7 and 1.8), and which we used for every subsequent field season. Serge also arranged for support in renting pneumatic jackhammer equipment, including an air generator which we left on the plateau, 80 m of tubing to reach down to the site, and jackhammers of various sizes, from 2 kg to 30 kg. For several seasons, we started with a small team undertaking a couple of weeks of jackhammer work in order to get through the breccia and reach archaeological layers below (Figure 1.9). We also had an electric jackhammer for incidental use throughout the rest of each season. Naturally, these measures resulted in large quantities of sediments. We installed tubes to transport the sterile sediments outside of the excavation area, and even then had to periodically work hard getting the piles out of the way of the ends of the tubes (Figure 1.10).

The site also turned out to be much larger, deeper and more complex than expected, extending far beyond Moulin's trench. It is also extremely rich: we excavated tens of thousands of lithics and hundreds of thousands of bones, from multiple layers and areas. Serge led his teams through many seasons of very hard work, but always with an exemplary attention to detail.

Figure 1.7. The hoist system on the plateau above the site, installed in 1989. ***Le treuil sur le plateau en haut du site, installé en 1989.***

Figure 1.8. A box containing an electric jackhammer being lowered down to the site. ***Une caisse contenant un marteau-piqueur électrique descendant vers le site.***

Figure 1.9. The south wall of A15-B15-C15, showing archaeological layer H1 (dark) below and breccia above. The white lines on the breccia are marks of the jackhammer bit, demonstrating how difficult it was to get through this highly cemented deposit. ***La coupe sud de A15-B15-C15, avec la couche archéologique H1 (couleur noire) en bas, et la brèche au-dessus. Les marques blanches sur la brèche sont des traces du marteau-piqueur, montrant la difficulté pour arriver à cette couche fortement cimentée.***

At the beginning of our first season, in 1987, using a theodolite, we marked lines of equal height on three walls of the rock shelter; the top of each line constitutes our datum level. All depths that I give throughout the rest of this book are measured in cm or metres vis-à-vis that level (our z zero, or z Ø), expressed as negative numbers because they are below datum. We also divided the site into metre-grids (Figure 1.11). The site is marked off from back to front by numbers, starting with 1 inside the back wall and increasing towards the gorge, and from side to side by letters, with A being an incomplete metre that starts inside the western wall, followed by B, C and so on eastwards. All locations that I give below thus refer to this letter-number combination. Note that photos of the site may also show a different series of numbers painted on the walls; these increase towards the back of the cave. I have been told that those were painted on by Henry de Lumley in the 1960s. We never used them and this book will never again refer to them.

In addition, we labelled the layers within the deposits using two different systems (Figure 1.12). The western part of the site, including the tranchée Moulin and the area in front of and below it, the pente du remplissage (which means “slope of the deposits”), has the layers labelled in alphabetical order, starting with A at the top. Some of these are subdivided depending on sedimentological or archaeological criteria, using numbers or letters (e.g. E, EA, EB; or H1, H2). The lower layers in this part of the site, starting at the G/H boundary, are defined as being one metre thick: H extends from 605 to 705 cm below z Ø, I runs from 705 to 805 cm, J from 805 to 905 cm, and K is below 905 cm. No archaeological material was found below the K metre, although we did dig a test pit down to below 1200 cm. In the central part of the site, we dug a new trench and named it the tranchée L. Since we did not know how the layers in that trench lined up (or did not) with the tranchée Moulin, those layers are labelled with numbers, starting with 1 at the top. These, too, are often subdivided, using supplemental letters (e.g. 3, 3A, 3B and so on). These will all be explained as necessary throughout the rest of this book.

These excavations showed that the deposits are more than 12 metres thick, well stratified, and contain several well-

Figure 1.10. Clearing away sediments at the bottom of a disposal tube in 1993. ***Déblaiement des sédiments en bas d'un tube, en 1993.***

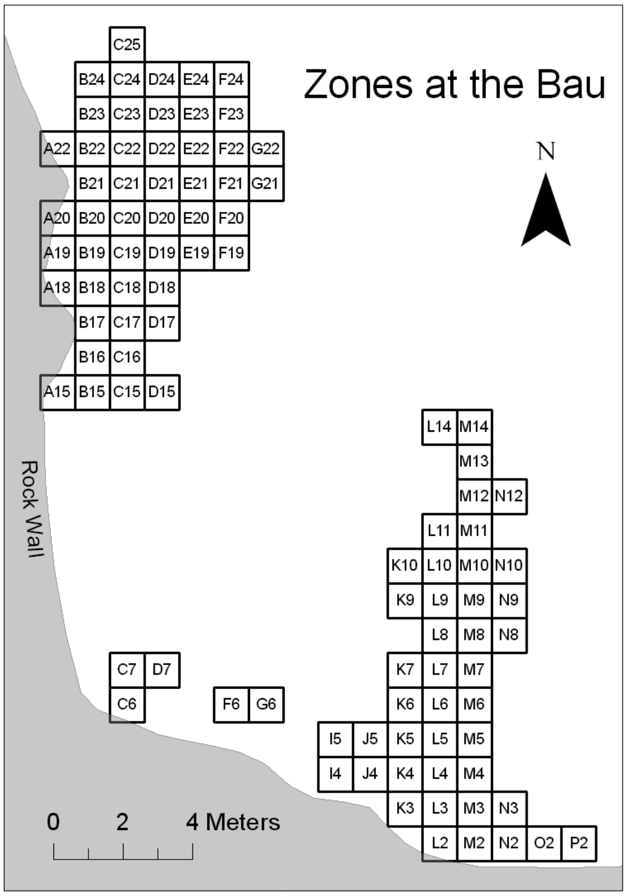


Figure 1.11. Map of the site showing the metre grid system and most important excavated areas. ***Carte du site avec le système de quadrillage par mètre carré, et les zones fouillées les plus importantes.***

differentiated archaeological layers, some highly burned, with the ensemble probably dating to oxygen isotope stages 7 to 5. Some layers are exceptionally rich in faunal remains (Fernandez 2001, Fernandez et al. 1998), others in lithics. Our excavations also turned up some more human remains, Neandertal and older, including teeth and part of a jaw (Trinkaus et al. 2000, Lebel et al. 2001, Lebel & Trinkaus 2002).

Excavations were conducted in the summers of 1987, 1988, 1989, 1990, 1992, 1993, 1994, 1995, 1998, 1999 and 2000, with a short scientific mission in 2006. Serge had an assistant every year, and these were:

Danielle Fournier	1987–1990
André Delisle	1992–1993
Dominique Paquin	1994–1995, 1998–1999
Jennifer Lehoux	2000
Eric Perreault	2006

The excavation teams included many people over the years. I am not going to list their names, because I am sure to miss somebody. Many of them worked very well, and we often had a lot of fun, too. I hope they all look back on it as an important learning experience.

This book is based partly on information from Franki Moulin's description of his excavation (Moulin 1904), and Henry de Lumley's site description and stratigraphy from the mid-60s (de Lumley 1971), but it is mainly based on materials from our excavations, including site reports

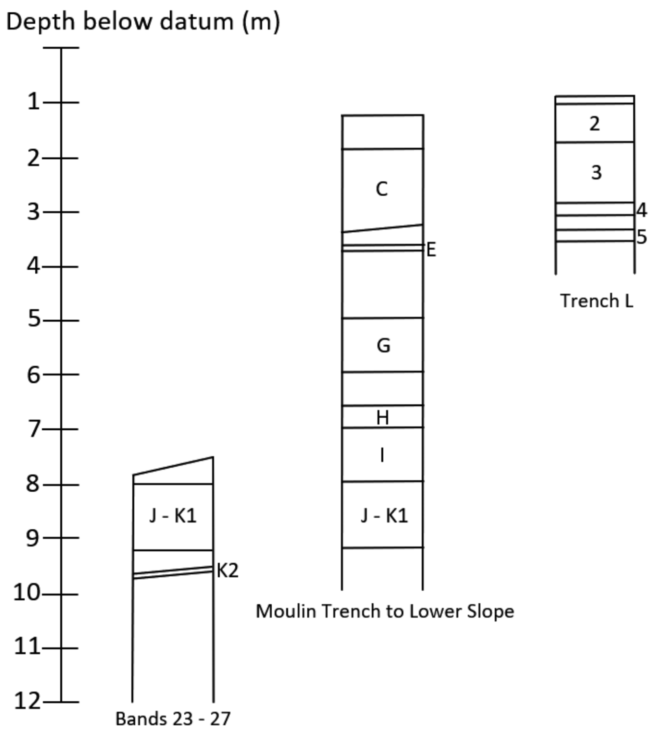


Figure 1.12. Summary site stratigraphy, mentioning major archaeological layers. ***Schéma stratigraphique sommaire, avec niveaux archéologiques majeurs.***

submitted to the French government, a variety of papers published about the human teeth and jaw, my own notes from the excavation seasons, a few theses written by students, and occasional analytical reports by myself and others (beyond those included in the site reports). These will be cited and listed in the bibliography. I have extensive data about the stone tools, both their raw materials (which I recorded as we excavated) and their typology (analysed in a basic way by myself and three students during the summers of 2013 and 2014, using the collections in storage at the archaeological depository in Vaison-la-Romaine). I will use this large collection of detailed typological data, rather than the summary data occasionally included in site reports by Serge Lebel, when I discuss typology throughout this book.

As mentioned above, the goal of this book is to present a synthesis of what went on at the site during prehistory. This is not a detailed site report, with lists of finds per layer. That is not really possible, anyway: a lot of the raw data are missing. For instance, although we recorded the exact location of many thousands of stone tools while we excavated them, all I currently have is information on which square meter and layer the tools came from. The reason for this lack is explained in section 1.5, "From The Chest". However, I choose to see this lack of detail as enforcing a "big-picture" view of the results, which is what I want to give in any case.

1.5. From The Chest: Serge

The Bau was excavated starting in 1987, as a project led by Dr. Serge Lebel, who at the time was employed by the Université du Québec à Montréal (UQAM). We excavated for about two months per summer in 1987-1990, 1992-1995, and 1998 and 1999. I was there for all of those. Serge also led an excavation in 2000, and I was present for part of that season. Serge did a short campaign in 2006, mainly testing and taking samples, with a very small team. I was not present for that, but I do have the report he wrote about it. During the 2000s, Serge withdrew more and more from contact with colleagues, and some time after 2006 left his employment at UQAM. I heard from him only infrequently during the period from 2002 to 2009. I last saw him in the summer of 2005, and last had any written word from him in 2009. Other friends and colleagues in France last heard from him even earlier than that. Serge had and may still have the excavation forms, sheets, notebooks, cross-sections, lists of samples, and so on. He has not responded to any attempts to contact him, directly or indirectly, by me or anyone I know of, since 2009. He has not published the results of the excavations. There is no sign of him participating any further in the analysis of the results. He does not, for instance, react when papers on the site are published. Since I am the person who knows second-best what went on during our excavations, and since I have continued to study the raw material geology of the Vaucluse (for the Bau and for other sites) ever since 1987, if anyone is going to write up an overall view of this site, it has to be me. Unfortunately, some potentially very useful information is just not available anymore.

1.6. The study of the lithic raw materials

My role in the Bau project was as on-site geologist and as archaeopetrographer – that is, studying the types of raw material the stone tools were made of. I was never an official assistant or co-director: I was in between, somehow, and in addition to doing my own specialist work, and a fair amount of prospecting throughout the region, I participated in the setting up and taking down of the dig equipment every year until 1999 inclusive, as well as in the excavations, the determination of stratigraphic questions and names for layers, teaching field-school participants and others about how to dig, and so on. After excavations were over, I continued studying the rock types.

As I studied the raw materials during the excavations, I classified them according to my série pétrographique (petrographic series): different varieties of rock (almost all flint), described and listed, and assigned a code letter. Table 1.1 gives the série, which ultimately came to 46 types, labelled in alphabetical order from A to AT. Starting in 1987, and continuing well into the 2000s, I undertook a very extensive prospecting campaign in the region, and identified more than 350 potential raw material sources, both outcrops and secondary sources such as colluvial and alluvial deposits (Figure 1.13). I then used a variety of methods (mainly petrographic, but also geochemical) to match the rock types from the série pétrographique to the source or sources where they could have been obtained (Wilson 2007, Wilson et al. 2010). Since many sources (e.g., separate outcrops of the same rock formation) give

Table 1.1. Petrographic series. *Série pétrographique*

Type	Description
A	silex patiné blanc et/ou beige
B	silex rose tacheté
C	silex mauve grisâtre ou gris
D	silex patiné jaunâtre
E	silex mauve grisâtre clair tacheté de blanc
F	silex gris foncé legèrement translucide
G	silex blanc ou beige à cortex roux
H	silex blanc et brun zoné
I	silex marron foncé
J	silex gris clair
K	silex jaune-orange
L	silex blanc et beige rayé
M	silex brun clair et gris translucide
N	silex brun-mauve à cortex roux
O	silex gris foncé ou noir
P	silex beige à bandes ou zones sous-corticales gris foncées
Q	silex beige à bandes sous-corticales marrons
R	silex brun-jaunâtre clair tacheté de blanc
S	silex brun-grisâtre translucide
T	silex argileux gris à cortex épais gris clair
U	silex gris clair à blanc à grain grossier
V	“silex” blanc à taches rouges (“saucisson”)
W	silex gris clair panaché, parfois piqueté de roux
X	silex brun-grisâtre piqueté de blanc et brun
Y	silex beige piqueté de rouge
Z	silex noir piqueté de blanc
AA	silex gris et brun-jaunâtre rayé de marron
AB	silex beige tacheté de blanc, brun, roux
AC	silex beige et brun marbré à cortex brun
AD	silex panaché, beige piqueté de noir, blanc, rouge
AE	silex brun-rose ou gris panaché, marbré de blanc, rose, brun, à zones foncées
AF	calcaire brun pâle
AG	andésite verdâtre porphyrique à phénocristaux de feldspath, amphibole, et mica
AH	silex gris clair à charophytes blancs d’environ 1 mm
AI	silex gris à brun avec de nombreuses petites taches blanches (“croûte de cantal”)
AJ	silex blanc à taches rouges; altération gris (surface de galet)
AK	silex gris opaque à taches blanches (charophytes)

Type	Description
AL	silex patiné blanc avec petits charophytes blancs
AM	silex blanc à grain très fin, avec possibilité de clivage (plane) naturelle; galet
AN	silex brun ocre opaque
AO	silex translucide de couleur pâle
AP	silex tacheté brun foncé et gris foncé avec gastéropodes blancs d'à peu près 1 à 2 mm
AQ	quartzite noir à grain fin
AR	silex café-au-lait (patiné?) à gastéropodes silicifiés cristallins
AS	silex gris à noir tacheté piqueté de brun et blanc, à spicules d'éponge
AT	silex beige à gris marbré de taches noires, brunes et rouges, avec d'abondants spicules d'éponge

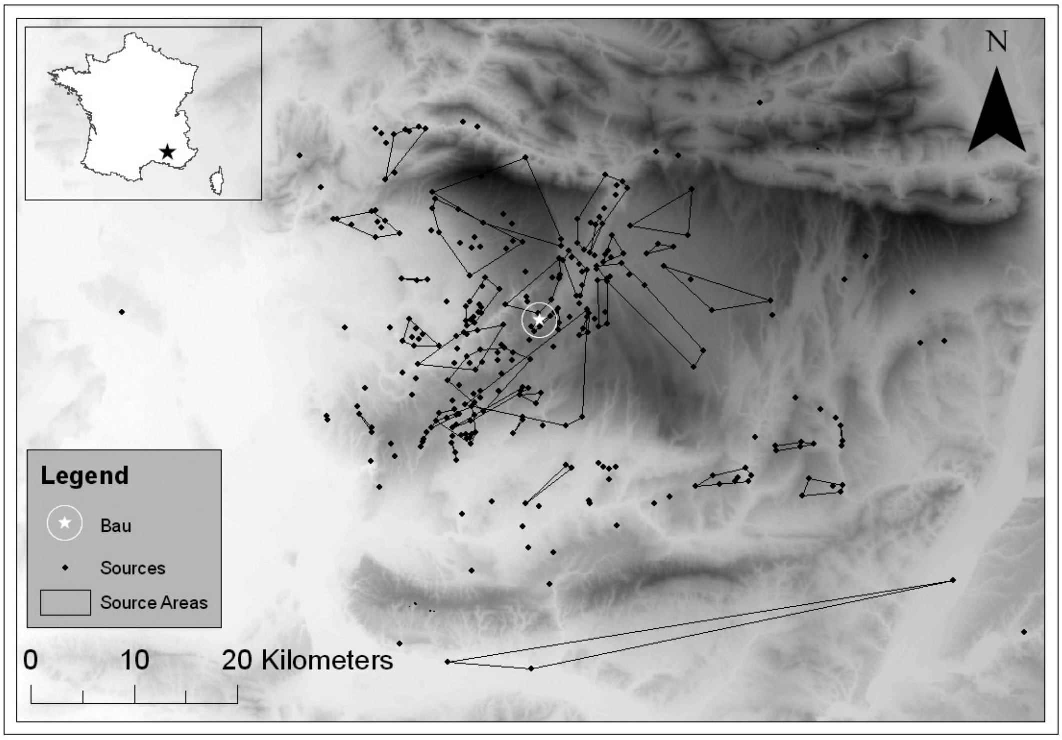


Figure 1.13. Map of the region showing potential lithic raw material sources. ***Carte de la région avec sources possibles de matières premières lithiques.***

flint types which are indistinguishable from each other, the sources were combined into source areas, containing from one to fifteen individual sources. Table 1.2 lists the used source areas, giving each a name which indicates roughly where it is. Table 1.2 also lists a distance value and a direction from the Bau to each source area. The distances are straight-line (Euclidean) distances to a representative source within the source area. In the resource use modelling (described further below) that Connie Browne and I have been doing for the last few years (Browne & Wilson 2011, Wilson & Browne 2014, Wilson et al. 2018), each source area has to be represented by a unique set of values, and we determined (by testing a whole lot of different models) that for the Bau, the best results come from using the source with the highest quality raw material available. That means that in many cases the representative source is not the closest source to the Bau, and the distances given in Table 1.2 are not necessarily minimum values.

Overall, many of the pieces were either patinated or burned, often to such an extent that the original rock type was no longer visible. I therefore could not say where those types originated from. The proportion of such pieces varies from layer to layer within the site, but often exceeds 50%. Of the remainder, almost all could be attributed to a source area. I examined nearly 40,000 pieces and could identify the flint type but not determine the source of only 0.4% of them. These are described below as "unknown", whereas the overly patinated and burnt pieces are "unidentifiable".

I must make it clear right away that the numbers of pieces per layer on the typological lists will never match the

Table 1.2. Used raw material source areas. ***Aires d'approvisionnement en matière première utilisées***

Source area	Direction	Distance (approximate)	Petrographic types
Unidentifiable	n/a	n/a	A, B, C, D, E, K, L
Unknown	n/a	n/a	F, M, T, Z AB, AD
Faraud etc.	SW	10.4	G, N, Y, AC, AS, AT
Méthamis etc.	W	8.0	H
Les Sautarels etc.	SW	10.7	I, O, AN
Sault	NE	9.1	J, R
Murs	SW	12.1	P, Q
Local	S	1.1	S, AF, AJ
St. Jean de Sault	NE	4.1	U, W, AM
Roussillon	S	18.2	V
Murs-Bezaure Olig.	SW	13.0	X
Ravin de la Treille	NW	4.9	AA, AI
St. Trinit	NE	14.7	AE
Durance	S	34.3	AG
Tertiary Calavon	S	14.6	AH
Tertiary Murs VdeV	SW	13.5	AK, AL
Mormoiron	W	11.4	AO
R de Guérin	SE	31.7	AP, AR
N.Aurel	NE	14.2	AQ

numbers on the raw materials lists. In some cases I did not see all of the pieces so the raw materials list has fewer pieces. In other cases, some of the pieces somehow did not get stored at the depository at Vaison-la-Romaine, so the raw materials list is longer. And in some cases, whether because of errors in marking the pieces at the dig, or because pieces have been separated from their identification (if they were with others in a labelled bag, for instance), I just was unable to match them all up. Most of the pieces do match, and the numbers are so large that they are useful, but no list will ever end up with exactly the same number of pieces as another list, even though they are supposed to be lists of the same things.

The raw material and typological information is presented layer by layer within this book, and I often refer to the results of the resource selection models mentioned above that Connie Browne and I have been working with for several years (Browne & Wilson 2011, Wilson & Browne 2014, Wilson et al. 2018). These are models that allow us to see what influenced prehistoric choices of which raw materials to use. Each potential source area is described in terms of factors such as the quality of the raw material, the size of pieces available there, the size of the source area, the difficulty of the terrain between the source and the Bau, the Calories (kCal) expended to travel from there to the Bau (which gives a better result than the distance in km), and so on (see Browne & Wilson 2011 for a full explanation). The models then calculate which combination of factors best matches the actual representation of raw materials within an assemblage, and weights them, so that we can see, for instance, that quality is more "important" (more highly weighted) in one layer than in another. The results also show whether a factor was positively or negatively important: for instance, a positive Beta value for quality means that sources with better quality material were used more, whereas a negative Beta value for terrain difficulty means that sources that are harder to get to were used less.

1.7. The scientific team

The synthesis provided in this book will include not only my own work, of course, but also the results obtained by many other researchers. Studies of fauna, sediments and pollen contribute to understanding the environment at the various times of occupation. Studies of fauna also contribute essential data to our understanding of how people behaved: what types of animals did they eat, and how did they obtain them? This needs to be combined with the stone tool data (typology and raw materials), and the characteristics of the occupation layers (use of fire, for instance), to give a fuller picture of hominin lives at the time. Faunal identification also gives us information on biochronostratigraphy, to combine with radiometric dating results in order to determine the age of the deposits. I am thus indebted to ALL of the contributors to the scientific study of the Bau de l'Aubesier, without whom this book would be impossible.

The multidisciplinary, international team that Serge put together included the following:

Serge Lebel: Director of excavations; with the collaboration in 1987-1988 of Robert Brandi, Direction des Antiquités, Aix-en-Provence
Alain Argant: Fauna, carnivores
Jacqueline Argant: Palynology
Bonnie Blackwell: ESR dating
Marie-Agnès Courty: Micromorphology
Martine Faure: Fauna
Philippe Fernandez: Fauna, ungulates
Bassam Ghaleb: U/Th dating
Claude Guérin: Fauna
Alfred Jaouich: X-ray diffractometry
Serge Lebel: Typology of the lithic assemblages
Jean-Claude Miskovsky: Sedimentology
Dominique Paquin: Geochemical sedimentology
Gilbert Prichonnet: Sedimentology
Henry Schwarcz: ESR dating
Hélène Valladas: TL dating
Lucy Wilson: Geology, archaeopetrography of the lithic assemblages
Manon Wilson: Micromorphology

In addition, Serge never released the full results of his typological study, so in order to obtain a complete record of the typology, I went through the collections, assisted by University of New Brunswick students Lauren Cudmore (2013), Lindsay Fleming (2014) and Leta Miciak (2013 & 2014). More detailed typo-technological analysis of part of the assemblage was undertaken by Leonardo Carmignani, as part of his Erasmus international doctoral programme (Carmignani 2017, Carmignani et al. 2017). My UNB student Peter Mears has been studying raw material use from the point of view of weights of materials, rather than numbers of pieces of them, for his Honours BSc degree (2020), and starting in 2020 for a Master of Science degree co-supervised by Connie Browne, which is now (summer 2021) rolling over into a PhD.

Serge obtained financing and logistical help from the Canadian Social Sciences and Humanities Research Council (SSHRC), the Ministère de la Culture et de la Communication de France, the Conseil Général du Vaucluse, the Service régional d'Archéologie, and UQAM. Students from Quebec were helped by UQAM and by the Office Franco-Québecois de la Jeunesse. In-kind help and goodwill were greatly appreciated, and in particular came from the Mairies of Monieux and Sault, the Ughetto family (Georges and Marie-Josée and their children, from Monieux, and Guy and Valérie and their children, from Sault), and Jean-Pierre Rey of Avignon. I am sure that Serge would want to mention other people, but I do not know whom. For my own research, I obtained funding from SSHRC (1991-1994), and later from the University of New Brunswick (UNB) and Dr. George R. (Rip) Rapp. I must especially thank Philippe Fernandez, for his help with this book: not only for reading and correcting each chapter, but for checking the French! I have also been greatly helped by Georges Ughetto (and the rest of the Ughetto families), by JP Rey and Monique Thiriot, by Muriel Bertrand, by Robert Russ of St.-Jean de Sault, and of course by my own family, who have been hearing all about this project for more than 30 years.

1.8. Sommaire du chapitre

Ce livre a pour objet l'étude de l'abri-sous-roche du Bau de l'Aubesier (le Bau) à travers sa situation et son contexte géographique, son évolution, et surtout son utilisation par des hominidés pendant une période de près de 300 000 ans. Le but du livre n'est pas de fournir un compte-rendu strict des fouilles qui ont eu lieu dans ce site, mais puisque ces dernières nous permettent de mieux comprendre les activités préhistoriques j'en parle souvent, et surtout des fouilles commencées en 1987, auxquelles j'ai participées. Le lecteur trouvera parfois dans le texte des commentaires personnels en marge du sujet principal; j'appelle ces anecdotes "From The Chest".

Le livre est rédigé la plupart du temps en anglais mais il comprend beaucoup de français. En effet, j'ai souhaité conserver par exemple les extraits de rapports, et donner les titres des figures et tableaux ainsi que les sommaires de chaque chapitre, pour rendre l'ouvrage plus intéressant aux lecteurs francophones.

Mon but est de synthétiser les données obtenues à partir des études du site. Au lieu de découper l'ouvrage en chapitres thématiques (par exemple, un chapitre sur la faune, le lithique, etc…), j'essaie d'expliquer en commençant par le niveau le plus bas, donc le plus vieux, tout ce que nous savons sur chaque couche ou niveau à l'intérieur du site. Il s'agit pour moi d'essayer de comprendre les activités des préhistoriques qui vivaient dans ce lieu vraiment très privilégié et beau.

Le Bau est un grand abri-sous-roche d'environ 25 à 30 m de largeur, mesurant pas moins de 26 m de la paroi du fond jusqu'à l'extérieur des dépôts. Ce site contient au moins 13 m de dépôts de sédiments, souvent fortement cimentés en une brèche très dure qui a servi à protéger les niveaux archéologiques mais à rendre leur fouille très difficile. L'abri est orienté au nord, et se situe dans le côté sud des gorges de la Nesque. La rivière a actuellement un regime intermittent, et le fond des gorges de la Nesque est souvent à sec, mais aurait pu parfois contenir plus d'eau dans le passé, en particulier lors de périodes de climat plus humide.

Je ne répéterai pas ici l'histoire géologique de la région, étant donné qu'il existe déjà beaucoup de sources en français sur ce sujet. Il suffit de dire, j'espère, que les processus de l'histoire géologique ont créé un paysage calcaire karstique escarpé où l'eau était disponible seulement ponctuellement, par endroits. Dans ce paysage on trouve deux autres ressources très utiles aux hominidés: des gîtes de rognons de silex pour fabriquer leurs outils ainsi que des abris-sous-roche et grottes, pour les abriter.

Les fouilles archéologiques au Bau ont commencées en 1901-1904 avec les travaux de Franki Moulin, qui a découvert une industrie lithique très riche, des restes fauniques, et une dent de Néandertalien. D'autres études ont suivi dans les années 1950 et 1960, puis des fouilles scientifiques pluridisciplinaires ont commencé en 1987 sous la direction de Serge Lebel (qui était alors affilié à l'Université du Québec à Montréal). Serge était un personnage visionnaire qui obtenait les permis et trouvait les moyens necessaires à la fouille d'un site de brèche si difficile d'accès. Tous les deux canadiens, nous avions été étudiants ensemble en France et il m'a offert de participer à ses fouilles, ce que j'ai chaudement accepté.

Nous avons divisé le site par mètre carré (voir Figure 1.11) et commencé le travail dans la partie du gisement où toutes les autres fouilles avaient été menées, ce que nous appellons la Tranchée Moulin. Après quelques temps, nous avons également ouvert une deuxième tranchée dans les dépôts supérieurs, la tranchée L (dans la bande L de notre carroyage). Plus tard encore nous avons ouvert des fouilles dans la partie inférieure des dépôts, dans la pente du remplissage, là où auparavant personne n'avait soupçonné l'existence de couches archéologiques. Le site était donc plus riche, plus grand, et plus compliqué que prévu. Nous avons utilisé des lettres pour marquer les niveaux archéologiques dans la Tranchée Moulin ainsi que devant cette tranchée, dans la pente du remplissage. Nous avons utilisé des chiffres pour nommer les couches dans la tranchée L, en attendant de comprendre comment et si les couches des différentes zones étaient liées les unes aux autres. Serge a dirigé une douzaine de missions et fouilles pendant la période de 1987 à 2006, mais a par la suite coupé tous contacts avec ses collègues et arreté ses travaux sur ce site (voir From The Chest: Serge).

J'ai participé à toutes les fouilles, sauf la mission courte de 2006. Dans le même temps j'ai entrepris une étude des matières premières lithiques du matériel (voir Tableau 1.1) ainsi que leurs sources possibles dans la région: j'en ai échantillonné plus de 350, pendant plus de 20 ans de prospections. Bon nombre d'autres chercheurs ont contribué à l'étude du Bau (voir "The scientific team"), et sans eux ce livre n'aurait pas été possible. Plusieurs étudiants à moi et à Serge y ont également contribué par leurs efforts sur le terrain ou dans leurs travaux universitaires, et je les en remercie.

Les campagnes de fouilles dirigées par Serge Lebel ont été soutenues financièrement et par des aides logistiques par le Conseil de Recherches en Sciences Humaines (CRSH) du Canada, le Ministère de la Culture et de la Communication de France, le Conseil Général du Vaucluse, le Service régional d'Archéologie, l'Université du Québec à Montréal, l'Office Franco-Québecois de la Jeunesse, et les Mairies de Monieux et de Sault. L'aide et l'amitié offertes par les familles Ughetto (Georges et Marie-Josée et leurs enfants, de Monieux ainsi que Guy et Valérie et leurs enfants, de Sault) de même que celles de Jean-Pierre Rey ont été précieuses pour nous. J'imagine que Serge aimerait remercier d'autres gens, mais je ne sais pas qui; ils se reconnaitront.

Quant à moi, j'ai obtenu de l'aide financière du CRSH (1991-1994) et plus tard de l'University of New Brunswick ainsi que de Dr. George R. (Rip) Rapp. Je tiens surtout à remercier Philippe Fernandez, qui a non seulement étudié la faune du site, mais m'a beaucoup aidé dans la redaction de ce livre, tant en lecteur averti qu'en "correcteur" de mon français! (Je suis responsable des erreurs qui restent.) Mes travaux typologiques en 2013 et 2014 ont été facilités par Robert Russ et sa femme Martine et j'apprécie l'amitié qui nous lie désormais. L'aide et l'amitié indéfectibles depuis les années 1980 de JP Rey et Monique Thiriot, de Georges Ughetto et sa famille, ainsi que de Muriel Bertrand et sa famille, me seront toujours très chères. Et je remercie bien sûr ma propre famille, qui ont vécu "Bau, Bau, Bau!" avec moi depuis plus de trente ans.