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The Badegoulian Culture – a matter of definition

A survey of recent research, discussions and problems within the Badegoulian culture

Abstract

The definition of the Badegoulian culture has been the matter of many discussions. The main reason for this cultural confusion is caused by the fact, that most of the Badgoulian sites are open-air sites, which lacks a stratigraphic significance. However, a few Badegoulian cave sites show an early phase dominated by transverse burins and a late phase, which is dominated by raclettes.

Furthermore, the definition problems are also complicated by the fact, that the Badegoulian culture is dominated by a coarse lithic production, which has many similarities with the Late Aurignacian. By investigating the main characteristic within the Badegoulian it is possible to determine this particular culture complex, and investigate the similarities and differences to the other cultures around the Last Glacial Maximum. Recent research in both Southern and Central Europe has shown, that there are both chronological and regional similarities as well as differences within the Badegoulian culture. Especially the chronological implications change the understanding of the colonization process after the Last Glacial Maximum, which opens the possibility of an eastern expansion of the Badegoulian towards the west from the east.

In future research it is necessary to make further comparative studies of the various Badegoulian settlements in Southern and Western Europe in order to clarify the regional differences within this complex. It is also necessary to make a dating project in order to fix the typo-chronology. Especially the dating project is a valuable tool, when we try to solve the identification and chronological problems within the Badegoulian culture.

Keywords: Badegoulian, cultural definition, chronology, lithic industry, regional studies and Last Glacial Maximum

Contents

Abstract.....	2
Contents	3
Introduction.....	4
Research history of the Badegoulian Culture – a matter of many names	4
The definition of the lithic and bone industry in the Badegoulian Culture.....	6
Differences between Early and Late Badegoulian	7
Abri Fritsch - a non typical Badegoulian site	8
Site structures and art within the Badegoulian.....	8
Climate and hunted animals	9
Distribution of the Badegoulian Culture - The Paris Basin – a core area	11
The Badegoulian Cantabrique – la Riera a key site	12
Bone and lithic technology in the Badegoulian Cantabrique.....	13
Western European habitation during the Last Glacial Maximum - fact or fantasy?	15
Wiesbaden-Igstadt	16
Comparative Badegoulian sites in Central Europe	17
The cultural influences on the Wiesbaden-Igstadt material	18
The implication of an eastern Badegoulian complex	19
Identification problems of the Badegoulian Culture	21
Conclusion	23
References.....	26
List of figures.....	33

Introduction

The Paleolithic habitation during the Last Glacial Maximum (LGM) was dominated by the Badegoulian technocomplex, which has been dated to the Lascaux oscillation and the Dryas Ib (18000-17000 BP).

The concept of the Badegoulian Culture is rather new in the French archaeology and has been the subject of confusion and many discussions. In the following paper, the emergence of the Badegoulien as an independent cultural phase is described together with a discussion of how we define the Badegoulian as an independent culture. Moreover it is necessary to investigate the main characteristics within the Badegoulian concerning the climate aspects, faunal changes, site distribution, chronology, stratigraphy on key sites, lithic industry, bone studies, site structures and art. Hereby it should be possible to determine how the Badegoulian is both similar and different to the Late Aurignacian, Epigravettian, Solutrean and the Magdalenian. Furthermore, it is the aim of this paper to clarify the geographical distribution of the Badegoulian in the light of new research and recent discussions, especially regarding the emergence of a Badegoulian Cantabrique and a newly discovered Badegoulian complex in Central Europe. Normally it has been accepted, that the LGM led to the complete desertion of humans in northern Central Europe. The area was abandoned by the end of the Gravettian and recolonized some time in the Bølling oscillation during the middle part of the Magdalenian Culture. The Badegoulian complex in north Central Europe challenges this hypothesis. Finally, the early AMS dates from the Badegoulian sites in Central European questions the origin of both the Badegoulian and the Early Magdalenian.

Research history of the Badegoulian Culture – a matter of many names

The name of this cultural stage has changed through the last decades from *Proto-Magdalenian* (Cheynier 1939) to *Magdalenian 0* and *Magdalenian I* (Bordes 1968), which has caused some confusion regarding the definition of this cultural phase. The term we use today is the Badegoulian. Through the research history the Badegoulian culture has always been associated with the Magdalenian. Furthermore, the Badegoulian has been interpreted as the onset and origin of the Magdalenian. But recent research has proven, that there are similarities and major differences between these two successive cultures. Especially regarding the Badegoulian lithic industry, which

shows similarities with the Aurignacian. These identification problems have caused the various definitions of the Badegoulian culture to change through the 20th century. The research history regarding the Badegoulian Culture began with the publication of an article by Cheynier (1939) on the “primitive Magdalenian” of Badegoule. Here he applied the term “Proto-Magdalenian” to the early Magdalenian. In this publication a great difference between the earliest and the later Magdalenian is suggested. The general observations from the levels at Badegoule are showing a subdivision of the raclette, which was interpreted as the main tool within the Protomagdalenian.

Layer Ia: with few raclettes, and many tools on flake particularly burins on notch.

Layer Ib: with many raclettes, fewer endscrapers, and many multiple tools.

Layer Ic: with raclettes, but with backed bladelets appearing in the level of transition.

Cheynier suggests a connection of this earliest Magdalenian to the Aurignacian, on the burins and endscrapers. This is however rejected by Bordes (1968), which describes the initial Magdalenian in two phases 0 and I, which is dominated by a crude flake-based industry. Magdalenian 0 has few raclettes, transverse burins on notch and star shaped percoirs. This is followed by Magdalenian I, with more raclettes, multiple percoirs, splintered pieces and fewer transverse burins on notch. A great change is visualized between the Magdalenian I and Magdalenian II. The Magdalenian II is dominated by a bladelet industry. Bordes also rejects a connection between the Solutrean and the Magdalenian O and I. Other researchers also separates the early Magdalenian into different phases, which is observed in a number of publications during the 1960's by Cheynier (1965, 1966, 1967). Especially the work of Vignard and Vacher (1965, 84ff) on the “Gros Monts de Nemours” sites are particular interesting, because Gravettian, Magdalenian and Initial Magdalenian material turned up, and was dealt with in a series of publications between 1956 and 1965. The real breakthrough for the term Badegoulian were made by Delarue, Delarue and Vignard. As early as 1958, they remark that the Protomagdalenian I should not be so described, resembling as it does the Magdalenian so little, while having undeniable connections to the Aurignacian (Delarue *et al.* 1958, 536ff). In 1963, the same authors suggest the term “Badegoulian” for the material as being the best attribution (Delarue & Vignard 1963, 194ff). Cheynier also made use of the term “Badegoulian” in his book from 1965

“Comment vivait l’homme des caverns à l’âge du Renne”, where he emphasize the individuality of the period (Cheynier 1965).

The Solutrean civilization with their genius for flat retouche, and for bonework (that culminated in the eyed needle) disappeared: “Une fin de monde se produit qui laisse la terre de France vide d’habitants”.

The Badegoulians “barbares nordiques” repeople it, only to disappear in their turn, perhaps 2000 years after, leaving the land to the Magdalenian groups moving northward from Italy and Mediterranean France (Cheynier 1965, 222f). The term “Badegoulian” were taken over by Allain and Fritsch (1967, 83ff), to describe the material from their excavations at the key Badegoulian site of Abri Fritsch (Fig. 1 & 8). Here they could place the Badegoulian stratigraphically between the Solutrean and the Magdalenian. They even conclude that if a connection between the Badegoulian and either the Solutrean or the Magdalenien were to be demonstrated the term “Badegoulian” would still have value as an individual techno-complex. This initial article by Allain and Fritsch is the first detailed statement on the structure of the initial Magdalenian since the 1939 article of Cheynier on Badegoule (Cheynier 1939, 354ff). The use of the term Badegoulian quickly gained currency, being applied by Schmider in her study of the Upper Palaeolithic of the Ile-de-France (Schmider 1971) and being employed as a term at university courses in Cambridge and Paris.

The definition of the lithic and bone industry in the Badegoulian Culture

The cultural transition between the Solutrean and the Magdalenian has, as described above, been a matter of discussion through many years, especially in the Paleolithic research in France. The term we use today is the Badegoulien. The Badegoulian lithic industry differs considerably from the Solutrean one (Trotignon *et al.* 1984). Bifacial retouche disappears and tools were made on flakes, which gives the Badegoulian industry a crude and coarse appearance. The lithic raw material in the Badegoulian assemblages is dominated by local sources often of poor quality, which has been procured in a 30 km radius of the site. Unlike the more exotic procurement strategy, which is observed in the Magdalenian (Djindjian *et al.* 1999, 267). The preferred raw material in the Badegoulian culture is various types of flint, but they have also used quartzite in their tool production (Djindjian *et al.* 1999, 224f).

The Badegoulian is characterized by two specific tool types: *the transverse burin on notch, with a large and robust beveled edge, and the raclette*, which is a small flake with an abrupt retouche (Fig. 2). These rather coarse lithic tools have been used for woodworking and their appearance in the industry may be interpreted as reflecting reforestation. Furthermore the Badegoulian bone industry was produced by a unique technique. The groove-and splinter method widely used for working antler during the Magdalenian was not utilized during the Badegoulian, instead reindeer antlers were worked by direct percussion, which was used to modify the often flattened *sagaies* sections (Trotignon *et al.* 1984; Schmider 1990, 41ff; Djindjian *et al.* 1999, 223ff).

Differences between Early and Late Badegoulian

The statistic proportion of raclettes and the transverse burins has also been used to differentiate the various phases of the Badegoulian. The earliest phase is characterized by the absence of raclettes and the abundance of transverse burins, which has been observed from one of the key Badegoulian sites (Abri Fritsch – level 6). This early phase is now called *Badegoulien inférieur*, but it has previously been called Magdalenian ancient or Magdalenian 0, primarily because it has been regarded as the onset of the Magdalenian Culture (Trotignon 1984; Fig. 3).

During the Badegoulian the percentage of raclettes increases through time, while the transverse burins becomes less numerous. In the late Badegoulian level (3a) in Abri Fritsch the raclettes represents 83% of the total tool kit (Fig. 3). The late Badegoulian is thus characterized by a high concentration of raclettes in the tool kit (Trotignon 1984). This late Badegoulian phase is at present called *Badegoulien supérieur* but previously it was called Magdalenian I, because it too was interpreted as being the beginning of the Magdalenian. There are several sites besides Abri Fritsch such as Laugerie-Haute, Badegoule, Cassegros, le Cuzoul and Pégourié, where the early and late phase of the Badegoulian culture has been observed (Djindjian *et al.* 1999, 224; Fig. 1).

It is thus clear, that there are some main differences between the Badegoulian and the beginning of the Magdalenian, which can be observed in the lithic production. The Badegoulian is dominated by a coarse flake production, whereas the Magdalenian phase II is based on a microlithic blade industry.

Although the lithic industry from the Badegoulian culture is very different from the Magdalenian industry, there are overall similarities regarding the structure of settlements, which for both cultural groups are dominated by open-air sites.

Abri Fritsch - a non typical Badegoulian site

Most of the Badegoulian sites are open-air sites, with the exception of Abri Fritsch, which is a rock shelter site. On the open-air sites it is often difficult to interpret the different synchronic finds from each other. However, at a site like Abri Fritsch it was possible to register a unique stratigraphic sequence of 23 horizons, documenting the transition from the Solutrean to the Badegoulian and then the long evolution of the Badegoulian (Trotignon *et al.* 1984; Fig. 3). In Abri Fritsch the Solutrean disappears suddenly at the onset of a new cold period after the Laugerie oscillation. The rock shelter was then reoccupied at the beginning of the Lascaux oscillation (Fig. 4). The earliest Badegoulian level in Abri Fritsch consisted of three layers (6, 5d and 5b), where layer 6 was dated to 17960 +/- 350 BP (Leroi-Gourhan 1967). These layers overlay the Solutrean layers from Abri Fritsch. The same stratigraphical order with Badegoulian layers lying above the Solutrean layers is registered at other sites like Laugerie-Haute, Cassegros or Badegoule (Djindjian *et al.* 1999, 224). The late Badegoulian in Abri Fritsch also consisted of three layers (5a, 4 and 3), where layer 3 was dated to 17130 +/- 550 BP (Fig. 3 & 5). These chronological and stratigraphical observations are rare, because most of the Badegoulian settlements are open-air sites (Trotignon *et al.* 1984).

Site structures and art within the Badegoulian

On the Badegoulian open-air sites only a few site structures are known. However, at the site of Plateau Parrain, a rectangular structure made of tent-stones has been registered (Gaussen 1980; Fig. 6). This particular shape has also been observed on many Magdalenian sites such as Gönnersdorf, Étiolles W 11 and Le Closeau, locus 46 (Jöris & Terberger 2001, 171f). The strong parallels of this particular structure indicate the continuous relationships between the Badegoulian and Magdalenian Culture. There are also indications of a possible connection between the art from the Badegoulian and the Magdalenian Culture. Arguably it is not easy to register these similarities regarding their art. Mainly because the traces of cave art are quit rare in the Badegoulian and objects of portable art are almost non existent from the open air sites (Djindjian *et al.* 1999, 228). It is however clear, that

the depiction of real groups, flocks or herds of animals like those of Lascaux came into fashion during the Solutrean, Badegoulian and Early Magdalenian period. Examples of rock paintings, which has a possible Late Solutrean or Badegoulian date can be observed in Badegoule (Cheynier 1949), Lascaux (Bataille 1955, 113) or Pech-Merle (Lemozi 1929, Pl. 30). At Grotte Cosquer one of the Bisons has been AMS dated to 18500 +/- 180 BP, which is on the transition between the Late Solutrean and the Badegoulian (Clottes 1996; Clottes & Courtin 1995; Clottes *et al.* 1992, 122ff; 1996; 1997, 324ff). A similar bison from Grotte Cosquer was dated to the Gravettian (26250 – 27350 BP), which causes some problems with the direct dating of the rock paintings (Clottes *et al.* 1997, 324ff; Fig. 7). Either the depiction style of the bison stayed the same through 8000 years, or the bison dated to the Gravettian is indeed contemporary with the bison from the Late Solutrean/Badegoulian. This could be the case, if the Gravettian bison had been drawn with charcoal left on the ground by people who came into the cave during the Late Solutrean or Badegoulian. A similar problem concerning the direct dating of the rock paintings has been discussed in the case of Grotte Chauvet by Züchner (1996, 25ff). If this interpretation indeed is the case, then the rock art from the Badegoulian is much richer than previously expected. Especially the depiction of the herds is a popular motif from the Magdalenian portable art, which proves the continuity of this motif during the periods of the Badegoulian and Magdalenian. Although the motif stayed the same, the animals depicted did not. Mainly because the climate and faunal situation during the Badegoulian and Magdalenian changed. The faunal changes during the Badegoulian was caused by some major geographical and climatic changes, which occurred around the LGM. All these changes had a major impact on these hunter gatherers.

Climate and hunted animals

During the Last Glacial Maximum (LGM) (22500 – 17000 BP) the northern part of Europe was more or less covered by ice (Fig. 8). In Abri Fritsch there are pollen data, which indicates two warm oscillations, which followed the LGM (Leroi-Gourhan 1980; 1984). The first one corresponded to the Würm III-IV interstadial (Laugerie oscillation), dated to 19200 BP, synchronic with the Solutrean (Fig. 4). During this episode, aboreal pollen arose to 22 % and such thermophyllous species as *Quercus*, *Ulmus*, *Tilian caroinus* and *Hedera* were present in the landscape. Though, *liguliflorae*, indicators of a steppe climate, were still numerous with 46%. The pollen analysis indicates a steppe tundra with a scarce vegetation in Central and western part of Europe. The

Lascaux oscillation (18-17000 BP), which followed the Laugerie oscillation after a brief cold dry episode, was more humid (Fig. 4). The pollen spectra is dominated by steppe grasses as well as ferns, *salix*, *Alnus* and *Tilia* as well as maritime Pine (*Pinus pinaster*) has been observed in several cave sites, which coincides with the Badegoulian occupation (Schmider 1990, 41ff). The date of this Lascaux oscillation at Abri Fritsch is 17500 BP and coincides with the Badegoulian occupation (Fig. 4 & 5). This rather favorable climate change could be associated with the high frequency of open-air sites, which has been registered from the Badegoulian Culture. An article by Demars (2004) is a rather simplistic example of a synthesis that tries to use major climatic trends as explanations for changes in archaeological site geographical distribution over long periods. He concludes, that most of the Badegoulian sites are situated on higher elevated grounds and that there is a high open-air site frequency of this particular culture compared to the Gravettian and Magdalenian. Again this suggests, according to Demars (2004), a correlation between the high frequency of open-air sites and the milder temperature trends during the Badegoulian Culture, because the hunter-gatherers settled more in the open when it was warmer.

The climatic changes had some consequences for the fauna situation in Western Europe (Delpech 1979; 1983; Laville *et al.* 1983; Djindjian 1999, 57ff). Reindeer (*Rangifer tarandus*) were present in Europe throughout the LGM, but before 18000 BP, they were associated either with forest-dwelling species such as red deer (*Cervus elaphus*), or with horse (*Equus sp.*), or with mammoth (*Mammuthus sp.*) and large bovids (e.g. *Bos primigenius*, *Bison sp.*). Biometric analysis of the reindeer bones indicates a clear reduction in size around 20000 BP. This change is probably related to the spread of less favorable environments and coincident feeding difficulties due to either thick snowpacks or to the frequent formation of icy crusts on top of the snow. During the brief improvement corresponding to the Laugerie interstadial (also called the Würm III-IV interstadial; Fig. 4), the forest expanded, but the reindeer continued to be the dominant herbivore species. Following this humid but still cold phase, very cold and dry climates caused a marked decrease in tree growth (with pine, birch and willow). Reindeer were still abundant, but other steppic animals were also frequent, including horse and saiga antelope. This fauna assemblage is characteristic of the LGM. The Lascaux interstadial saw a general improvement of conditions, and forests expanded, while horse and antelope decreased. The Lascaux interstadial was then followed by the Dryas I phase, which is a colder period that witnessed open vegetation supporting reindeer, horse, saiga

antelope and mammoth (Schmider 1990, 41ff; Fig. 4). There are also indications of a substantial Badegoulian habitation during this rather cold phase.

This particular faunal picture has been observed in the Badegoulian layers of Abri Fritsch, which includes horses, reindeer, ibex, foxes and hares (Poulain 1984; Fig. 9). This faunal assemblage has similarities with the faunal situation during the Magdalenian. The reindeer remains is the dominant species in Abri Fritsch (except level 4), however horses are also represented by a considerable numbers. Interesting is also the presence of squirrels, which have been found in the layers in Abri Fritsch dated to the Lascaux oscillation (Fig. 9). This could indicate the presence of trees near the Abri Fritsch. Schmider (1981, 259; 1990, 49) has already suggested that the common tools from the Badegoulian (raclette and the transverse burin on notch) could have been used for woodworking.

These climate and faunal changes had an impact on the Badegoulian hunter-gathers. Based on site frequencies from the Badegoulian Culture, Western Europe saw a very substantial collapse of human population during the LGM, compared to the cultural groups, which were present before and after the Pleniglacial. Still, human populations, reduced in size and number, were always present in Western Europe. One of the main core areas during the Badegoulian Culture was the Paris Basin.

Distribution of the Badegoulian Culture - The Paris Basin – a core area

The core area of the Badegoulian complex is the centre of the Paris Basin (Fig. 1). One group is located in the Creuse Valley south of the Loire, not far from Abri Fritsch. This group includes sites as La Pluche, Le Silo and Saint-Fiacre. North of this group lie Cèrè-La-Ronde and La Chapelle-Saint-Mesmin. A third group clusters in the small valleys of the Stampian zone, which includes Saint-Martin-de-La-Roche, Ballancourt, Chaintréville and Les Bois des Beauregards (Schmider 1971; 1990, 41ff). Several potential Badegoulian sites have been identified southeast of the Paris Basin, but Hemmingway (1980) has argued that only Farincourt and Le Porondes-Cuèches are probable. During the last overview of Badegoulian sites in France, the number of settlements has increased considerably, and is now believed to be distributed all over France. In Aquitaine: les Charentes (Le Placard, abri Paignon à Montgaudier). In Périgord (Lauzerie-Haute, Badegoule, les Jeans-Blancs, le Pech de la Boissière, Guillassou, Solvieux, Birac III and Raymondin). In le Lot (le

Cuzoul à Vers, Pégourié, Les Peyruges), l'Agenais (Cassegros), le Quercy (Le Piage), la Gironde (Saint-Germain-la-Rivière, Houleau), le Languedoc (Lassac, La Rivière, Bize, Camparnaud, Les Piles-Loins), the Pyrénées faiblement (Enléne), The Loire Basin (Abri Fritsch, Le Grand-Pressigny, Saint-Fiacre, La Pluche, La Chapelle Saint Mesmin), in the Auvergne (Le Blot, Rond-du-Barry, Cottier) and the Paris Basin (Les Bois des Beauregards) (Djindjian *et al.* 1999, 223).

The most important Badegoulian sites with stratigraphical sequences are Laugerie-Haute, Badegoule, Abri Fritsch, Cassegros, le Cuzoul and Pégourié, which contains the typological and chronological evolution of the lithic industry in the Badegoulian Culture (Djindjian *et al.* 1999, 224). Recently Bosselin and Djindjian (1999, 153ff) have also argued for a *Cantabrian Badegoulian* spreading in Spain and Portugal.

The Badegoulian Cantabrique – la Riera a key site

The key sites of the Badegoulian Cantabrique include sites as La Riera (layer 8-14. 18200-17200 BP) (Straus & Clark 1986), Las Caldas (layer 2-7. 18300-17000 BP) and Cabeco de Porto Marinho (17500 BP) (Djindjian *et al.* 1999, 222f; Fig. 10). According to Djindjian *et al.* (1999, 237), the dates of the Badegoulian Cantabrique are almost synchronic to the dates from the Badegoulian culture in France. However, when we look at the two dates from La Riera (layer 12 – 17210 +/-350 BP and layer 16 – 18200 +/- 610 BP) it is evidently clear, that these two dates has been included in Djindjian *et al.* (1999), because they fit into the Badegoulian chronology (Fig. 10). Djindjian *et al.* (1999, 237) do not mention the other dates from La Riera, which are inconsistent (Fig. 11). This error is mentioned because the interpretation of the Badegoulian Cantabrique has come to light especially by re-analyzing the cave site La Riera on the northeastern coast of Spain.

The palaeoclimatological framework underlines a very cold context, with some more humid episodes during the Badegoulian sequences in La Riera (Laville 1986, 40ff). The results of the statistical processing of the stone industries reveal the presence of a Badegoulian Cantabrique (layers 8-12), which are dominated by a coarse flake industry, producing raclettes, retouched pieces and a few transverse burins (Fig. 12 & 13). This early phase of the Badegoulian Cantabrique is thus different from the early phase of the Badegoulian in the Paris Basin, which is dominated by transverse burins (Straus & Clark 1986, 75ff). These differences in the tool industry could be

chronological. However, when we look at the dates from Abri Fritsch and La Riera there seems to be some inconsistency in the C-14 dates from La Riera, spreading from 15860 +/- 330 BP to 20690 +/- 330 BP, within the same layer (8), whereas the layers from Abri Fritsch seem to be more homogenous in the lithic industry as well as in the spreading of the C-14 dates from 17960 +/- 350 BP (layer 6) until 16530 +/- 550 BP (layer 4) (Fig. 5 & 11). This could indicate that some of the layers at La Riera are mixed or contaminated and it can therefore not be refused, that some of the layers are mixed, causing a non-typical lithic material. Straus (1986, 19) also acknowledges this problem “*There are inversions among the determinations made on both charcoal and bone. Some of the dates are so far out of stratigraphic order that they must be the results of major contamination*” One of the main reasons for these inconsistent dates, is because the charcoal samples consist of many pieces. This was made in order to get enough charcoal for the dates (Fig. 11). At that time they did not have access to AMS dates, which only requires a small amount of charcoal compared to the older C-14 method.

An example of the contamination on La Riera is observed in Layer 11 (Straus & Clark 1986, 117: Fig. 8.53 – 1-3), where some backed bladelets were found (Fig. 14). The backed bladelets are normally not observed in a Badegoulian context, unless they are a distinctive part of the Badegoulian Cantabrique? This question needs to be discussed by Bosselin and Djindjian (1999). They set the Late Badegoulian Cantabrique in La Riera between layers 14 to 16 (Bosselin & Djindjian 1999, 156), where the backed bladelets are observed in all these layers (Fig. 15 & 16). Here we observe the same inconsistency in the C-14 dates spreading from 15690 +/- 310 BP (layer 14) to 18200 +/- 610 BP (layer 16) (Fig. 11). These problems concerning the C-14 dates could also be caused by the material, which has been dated. The results of the dates of bones and charcoal from the same layer are not the same in La Riera, because of contamination or the fact that dates on charcoal tend to give an earlier date compared to dates made on bones (Straus 1986, 21; Fig. 11).

Bone and lithic technology in the Badegoulian Cantabrique

Regarding the bone technology, there is observed a continuity of the technological choices from the Solutrean to the Badegoulian Cantabrique. The noteworthy continuous type is the *sagaie* with a single basal bevel occupying more than a third of the length of the piece (Fig. 17). This type is

generally considered diagnostic of the late Solutrean, Badegoulian and the Badegoulian Cantabrique (Djindjian *et al.* 1999, 223).

The late lithic phases of the Badegoulian Cantabrique has been registered at La Riera in layer 14-16, which also show a dominance of raclettes, retouched pieces, some transverse burins, end scrapers and a few backed bladelets (Straus & Clark 1986, 128ff; Fig. 8.66-8.77; Fig. 15 & 16). This industry and tool kit corresponds more to the tool assemblage from for instance Abri Fritsch, where the late Badegoulian are dominated by raclettes (Trotignon 1984). Furthermore there has been registered a small microblade production in the Badegoulian Cantabrique (Straus & Clark 1986, 137. Fig. 8.77; Fig. 15 & 16), which could indicate, that this feature is a distinct part of the Late Badegoulian Cantabrique compared to the Badegoulian complex in the Paris Basin. Recent research from the cave of Le Tallis des Coteaux seems to support the fact that the bladelet production is an integrated part of the Badegoulian Culture (Primault *et al.* 2007, 6ff). The cave site Le Tallis des Coteaux is lying approx. 20 km south of Abri Fritsch and contains a whole stratigraphic sequence from the Aurignacian to the Middle Magdalenian. The Badegoulian layer (Vd) has been dated (18140 +/-85BP on reindeer bones) and contains a very typical assemblage dominated by raclettes and transverse burins (Primault *et al.* 2007, 9ff). The latter sequence, level AG-IIIa has however provided an assemblage with original typo-technological features evoking the Magdalenian, dominated by a distinct bladelet production similar to the one observed in the Late Badegoulian Cantabrique in La Riera (Fig. 14, 15 & 16). This particular bladelet production from Le Tallis des Coteaux layer Ag-IIIa has been dated to 17130 +/- 65 BP and 16920 +/- 170 BP, which is closer to the Badegoulian and Magdalenian transition. These new suggestions of a possible bladelet production within the Badegoulian are possible, however many other sites must be investigated and dated in order to acknowledge this hypothesis. In general it is my opinion that it is necessary to make some more comparative studies and dates in order to establish the Badegoulian Cantabrique as a distinct regional group of the Badegoulian. Furthermore, there seems to evolve some regional differences within the Badegoulian culture reflecting both the geographical and chronological setting. Part of this identifying problem within the Badegoulian culture has also been discussed by (Street & Terberger 1999, 266; 2002, 694). They have interpreted a possible Badegoulian habitation on several sites in Central Europe. The key sites in their discussion are Wiesbaden-Igstadt, Kastelhöhle-Nord and Grubgraben, which has a similar and even earlier dates

compared to the classical Badegoulian sites in the Paris Basin (Street & Terberger 1999, 266; Terberger & Street 2002, 694).

Western European habitation during the Last Glacial Maximum - fact or fantasy?

Many researchers has argued that Northern Europe have been unoccupied during the LGM (Schmider 1990, 51; Bosinski 1986, 65f; 1990, 131; 1992, 84; Gamble 1986, 205; Housley *et al.* 1997, 33ff; Fig. 8). They all proposed a re-colonization of northwestern Europe constrained by the retreat of the ice. As Housley *et al.* (1997,33) concludes “*We acknowledge it is possible to show categorically a lack of human occupation in this part of Europe, but currently the best working hypothesis is absence rather than presence before 14000-13500 BP*”. Although Weniger (1990) already had published some early C-14 dates from two Magdalenian sites in Southern Germany (Hohle Fels IIa and Schussenquelle) showing C-14 dates between 19000 and 15000 BP. Weniger (1990,189) concludes “*that the study area was not completely depopulated during the LGM*”. It is however certain that there was a major reduction of settlement intensity in Central Europe after the Gravettian (Hahn 1969; Bosinski *et al.* 1985).

Furthermore new calibrations of especially the Magdalenian sites in northern Central Europe increases the true age of the Magdalenian radiocarbon dates by some 2500 years and puts them well before the Bølling oscillation (Street *et al.* 1994; Jöris & Weniger 2000, 47ff). These dates indicates an earlier colonization of the central European plains than previously, which agrees better with the faunal evidence of the small and large mammals found on these early Magdalenian sites (Street 1997, 55; Fig. 18). It is thus clear, that the central European region was potentially occupied sporadically during the early parts of the Magdalenian. The same tendency were already registered on the Paleolithic burial of a 30-40 year old man from the Mittlere Klause cave in Bavaria, which was C-14 dated to 18200 +/-200 BP in the 1970s (Protsch & Glowatzki 1974). The new date on the burial (18590+/- 260 BP) supports the previous result, which confirms a human burial close to the LGM (Terberger & Street 2002, 694f). Recently, the site of Wiesbaden-Igstadt in the Rhineland displayed some dates, which clearly indicates a tiny occupation during the LGM followed by a major demographic expansion in the beginning of the Magdalenian (Street & Terberger 1999, 266; Terberger & Street 2002, 694).

Wiesbaden-Igstadt

One of the key sites in this current discussion regarding a possible Badegoulian occupation in Central Europe is the German site of Wiesbaden-Igstadt (Fig. 1). The site was discovered at the end of the 1980's in southern Hessen, when finds of bones and lithic artifacts were ploughed up. The site was subsequently excavated from 1991 until 1995 by Dr. Thomas Terberger (1992; 1994; 1995; Fig. 19). The lithic material from Wiesbaden-Igstadt was first interpreted as having a Gravettian character (Terberger 1992), which were similar to sites of sprenglingen and Mainz-Linsenberg all lying in the same region (Bosinski 1995a; 1995b). This interpretation was revised by the analysis of the lithic assemblage, which entirely lacks backed laminar pieces typical of the Upper Perigodian/Gravettian, but contains flake tools, burins and carinated and nosed scrapers. The best resemblance of the lithic assemblage appeared to be connected to industries of an Aurignacian type (Serangeli 1996; Terberger & Serangeli 1996; Fig. 20). A number of bone specimens selected for radiocarbon dates gave a heterogeneous result, which did not support an Aurignacian date (Fig. 21). The datings were believed to be unreliable. A late glacial date obtained by conventional dating methods was obtained from a surface find and perhaps discarded, but two accelerator dates on excavated material (Bone and a tooth), were also not very different from the earlier dates. In an attempt to confirm the Aurignacian context of the site a further series of bones was dated by the Oxford AMS unit (Pettitt *et al.* 1998). The results of this new dating program resemble the previously obtained AMS date on bone, and suggest that the occupation of the site is indeed appreciable younger than the supposed Aurignacian context and the interpretation of the site must be reconsidered (Street & Terberger 1999; Fig. 21).

The lithic assemblage from Wiesbaden-Igstadt, resemble the Badegoulian industry (Fig. 20). These industries are both characterized by the absence or low frequencies of laminar and backed pieces and contain varying proportions of flake tools and types, such as carinated and nosed scrapers. The most obvious parallel to the Wiesbaden-Igstadt assemblage in both geographically and chronological terms are the Badegoulian sites in the Paris Basin (Schmider 1971). Those sites which are C-14 dated, suggests that the French Badegoulian, which extends relatively far to the north (Paris Basin) are slightly younger (Abri Fritsch – 17980 +/- 150BP; Laugerie Haute Est - 18260 +/- 360 BP; Cuzoul à Vers - 18400 +/-18400 BP; Pégourié – 17420 +/- 390 BP) compared to the dates from Wiesbaden-Igstadt (17210 +/-135 BP to 19320 +/-240) (Fig. 18 & 22).

Comparative Badegoulian sites in Central Europe

One of the more important comparative sites was the Kastelhöhle-Nord cave from the northwestern part of Switzerland. The middle horizon of the site had been typologically dated to the early Magdalenian (Bay 1959) and later linked to the French Badegoulian by Le Tensorer (1986, 31). However, the Badegoulian hypothesis could not be supported by the late C-14 dates of the middle horizon (13990 +/- 150 BP and 7200 +/- 160 BP) (Höniesen *et al.* 1993, 156). The dates were considered to be contaminated and it seemed important to attempt to date the Middle Horizon once again. The new AMS dates were taken from faunal material with human modification, which gave some consistent results clustering around 19000 BP (Fig. 18 & 22). The C-14 results supports the previously interpretation of the typological dating of the middle horizon and demonstrates a human presence in northwest Switzerland shortly after the LGM. Wiesbaden-Igstadt and Kastelhöhle-Nord (Middle Horizon) reveal many similarities in their chronological position and in the recovered lithic material. At both sites there has been registered a major flake tool production dominated by archaic elements such as nosed and carinated end scrapers, whereas regular blades and backed components are absent (Terberger & Street 2002, 696ff; Fig. 23).

The same typological analogy is observed on the site Zoitzberg in Thuringia close to Gera. Zoitzberg had already been described by Feustel (1965), which dated the assemblage to the early Magdalenian or the Badegoulian. Here there are also found backed bladelets in the assemblage together with nosed and carinated scrapers (Fig. 24). The situation on Zoitzberg indicates that there could be several sites belonging to the Badegoulian in Central Europe. The main critique on the material from Zoitzberg is the lack of C-14 dates of this material. Another example of a possible Badegoulian site has been suggested by Terberger and Street (2002,697) for Langmannersdorf in Austria (Fig. 25), which has been dated to 20580 +/-170 BP and 20260 +/-200 BP and Bockstein-Törle in Baden-Württemberg. All these sites contained the same material as Wiesbaden-Igstadt and Kastelhöhle-Nord. This could indicate that there are many other similar sites, but they need to be properly dated in order to establish their cultural resort.

The fact still remains, that these tool variations and flake production suggest a close parallel for all these Central European sites to the French Badegoulian, which indicates the presence of this technocomplex as far east as the Swiss Jura and Thuringia (Terberger & Street 2002, 696).

In light of these new Badegoulian sites in Central Europe it is necessary to investigate if there could have been other parallel industries to the Wiesbaden-Igstadt and Kastelhöhle-Nord assemblages during the LGM?

The cultural influences on the Wiesbaden-Igstadt material

The discussed material from Wiesbaden-Igstadt and Kastelhöhle-Nord could also have similarities in the lithic industry from other sites in the eastern part of Europe. In this part of Europe the late glacial sites are characterized by industries described as Epigravettian (Djindjian *et al.* 1999, 239ff). Many of the Epigravettian sites lack actual C-14 dates, in order to establish their chronological relationship to Wiesbaden-Igstadt and Kastelhöhle-Nord (Fig. 18 & 22).

The site of Grubgraben in Austria is an exception, where it is possible to compare both the assemblage and the C-14 dates from this site. The lithic assemblage from Grubgraben (layer KS3) appears to show a degree of typological and technological resemblance to the Igstadt and Kastelhöhle material, in the flake tool production (Brandtner 1996; Street & Terberger 1999, 270; Terberger 1998, 403ff; Fig. 26). However, Grubgraben also contains a laminar industry, which for the Epigravettian is quit normal (Montet-White 1990; Fig. 27).

During the re-examination of Grubgraben the site was interpreted as being an Epigravettian site (Montet-White 1990). Although the lithic assemblage from level 4 and 3/2 in Grubgraben have clear features, which correspond to the Badegoulian industry (Fig. 26). The site seems to be almost synchronic in age with the Badegoulian Culture, because level 4 in Grubgraben has been dated to 18860 BP (Damblon *et al.* 1996, 185; Einwogerer & Käfer 1998; Fig. 18 & 22). Furthermore, some thermoluminescence measurements of loess deposits date the occupation of Grubgraben to between 22000 and 19000 BP (Brandtner 1996, 123). The archaeological horizons were dated by C-14 to 16800 +/- 280 BP and 19270 +/- 80 BP. In light of these dates it can be concluded that Grubgraben is also synchronic with Wiesbaden-Igstadt and Kastelhöhle-Nord. However, the Wiesbaden-Igstadt and Kastelhöhle-Nord material lacks these laminar pieces, which could be explained chronologically by the relatively early date of the Wiesbaden-Igstadt and Kastelhöhle assemblages compared with the French Badegoulian sites. In the case of Grubgraben, it is however clear that the

laminar pieces is an integrated part of the assemblage, which supports the original typological dating to the Epigravettian.

Finally, these dates have also supported a possible typological dating of the Grubgraben material to the Aurignacian V, which also haunts the Eppigravettian as well as the Badegoulian. It has been suggested, that the Grubgraben layer KS3 shows great similarities with the Aurignacian V assemblage from Laugerie-Haute (Peyrony & Peyrony 1938; Street & Terberger 1999, 270). In general several dated eastern Central European assemblages from the period close to the Pleniglacial are described as Epi-Aurignacian (Oliva 1996, 70) or as Late Aurignacian (V) (Kozłowski 1996). One of these sites is Stránská Skála in Moravian. The Stránská Skála IV assemblage is dominated by carinated scrapers, burins and a few backed bladelets (Fig. 28). The site has been dated to 18820 +/-120 BP and 17740 +/-90 BP (Oliva 1996).

It is possible that other eastern Central European assemblages described as “Epi-Aurignacian” or “latest Aurignacian” (Kozłowski 1996) might also be generally related to the Wiesbaden-Igstadt and Kastelhöhle-Nord industry. These assemblages are often characterized as having Aurignacian elements and low frequencies of backed elements compared to a typical Epigravettian industry. The lack of backed pieces on some sites could have a functional explanation. Another explanation involves a limited chronological distribution of the Aurignacoid assemblages around the Pleniglacial, which allows us to interpret these sites as a possible eastern equivalent of the French Badegoulian industry. An alternative explanation could argue, that these settlements (Wiesbaden-Igstadt, Kastelhöhle-Nord, Grubgraben, Zoitzberg, Bockstein-Törle and Langmannersdorf), actually belongs to an independent cultural group (suggested terminology - *Grubgraben*) lying between the French Badegoulian and the eastern Epigravettian (Terberger 2003; Fig. 29). This hypothesis gains weight in light of the early dates from Wiesbaden-Igstadt, Kastelhöhle-Nord and Grubgraben (Fig. 18 & 22). However, the dates could also suggest that the Badegoulian culture has evolved and expanded from the eastern part of Central Europe and not from the French area.

The implication of an eastern Badegoulian complex

To answer the questions above it is necessary to compare the dates from the French Badegoulian with the dates from Central Europe. The radiocarbon dates from the Early Badegoulian in France is

lying between 18400 +/- 400 BP (Cuzoul á Vers) and 17280 +/- 350 BP (Abri Fritsch), which is younger than the earliest dates from Wiesbaden-Igstadt (19320 +/- 240 BP) and Kastelhöhle-Nord (Middle Horizon -19620 +/- 140BP). These data could make a Badegoulian expansion into France from Central Europe possible, which contradicts the current picture of a western expansion of the Badegoulian Culture (Terberger & Street 2002, 697f). Why is the dates from the French Badegoulian younger compared to the dates from Central Europe? First of all the French dates are all based on conventional radiocarbon dates and new AMS dates may give some higher ages. This phenomenon is observed at the newly excavated Badegoulian cave site of Tallis des Coteaux, where a late Badegoulian material, with laminar industries was AMS dated to 18140 +/- 85 BP (Primault *et al.* 2007, 9ff). According to Terberger and Street (2002, 696), the French Late Solutrean dates fall into the 20th millennium BP group, irrespective of whether they are conventional or AMS dates. The dates of the Late Solutrean and the Early Badegoulian are mutually exclusive, whereas the Central European dates from Wiesbaden-Igstadt, Kastelhöhle-Nord and Grubgraben are all lying between these dates (Fig. 18 & 22). On the basis of these facts Terberger and Street (2002, 696) believes that both Wiesbaden-Igstadt, Kastelhöhle-Nord and Grubgraben can be assigned to the Badegoulian, and that the Central European sites are at least as old and probably older than the Early Badegoulian sites in France. This hypothesis opens the possibility of an eastern expansion of the Badegoulian Culture towards the west during the 19th millennium.

If we accept this hypothesis, then it is also possible that the Magdalenian Culture came from the east and expanded rapidly towards the west. This interpretation also challenges the accepted theory, stating that the Magdalenian originated from Western Europe. There are currently two positive arguments for an eastern source of the Magdalenian. The first one indicates the flint technological similarities between the Epigravettian and the Early Magdalenian, with a production dominated by a blade industry. The second argument involves the early dates from several Central European Magdalenian sites at Hohle Fels, Geissenklösterle, Schussenquelle and Munzingen. However we must be cautious about the reliability of the dates from these sites. A date of 17100 +/- 150 BP exists for layer IIa at the Hohle Fels, Schelklingen (Weniger 1990) and somewhat younger dates were known from the same site (15760 +/- 140 BP). A similar result is also known from Geissenklösterle (16940 +/- 180 BP), where an impoverished Magdalenian layer overlies rich Gravettian horizons. It remains unclear if any of these dates demonstrates a very early Magdalenian presence at the site and it might be questioned whether the results date archaeological activity or

simply the ages of faunal occupation in these caves (Street 1997, 56). The slightly younger dates from the other Magdalenien sites of Schussenquelle and Munzingen in southern Germany are also problematic (Street 1997, 56; Pasda 1998, 175ff). The early dates from Schussenquelle were obtained on peat and their high age is probably influenced by the hard water effect. These dates should thus be rejected in favour of the four younger results given by direct dating carried out on bones of the hunted fauna (Schuler 1994, 166ff). The results from Muzingen are also difficult to interpret. The C-14 results cover more than 4000 years and are made from three different laboratories, which could imply that the samples were contaminated or that they represent some faunal remains that have no direct relation to the Magdalenian occupation (Housley *et al.* 1997).

On the basis of this critique of an early Magdalenian expansion from the east towards the west it is necessary to conduct several new dates from these Magdalenian sites, just as it has been done on the Central European Badegoulian sites. Although the question of an eastern origin of the Magdalenian still stands, we are thus on more firmer grounds when it comes to the origin of the Badegoulian. The main critique of the interpretation posed by Terberger and Street (2002, 696) is the fact that many of the Central European Badegoulian sites (Wiesbaden-Igstadt, Kastelhöhle-Nord, Grubgraben, Zoitzberg, Bockstein-Törle and Langmannersdorf) could indeed belong to the Epigravettian, which also contains elements of a coarse lithic industry (Djindjian *et al.* 1999, 239ff; Fig. 20, 23, 24, 25, 26, 27 & 28).

Identification problems of the Badegoulian Culture

It has certainly become more difficult to recognize a Badegoulian assemblage, especially if it contains both a crude flake industry and a small bladelet production. The main problem concerning the Badegoulian complex is the identification of the cultural complex, which includes difficulties in recognizing and identifying the lithic assemblage as being Badegoulian. Mainly because the coarse flake industry with raclettes can be registered in many other Late Paleolithic assemblages. This has caused some confusion in the actual identification of the Badegoulian Culture as the research history also shows. An example of this identification problem has not only involved the Magdalenian but also the latest phase V of the Aurignacian.

The final Aurignacian (phase V) was first recognized at Laugerie Haute by Peyrony and Peyrony (1938), where it lied stratigraphically between the Gravettian and the early Solutrean (Djindjian 1996).

The Aurignacian V lithic industries are very similar to the Badegoulian. It is characterized by the absence or low frequencies of laminar and backed pieces and contains varying proportions of flake tools and particularly elements of Aurignacian types, such as carinated and nosed scrapers.

Assemblages of this type, which might generally include industries such as the “Aurignacian V” assemblage from Laugerie-Haute (Peyrony & Peyrony 1938) are often referred to an Aurignacian terminal or described as *aurignacoïde* (Bazile 1996; Djindjian 1996). Because of these similarities, Rigaud (1976) proposed that the source of the Badegoulian might lie in the Late Aurignacian industries.

Late Aurignacian variability is not well understood in Europe and its chronological limits are even less well comprehended. Lacking C-14 dates, it is necessary to rely on Laville’s (1975) regional chronostratigraphy, which indicates that the Aurignacian V of Laugerie-Haute, the most recent Aurignacian found in the Périgord, was deposited in the recent Würm Phase IX after the Protomagdalenian but before the Solutrean. Based on this, the edge of the Aurignacian V, can according to Rigaud (1976), be estimated at 19500-19000 years. Therefore Rigaud (1976) interprets that the Aurignacian V might have provided a techno-industrial antecedent for the Badegoulian. The Late Aurignacian (later than 20000 BP) is known in the Perigord from Laugerie-Haute. Based on chronostratigraphic correlations and available radiocarbon dates, the Final Solutrean in the Perigord was according to Laville and Texier (1972) partly contemporary with the Badegoulian. However, recent C-14 dates of the Aurignacian phase V in the Grotte de Salpêtrière (layer 30A) show a much earlier result between 21500 to 20500 BP (Bazile 1996, 56f). This result does therefore not support a direct chronological relationship between the Aurignacian phase V and the earliest C-14 dates of the Badegoulian Culture, because of a considerable timegap. Furthermore the concept of Aurignacian V has recently been revised by (Aubry et al. 1995; Bosselin & Djindjian 1997, 443ff), which has rejected the term Aurignacian V as having a long time span, because of technologically, typologically, chronologically and geographically reasons.

Conclusion

The terminology of the Badegoulian Culture has gone through many definitions and names like the Protomagdalenian to Magdalenian 0 and Magdalenian I. This cultural confusion is caused by an undiagnostic lithic industry, which has been difficult to identify. Mainly because the Badegoulian industry has many similarities with the late Aurignacian and Magdalenian technocomplexes. Furthermore, most of the Badegoulian sites are open-air sites, where it is difficult to single out their synchronic value. This has caused some problems in establishing a secure chronology based on C-14 dates and stratigraphical evidence within the Badegoulian culture. However, a few Badegoulian cave sites such as Abri Fritsch, Laugerie-Haute, Badegoule, Cassegros, le Cuzoul and Pégourié provided the necessary stratigraphical and C-14 data, from which the Badegoulian chronology is based upon.

The Badegoulian hunter-gathers had a local procurement strategy, dominated by lithics of poor quality. Generally the lithic industry was quite coarse and characterized by a large flake production. The tool assemblage from the Badegoulian is determined by two types, which are of chronological significance. The transverse burin dominates the Early Badegoulian (*Badegoulien Inferieur*), whereas the raclettes dominate the Late Badegoulian (*Badegoulien Superieur*). Furthermore, the Badegoulian bone industry was produced by a unique technique where the reindeer antlers were worked by direct percussion, which was used to modify the flattened *sagaies* sections.

The time around the LGM was a cold and harsh climate attracting steppic animals such as reindeer, horse, saiga antelope and mammoth. During the following Lascaux oscillation (approx. 17500 BP), which is contemporary with the Badegoulian complex, the climate became warmer and more humid. These improved climate changes complemented the fauna situation with larger bovids as bison and aurochs and red deer during the Lascaux oscillation. In the following colder phase of Dryas I a more steppic fauna once again dominated the assemblage, which included reindeer, horse, saiga antelope and mammoth.

The core area of the Badegoulian Culture in France is in the Paris Basin, but generally the distribution pattern is very similar to the Solutrean in France. Outside of France, the Badegoulian is

known in Spain and Portugal as the *Badegoulian Cantabrique*, where the key site is La Riera. The Badegoulian Cantabrique is characterized by a coarse industry dominated by raclettes and a few retouched pieces and transverse burins including a small assemblage of backed bladelets. There are major problems regarding the dates from the key site of La Riera, which are contaminated. This makes it virtually impossible to register an early and late phase of the Badegoulian Cantabrique. Furthermore, it questions the possible small bladelet production, which has been interpreted as an integrated part of the Badegoulian Cantabrique. New research from the French Badegoulian site of Le Tallis de Coteaux supports the thesis of a small bladelet production within the Badegoulian culture. However, there seems to be regional differences within the Badegoulian culture, which reflects the geographically and the chronological setting within this complex.

The recent discoveries of a Badegoulian occupation in northern Central Europe supports this picture, which broadens the distribution of the Badegoulian Culture towards the North and East. This area was previously interpreted as a deserted area during the LGM and colonized during the Magdalenian. However, the dates and the similarities with the lithic industry contain positive arguments for an actual Badegoulian culture in this area. The implication of this Central European Badegoulian complex, if we choose to accept it, are important in understanding the colonization process after the LGM, as well as determining where the Badegoulian and the Magdalenian actually originated from. Previously it was believed that the Badegoulian originated from the west, but in the light of the early dates from Wiesbaden-Igstadt and Kastelhöhle-Nord a new hypothesis emerges. The Central European Badegoulian complex is indeed older than the French Badegoulian and thus opens the possibility of an eastern expansion of the Badegoulian towards the west from the east. This contradicts the current thesis, which states that the Badegoulian expanded from the west towards the east. Although new AMS dates of the French Badegoulian might challenge this hypothesis in the future. Arguably some of the Central European Badegoulian sites could also have been interpreted as Late Aurignacian or Epigravettian sites, which proves the identification problems we face, when trying to interpret a lithic assemblage to the Badegoulian.

The origin of the Magdalenian has also been challenged by the early dates of the Central European Badegoulian complex. It has often been suggested that the Badegoulian should be interpreted as the forerunner of the Magdalenian Culture. Many archaeological elements between the Badegoulian and the Magdalenian are similar, especially in their topographical position as well as the dominance

of open-air sites. At Plateau Parrain, which is a Badegoulian site, a rectangular hut structure was registered, which had clear similarities with Magdalenian hut structures. Furthermore, there seems to be continuity of the type of rock art paintings connecting them with both the Badegoulian and Early Magdalenian, which also points backwards towards the Solutrean.

There are also some differences between the Badegoulian and the Early Magdalenian. Especially regarding the blade industry of the Magdalenian, which seems to have similarities with the Epigravettian. The early dates from a few Early Magdalenian sites in Central Europe could indicate a possible chronological as well as typological connection with the eastern Epigravettian. However, this hypothesis needs to be investigated more carefully in the future, by making more dates and typo-chronological studies on Early Magdalenian and Epigravettian sites in Western and Eastern Europe in order to be verified.

In the future research it is necessary to make further comparative studies of the Badegoulian in Southern and Western Europe in order to clarify the regional differences within this complex. It is also necessary to make a dating project, where the general goal should be the dating of previously known Badegoulian sites in Western Europe in order to fix the typo-chronology. This is a valuable tool, when we try to solve these identification problems within the Badegoulian culture.

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List of figures

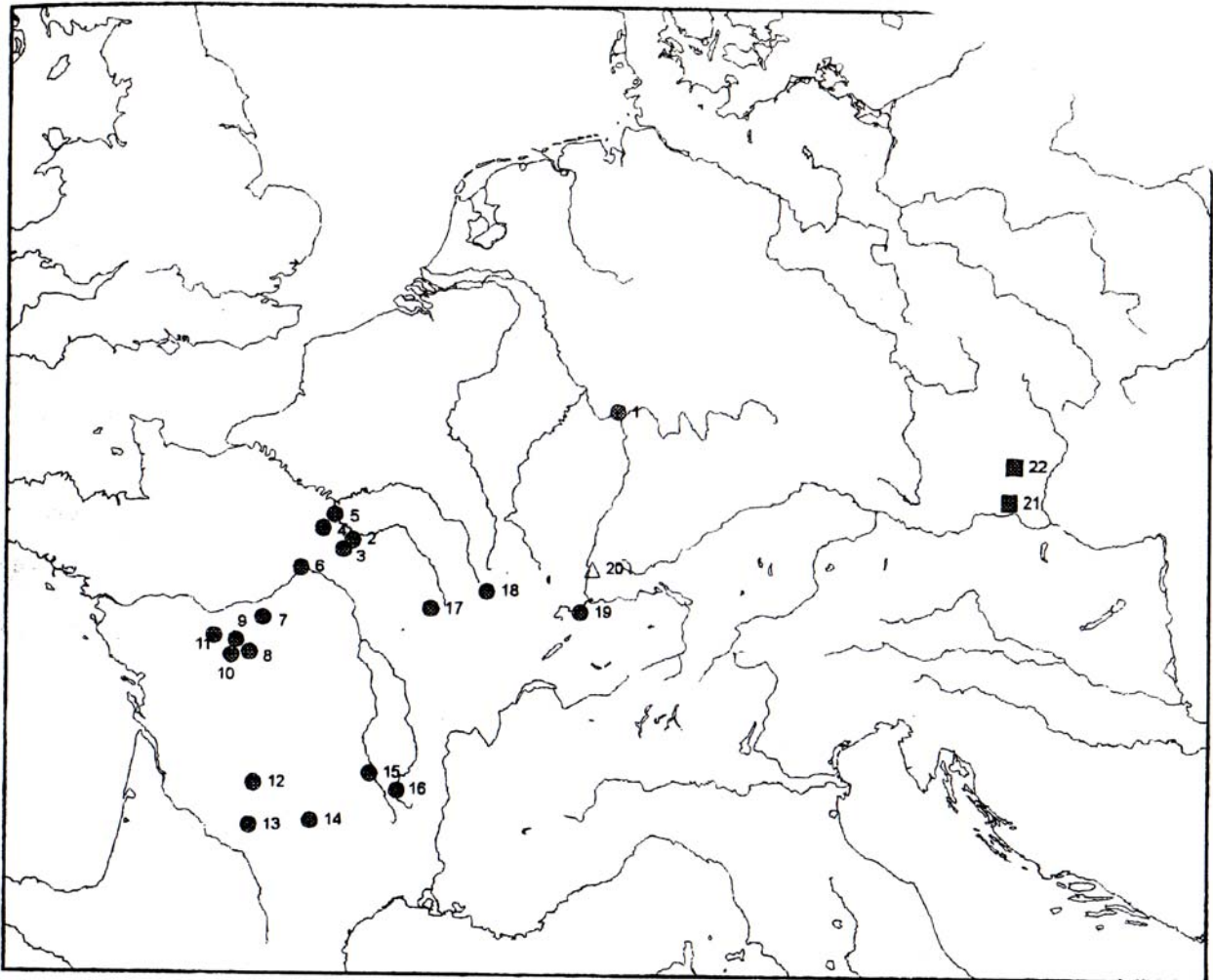


Fig. 1. Location of Wiesbaden-Igstadt (1), Badegoulian sites (2-19), early Magdalenian site Munzingen (20) and Pleniglacial eastern Central European assemblages with Aurignacian elements (21, 22). 1 Wiesbaden-Igstadt; 2 Les Beaugards; 3 Chaintréauville; 4 Saint Martin-de-la-Roche; 5 Ballancourt; 6 La Chapelle-Saint-Mesmin; 7 Céré-La-Ronde; 8 Abri Fritsch; 9 Saint-Fiacre; 10 La pluche; 11 Le Silo; 12 Laugerie Haute; 13 Cassegros; 14 Cuzoul de Vers; 15 Blot; 16 Rond du Barry; 17 Le Poron-des-Cuéches; 18 Farincourt; 19 Kastelhöhle; 20 Munzingen; 21 Grubgraben; 22 Stránská Skála. Map from (Street & Terberger 1999, 269)

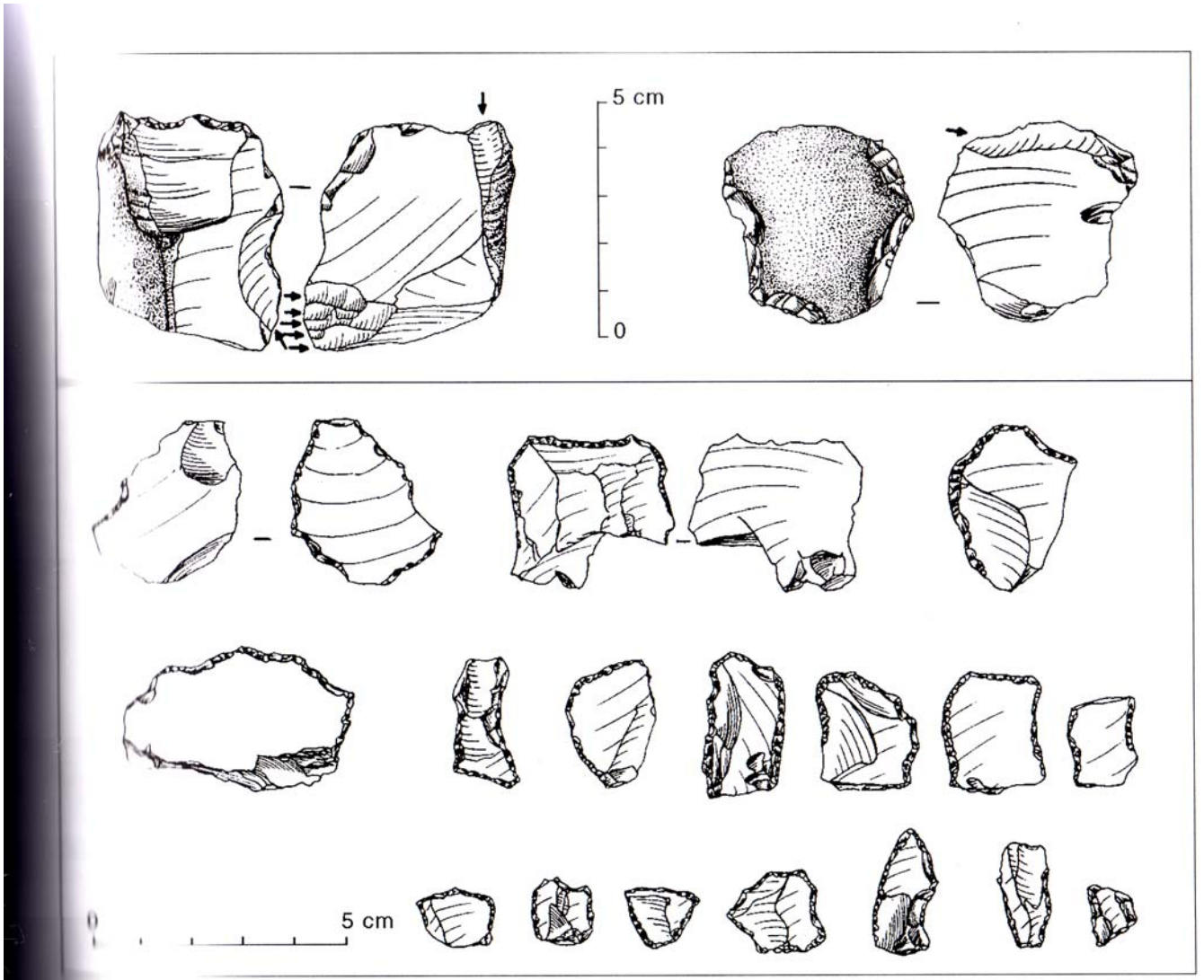


Fig. 2. Characteristic tool types from the Badegoulian Culture. On the upper line is the transverse burin on notch, with a large and robust bevelled edge. On following lines are the raclette. Tools found in layer 4 and 5b from Abri Fritsch (Trotignon 1984, fig. 9 and 18).

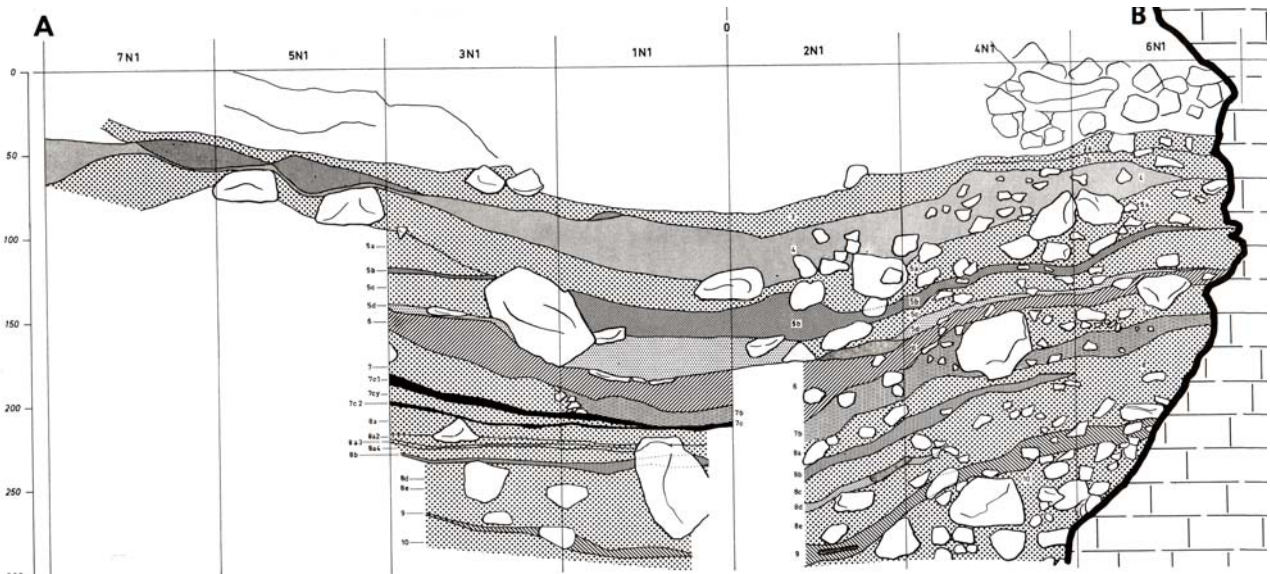


Fig. 3. Stratigraphic situation in Abri Fritsch. The early Badegoulien (Badegoulien inférieur) level is observed in layer 6 and the late Badegoulien (Badegoulien Supérieur) is registered in layer 3a. After Trotignon 1984, 22.

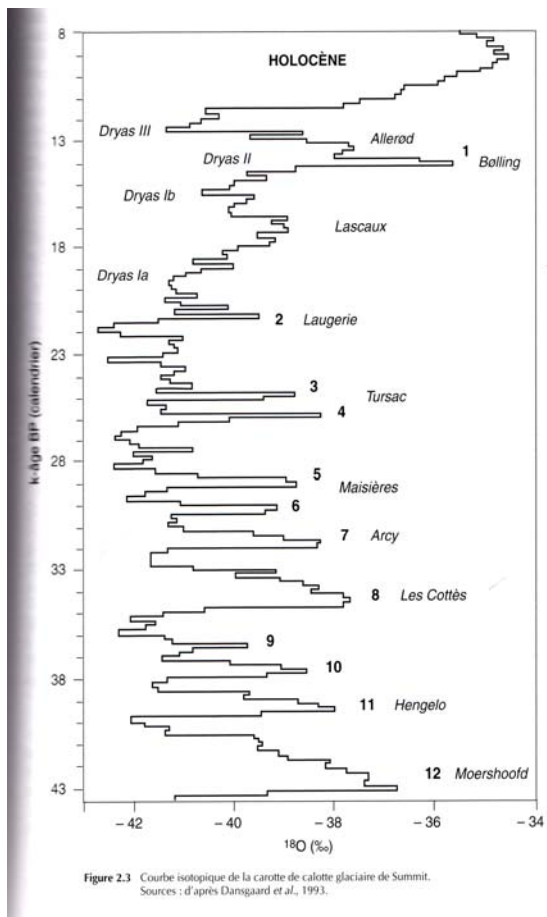


Figure 2.3 Courbe isotopique de la carotte de calotte glaciaire de Summit. Sources : d'après Dansgaard et al., 1993.

CLIMATOLOGIE		INDUSTRIES
OSCILLATION DE BOLLING		
PLÉNI-GLACIAIRE DU WÜRÉM RÉCENT	FROID ET SEC	MAGDALÉNIEN
	Episode humide de Lascaux	BADEGOULIEN RÉCENT
	FROID ET SEC	BADEGOULIEN ANCIEN
		?
	Episode humide de Laugerie	SOLUTRÉEN RÉCENT
	FROID ET SEC	SOLUTRÉEN ANCIEN
	Plus Humide ??	PROTO-SOLUTRÉEN
	FROID ET SEC	Gravettien tardif de faciès PROTOMAGDALÉNIEN
		Gravettien récent de faciès LAUGÉRIEN
	Episode humide de Tursac	Gravettien moyen de faciès NOAILLIEN / RAYSSIEN
	FROID ET SEC	Gravettien ancien de faciès BAYACIEN, FONTIROBERTIEN et INDIFFÉRENCIÉ

Fig. 4. Different oscillations in Europe during the Palaeolithic and Mesolithic, including the Laugerie oscillation and Lascaux oscillation (After Dansgaard et al. 1993) and their relationship to the Solutrean and Badegoulian cultures (After Bosselin & Djindjian 1997, 451).

SOLUTRÉEN ANCIEN				
PERIGORD	Laugerie-Haute Est	31h	GrN-1888	20890 ± 300 BP
	Laugerie-Haute Ouest	12d	GrN-4573	20750 ± 150 BP
	Laugerie-Haute Ouest	12a	GrN-4446	20180 ± 230 BP
	Laugerie-Haute Ouest	12a	GrN-4469	20160 ± 100 BP
	Abri Pataud	1	OXA-373	20400 ± 450 BP
QUERCY	Les Peyrugues	12a	?	20140 ± 280 BP
	Les Peyrugues	12a	?	20290 ± 230 BP
SOLUTRÉEN RÉCENT				
PERIGORD	Laugerie-Haute Ouest	5	GrN-4495	19740 ± 140 BP
	Laugerie-Haute Ouest	5	GrN-4442	19600 ± 140 BP
	Laugerie-Haute Ouest	2	GrN-4441	20000 ± 240 BP
	Laugerie-Haute Ouest	2	GrN-4605	19870 ± 190 BP
	Combe Saunière	IV-9	OXA-753	19630 ± 320 BP
	Combe Saunière	IV-8	OXA-752	19490 ± 350 BP
	Combe Saunière	IV-1	OXA-489	19450 ± 330 BP
	Jamblancs	3	Ly-4588	19010 ± 310 BP
QUERCY	Le Cuzoul à Vers	30	Gif-6699	19400 ± 210 BP
INDRE	Abri Fritsch	8d	GrN-5499	19180 ± 230 BP
EPISOLUTREEN (Salpétrien ancien)				
LANGUEDOC	Grotte de la Salpêtrière	6b	MC-2168	19530 ± 270 BP
		D	MC-2186	19440 ± 500 BP
		6	Ly-939	18880 ± 300 BP
		6b	MC-2083	18800 ± 300 BP
		D	MC-2084	18600 ± 240 BP
		5	MC-2167	17960 ± 600 BP
BADEGOULIEN ANCIEN				
PERIGORD	Laugerie-Haute Est	18	Ly-972	18260 ± 360 BP
QUERCY	Le Cuzoul à Vers	24	Gif-6798	18400 ± 200 BP
	Le Cuzoul à Vers	23	Gif-6370	18300 ± 200 BP
	Pégourié	9a	Ly-1836	17420 ± 390 BP
INDRE	Abri Fritsch	6	Ly-1124	17980 ± 350 BP
	Abri Fritsch	5b	Ly-1123	17280 ± 350 BP
BADEGOULIEN RÉCENT				
PERIGORD	Jamblancs	2	Ly-4589	17770 ± 260 BP
QUERCY	Le Cuzoul à Vers	20	Gif-6797	17050 ± 170 BP
	Le Cuzoul à Vers	13	Gif-6371	16800 ± 170 BP
	Le Cuzoul à Vers	5	Gif-6638	15980 ± 150 BP
	Pégourié	8b	Ly-1394	17490 ± 590 BP
	Pégourié	8b	Ly-1834	17320 ± 460 BP
INDRE	Abri Fritsch	4	Ly-1122	16530 ± 550 BP
	Abri Fritsch	3a	Ly-1121	17130 ± 550 BP

Fig. 5. C-14 dates from selected Solutrean and Badegoulian sites in Aquitaine. After Bosselin & Djindjian 1997 453).

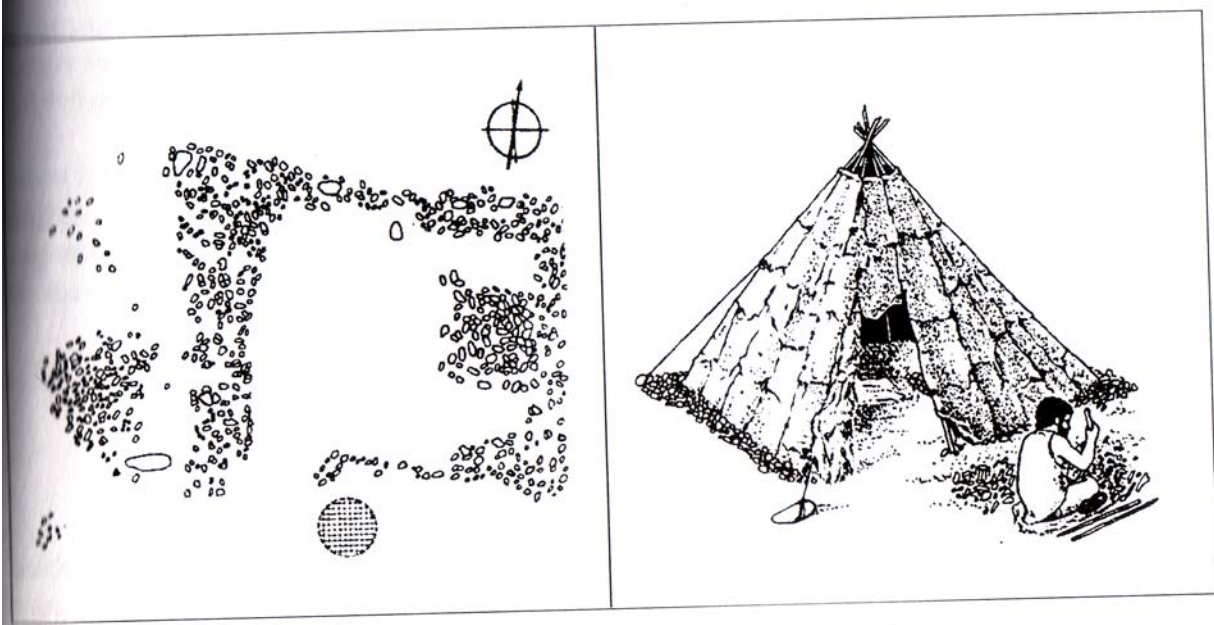


Fig. 6. Hut structure from the open-air Badegoulian site Plateau Parrain. After Gausson 1980.

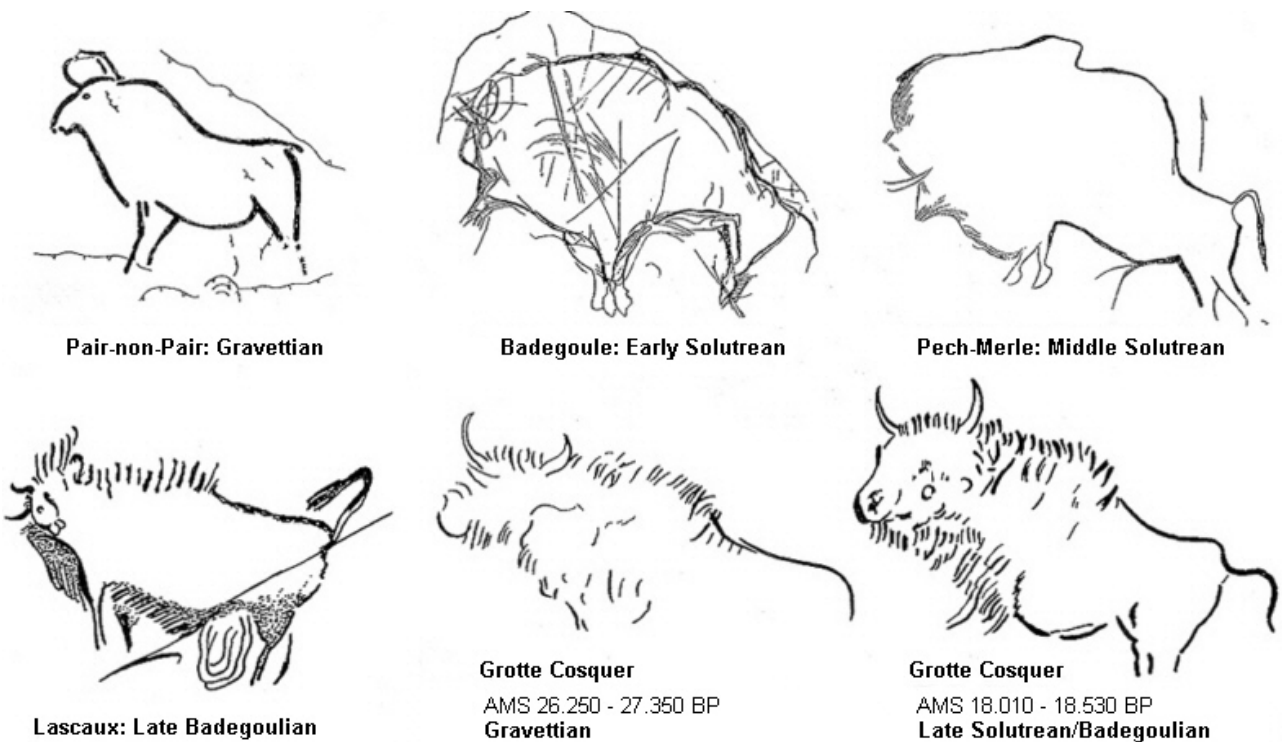


Fig. 7. Rock paintings of Bison from different cave sites in France, which has been dated to the Solutrean and the Badegoulian. After Cheynier 1949; Bataille 1955, 113; Lemozi 1929, Pl. 30; Clottes *et al.* 1997.

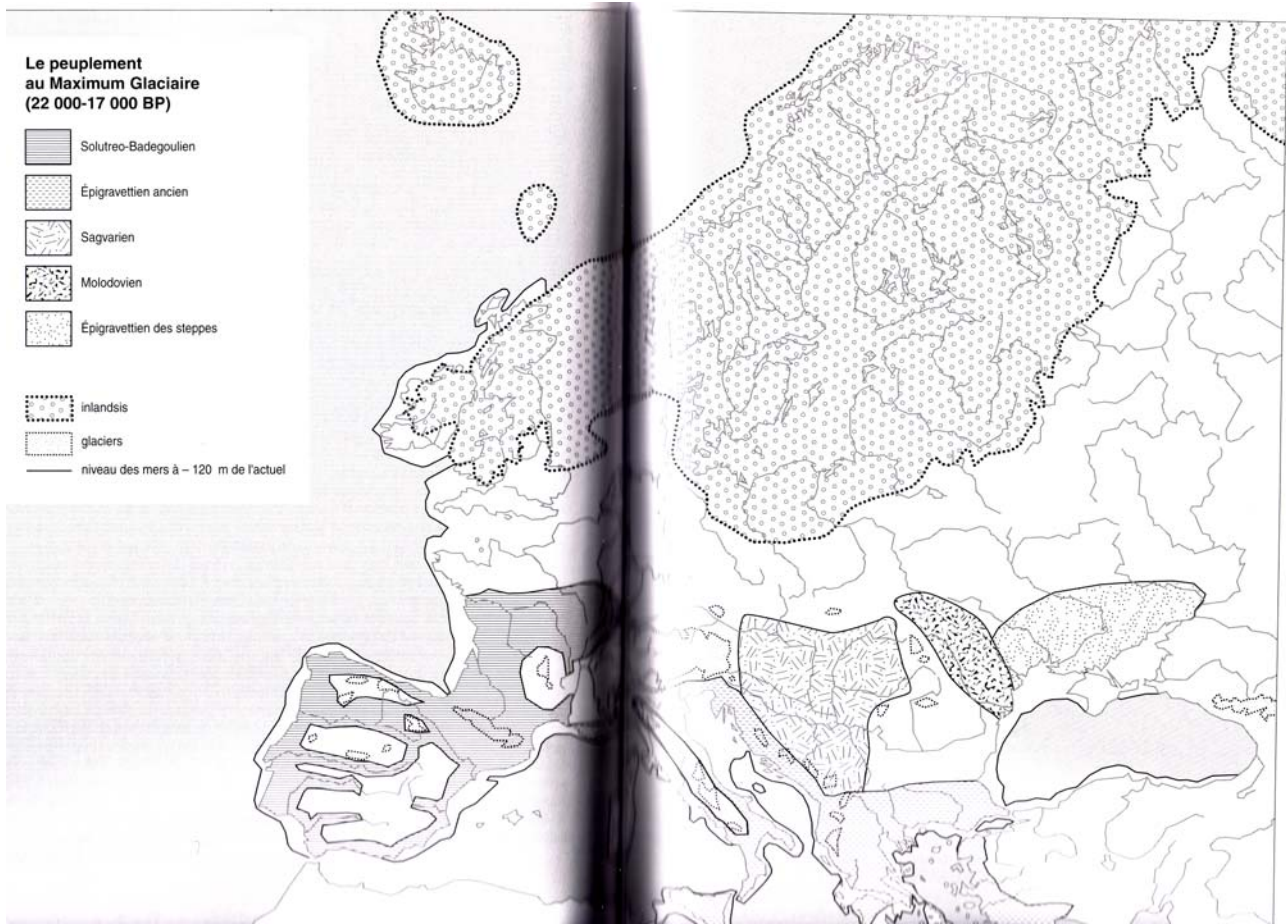


Fig. 8. The Last Glacial Maximum (22000-17000 BP) and the different Palaeolithic cultures in Europe including the Solutre-Badegoulian, Epigravettian, Sagvarian, Molodovian and Epigravettian steppic. After Djindjian *et al.* 1999, 234f.

<i>Animaux</i>	<i>C 6</i>	<i>C 5d</i>	<i>C 5c</i>	% d'individus			<i>C 3_b^a</i>
				<i>C 5b</i>	<i>C 5a</i>	<i>C 4</i>	
cheval	28,57	9,25	5,88	13,63	14,28	52,17	34,48
renne	44,64	61,11	47,05	52,27	31,42	19,56	31,03
gd bœuf	3,57	1,85		2,27	2,85	2,17	
gd cervidé		1,85					
bouquetin	8,92	3,70	11,76	2,27	5,71	2,17	3,44
sanglier	1,78	1,85					
ours des cavernes	1,78	1,85		2,27	2,85	2,17	2,54
loup	1,78	1,85		2,27	2,85		3,44
renard	5,35	5,55	17,64	9,09	14,28	10,86	13,79
blaireau	1,78			5,54			
putois					2,85	2,17	
belette		1,85		2,27	5,71		3,44
lièvre	1,78	7,40	11,76	6,81	11,42	6,52	6,88
écureuil		1,85	5,88	2,27	5,71	2,17	

Fig. 9. The upper line shows the different layers from Abri Fritsch during the Badegoulian culture, which is dominated by reindeers and horses. After Poulain 1984, 108.

Côte Cantabrique

Grotte de La Riera (Asturies)

	12	17 210 ± 350 BP	Gak 6446
	16	18 200 ± 610 BP	Gak 6983

Grotte de Las Caldas (Posada de Llanes, Asturies)

	7	18 310 ± 260 BP	Ly 2 423
	3	17 050 ± 300 BP	Ly 2 421

Fig. 10. Selected dates from the Badegoulian Cantabrique. After Djindjian *et al.* 1999, 222f.

TABLE 2.1
La Riera Radiocarbon Dates

Period	Level	Lab Number	Material	Date BP ¹	$\bar{x} \pm 1\sigma$	$\bar{x} \pm 2\sigma$
Aurignacian	29 top	GaK-3046	Charcoal	6,500±200	6,300- 6,700	6,100- 6,900
	29	GaK-2909	Charcoal	8,650±300	8,350- 8,950	8,050- 9,250
	27 up	BM-1494	Bone ²	10,630±120	10,510-10,740	10,390-10,870
Azilian	27 low	UCR-1275D	Bone	12,270±400	11,870-12,670	11,470-13,070
	27 low	GaK-6985	Charcoal	14,760±400	14,360-15,160	13,960-15,560
Mousterian	24	GaK-6982	Charcoal	10,890±430	10,460-11,320	10,030-11,750
	23	Ly-1646	Bone	10,340±560	9,780-10,900	9,220-11,460
	23	UCR-1274D	Bone	12,620±300	12,320-12,920	12,020-13,220
	20	Ly-1645	Bone	12,360±670	11,690-13,030	11,020-13,700
	20	UCR-1273D	Bone	9,090±570	8,520- 9,660	7,950-10,230
	20	GaK-6980	Charcoal	17,160±440	16,720-17,600	16,280-18,040
	19	Q-2116	Charcoal	15,230±300	14,930-15,530	14,630-15,830
	19	Q-2110	Charcoal	15,520±350	15,170-15,870	14,820-16,220
	19	GaK-6448	Charcoal	16,420±430	15,990-16,850	15,560-17,280
	17	GaK-6445	Charcoal	16,900±200	16,700-17,100	16,500-17,300
	17	GaK-6444	Charcoal	17,070±230	16,840-17,300	16,610-17,530
	16	GaK-6983	Charcoal	18,200±610	17,590-18,810	16,980-19,420
	15	GaK-6449	Charcoal	15,600±570	15,030-16,170	14,460-16,740
	15	UCR-1272A	Bone	17,225±350	16,875-17,575	16,525-17,925
	Solutrean	14	UCR-1271A	Bone	15,690±310	15,380-16,000
12		GaK-6446	Charcoal	17,210±350	16,860-17,560	16,510-17,910
10		GaK-6447	Charcoal	19,820±390	19,430-20,210	19,040-20,600
8		GaK-6450	Charcoal	15,860±330	15,530-16,190	15,200-16,520
8		GaK-6981	Charcoal	20,690±810	19,880-21,500	19,070-22,310
4		GaK-6984	Charcoal	20,970±620	20,350-21,590	19,730-22,210
1		UCR-1270A	Bone	19,620±390	19,230-20,010	18,840-20,400
Aurignacian ³	1	Ly-1783	Bone	20,360±450	19,910-20,810	19,460-21,260
	1	BM-1739	Bone	20,860±410	20,450-21,270	20,040-21,680

¹ All dates calculated based on Libby half-life of 5,570 years
² All bone dates are done on collagen

Fig. 11. C-14 dates from the different layers in La Riera. Note the inconsistent results in layer 8. After Straus 1986, 21.

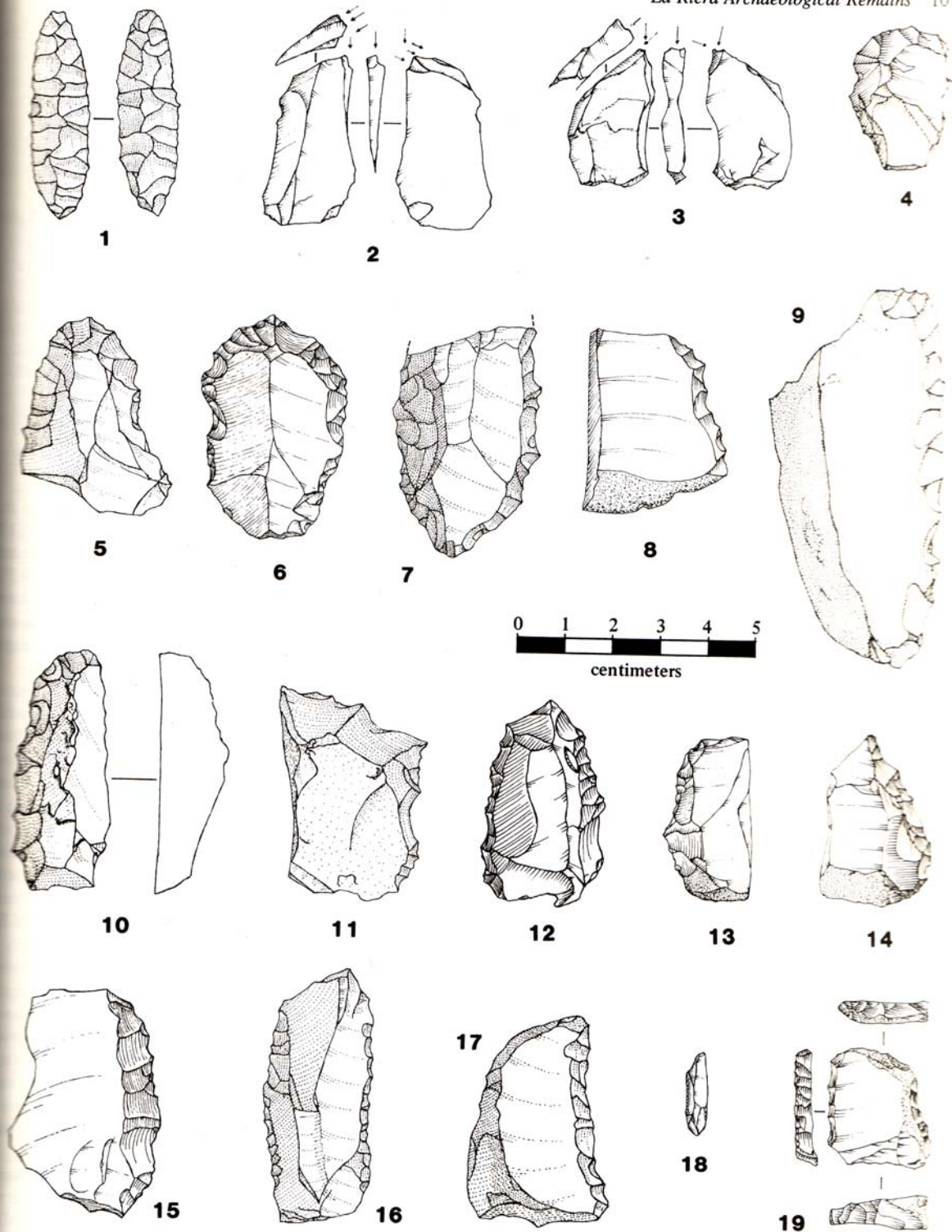


Fig. 8.39 Level 9 — Selected Retouched Pieces: 1 willow leaf point, 2-3 dihedral burin, 4-5 endscraper on flake, 6 endscraper on retouched flake, 7 denticulate/sidescraper, 8, 10, 12-14 denticulate, 9, 15, 17 sidescraper, 11 bec, 16 piece continuously retouched on two edges, 18 Dufour bladelet, 19 raclette.

Fig. 12. Selected tools (retouched pieces, raclettes, scrapers and transverse burins) from layer 9 in La Riera. After Straus & Clark 1986, 107.

TABLE 8.11

Levels 12 and 13 — Retouched Pieces and Debitage

<i>Type</i>	<i>Level</i> <i>12-12.2</i>	<i>Level</i> <i>13-13.1</i>	<i>Total</i>	<i>%</i>	<i>Cum. %</i>
2. atypical endscraper	1	1	2	3.08	3.08
8. endscraper on flake	1	2	3	4.62	7.70
15. nucleiform endscraper		1	1	1.54	9.24
24. atypical perforator		1	1	1.54	10.78
27. straight dihedral burin		2	2	3.98	13.86
30. angle burin on break	1	2	3	4.62	18.48
31. multiple dihedral burin	1	1	2	3.08	21.56
58. completely backed blade	1		1	1.54	23.10
65. continuously retouched piece — one edge		3	3	4.62	27.72
66. continuously retouched piece — two edges		1	1	1.54	29.26
74. notched piece	3	10	13	20.00	49.26
75. denticulated piece	4	20	24	36.92	86.18
76. pièce esquillée		1	1	1.54	87.72
77. sidescraper		4	4	6.15	93.87
78. raclette	1		1	1.54	95.41
85. backed bladelet		2	2	3.08	98.49
88. denticulated bladelet		1	1	1.54	100.03
TOTALS:	13	52	65		
flake core	3	3	6	0.52	
mixed core	1	1	2	0.17	
bladelet core		2	2	0.17	
chunk	17	31	48	4.19	
plain flake	102	203	305	26.61	
primary decortication flake	7	8	15	1.31	
secondary decortication flake		3	3	0.26	
edge renewal flake		3	3	0.26	
platform renewal flake		2	2	0.17	
blade	1	11	12	1.05	
bladelet	23	21	44	3.84	
burin spall	5	9	14	1.22	
trimming flake	105	274	379	33.07	
shatter	87	151	238	20.77	
TOTALS:	376	772	1148		

Fig. 13. The total assemblage from layer 12 and 13 in La Riera. After Straus & Clark 1986, 119.

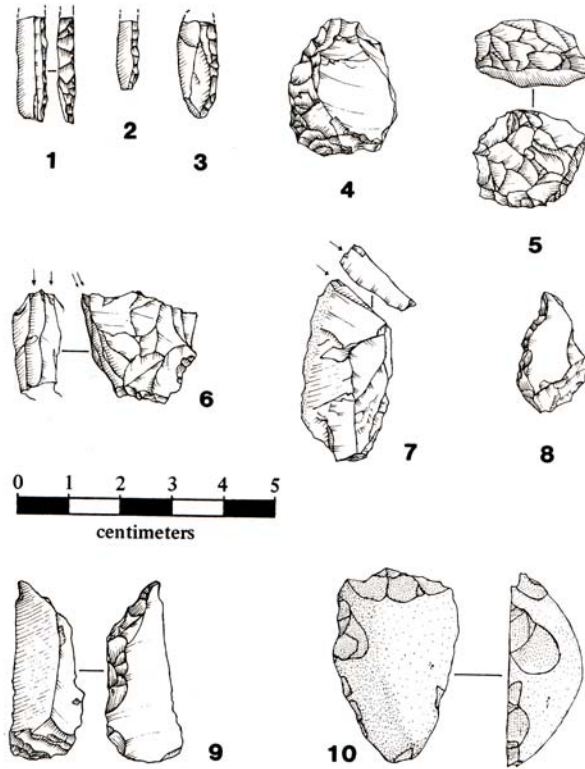


Fig. 8.53 Level 11 — Selected Retouched Pieces: 1-3 backed bladelet, 4 atypical endscraper, 5 nucleiform endscraper, 6 nucleiform burin, 7 burin on break, 8-9 bec, 10 piece with straight retouched truncation.

Fig. 14. Selected tools from layer 11 in La Riera. Note the backed bladelets number 1-3. After Straus & Clark 1986, 117.

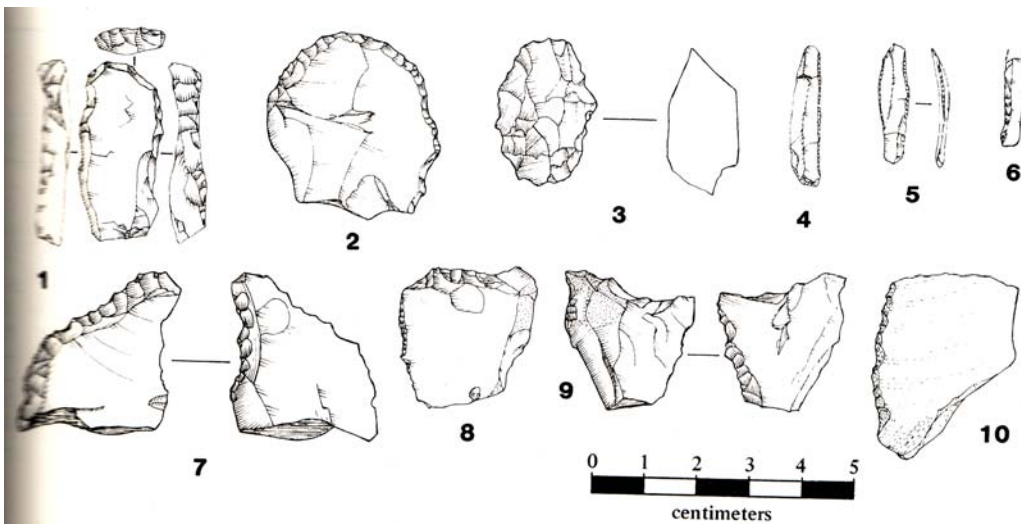


Fig. 15. Selected tools from layer 15 in La Riera. Note the backed bladelets number 4-6. After Straus & Clark 1986, 133.

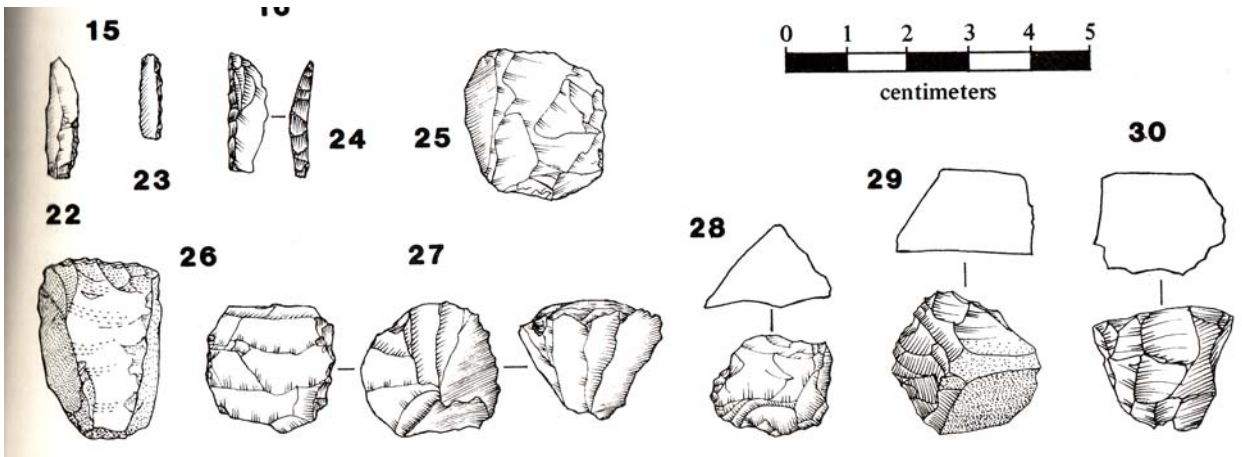


Fig. 16. Selected backed bladelets (number 22-24) and cores from layer 16 in La Riera. After Straus & Clark 1986, 137.

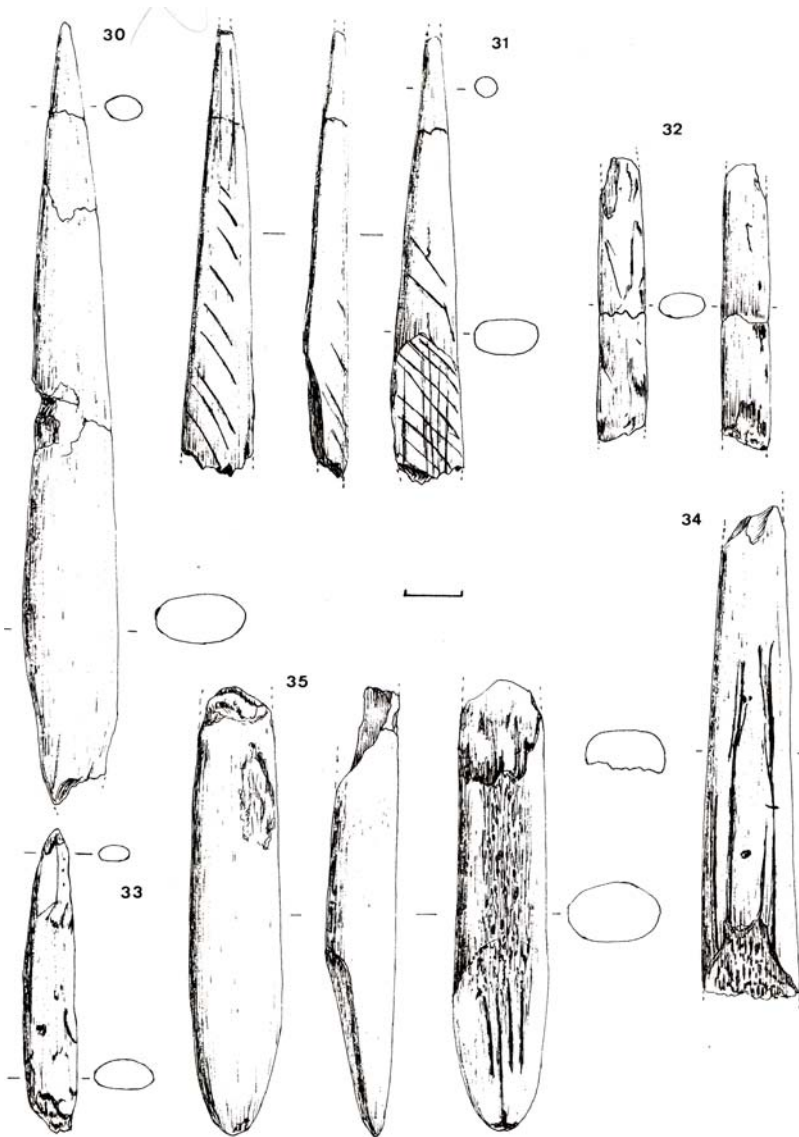


Fig. 17. Selected antler sagaie from layer 9 in La Riera. After Straus & Clark 1986, 393.

site	lab. no.	uncalibrated AMS date (BP)
Solutréen récent		
<i>Abri Fritsch</i>		
8d	GrN-5499	19,180 ±230
<i>Cuzoul à Vers</i>		
30	Gif-6699	19,400 ±210
<i>Solutré</i>		
	Ly-1533	19,590 ±280
<i>Combe Saunière</i>		
IV-1	OxA-489	19,450 ±330
IV-8	OxA-752	19,490 ±350
IV-9	OxA-753	19,630 ±320
<i>Laugerie Haute Ouest</i>		
5	GrN-4442	19,600 ±140
5	GrN-4495	19,740 ±140
2	GrN-4605	19,870 ±190
2	GrN-4441	20,000 ±240
western central Europe		
<i>Wiesbaden-Igstadt</i>		
	UZ-3768	17,210±135
	OxA-7500	17,820 ±240
	OxA-7501	18,220 ±180
	OxA-6809	18,670 ±160
	OxA-6808	19,080 ±160
	OxA-7406	19,200 ±160
	OxA-7502	19,320 ±240
<i>Grubgraben</i>		
A.L.1	Lv-1825	16,800±280
A.L.2b	Lv-1821	17,350±190
A.L.3	Lv-1810	18,030±270
A.L.2a	Lv-1823	18,070±270
A.L.2-4	Lv-1660	18,170±300
A.L.4	Lv-1680	18,400±330
A.L.2b	Lv-1822	18,620±220
A.L.4	GrN-21893	18,820±160
A.L.4	GrN-21790	19,270±80
<i>Kastelhöhle-Nord</i>		
	OxA-9737	18,530 ±150
	OxA-9739	19,200 ±150
	OxA-9738	19,620 ±140
<i>Mittlere Klause</i>		
	UCLA-1869	18,200 ±200
	OxA-9856	18,590 ±260
Badegoulien ancien		
<i>Cuzoul à Vers</i>		
23	Gif-6370	18,300 ±200
24	Gif-6798	18,400 ±200
<i>Laugerie Haute Est</i>		
18	Ly-972	18,260 ±360
<i>Abri Fritsch</i>		
5b	Ly-1123	17,280 ±350
6	Ly-1124	17,980 ±150
<i>Pégourié</i>		
9a	Ly-1836	17,420 ±390

Fig. 18. Uncalibrated AMS C-14 dates for archaeological sites in Central Europe, which were occupied close to the Last Glacial Maximum. After Terberger & Street 2002, 694.

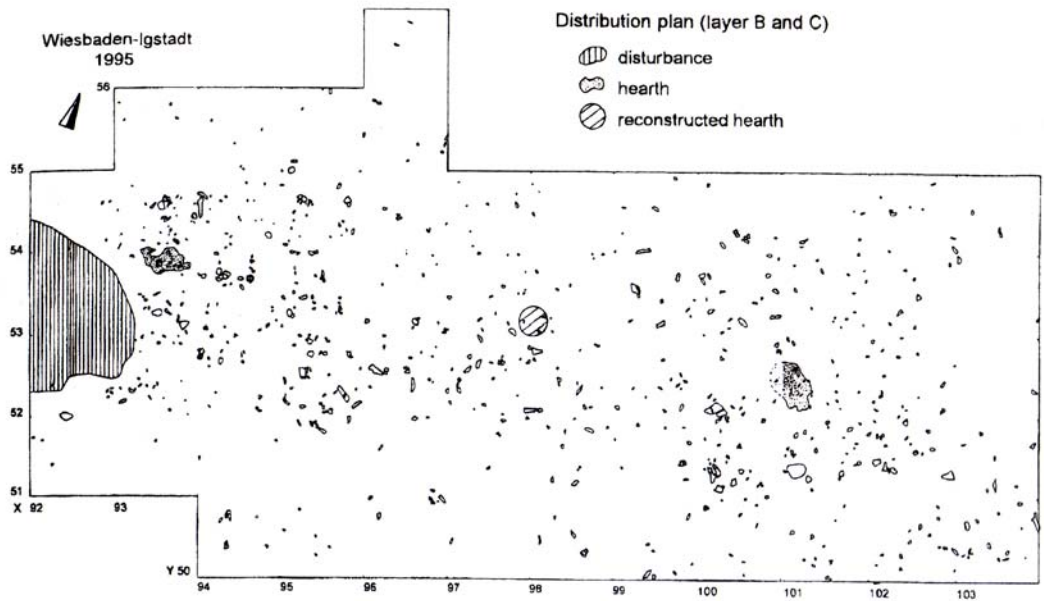


FIGURE 6. Site plan of Wiesbaden Igstadt. Area excavated until 1995.

Fig. 19. Site plan of Wiesbaden-Igstadt from 1995. After Street & Terberger 1999, 265.

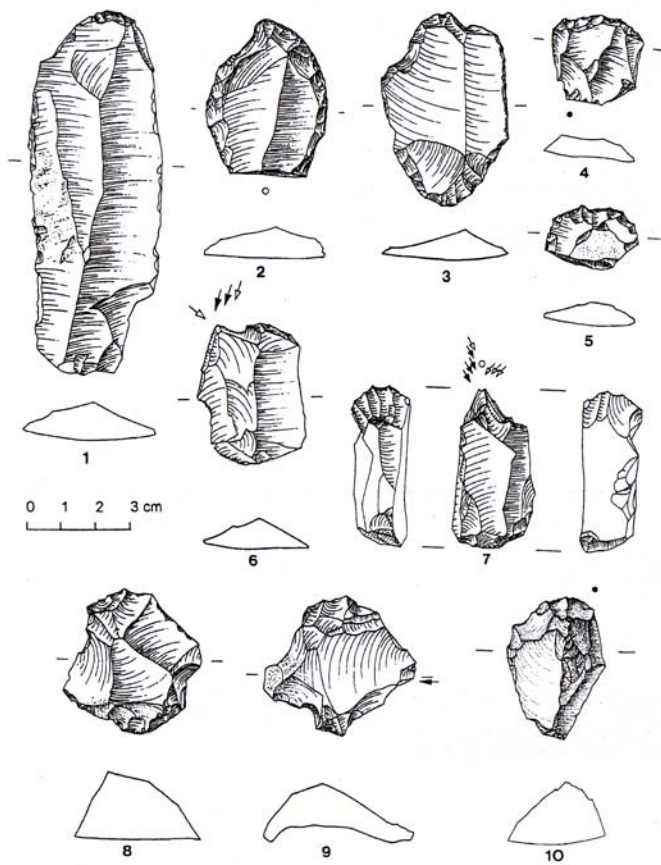


FIGURE 7. Artefacts from Wiesbaden-Igstadt (after Serangeli 1996).

Fig. 20. Selected artefacts from Wiesbaden-Igstadt. After Serangeli 1996.

lab.no.	years BP	sample	location	dating method
UZ-3767/ETH-13'379	12,000±90	tooth	100/53 Vt.3 Niv.B	AMS
Hd 15742-15440	13,940±690	bone	surface find	conventional
UZ-3768/ETH-13'380	17,210±135	bone	93/53-22	AMS
OxA-6808	19,080±160	<i>Equus</i> sp.? bone	95/53-1	AMS
OxA-6809	18,670±160	<i>Rangifer tarandus</i> bone	105/52-8,9	AMS
OxA-7406	19,200±160	<i>Equus</i> sp. bone	105/52-7	AMS
OxA-7500	17,820±240	<i>Rangifer tarandus</i> bone	93/53-13	AMS
OxA-7501	18,220±180	<i>Rangifer tarandus</i> bone	100/52-27	AMS
OxA-7502	19,320±240	<i>Equus</i> sp. bone	101/51-25	AMS

TABLE 1. Radiocarbon dates from Igstadt.

Fig. 21. All the C-14 dates from Wiesbaden-Igstadt. After Street & Terberger 1999, 266.

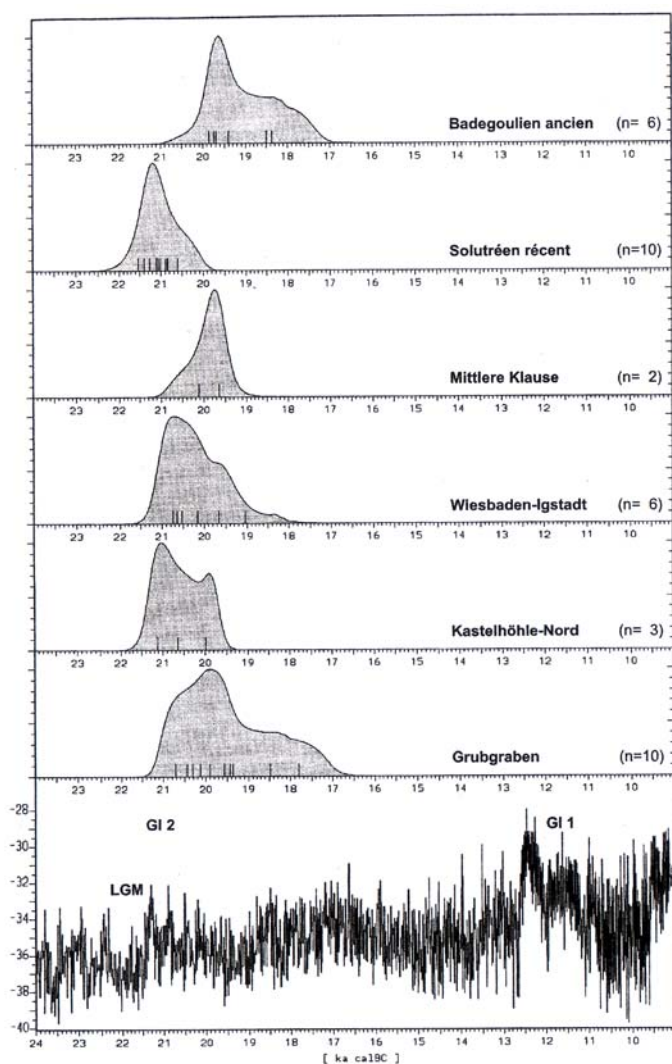


Fig. 22. Calibrated age of the sites discussed in the text shown against climatic data from the Greenland ice core GISP2. Note the early dates of Wiesbaden-Igstadt, Kastelh hle-Nord and Grubgraben compared to the Badegoulian sites in France. After Terberger & Street 2002, 692.

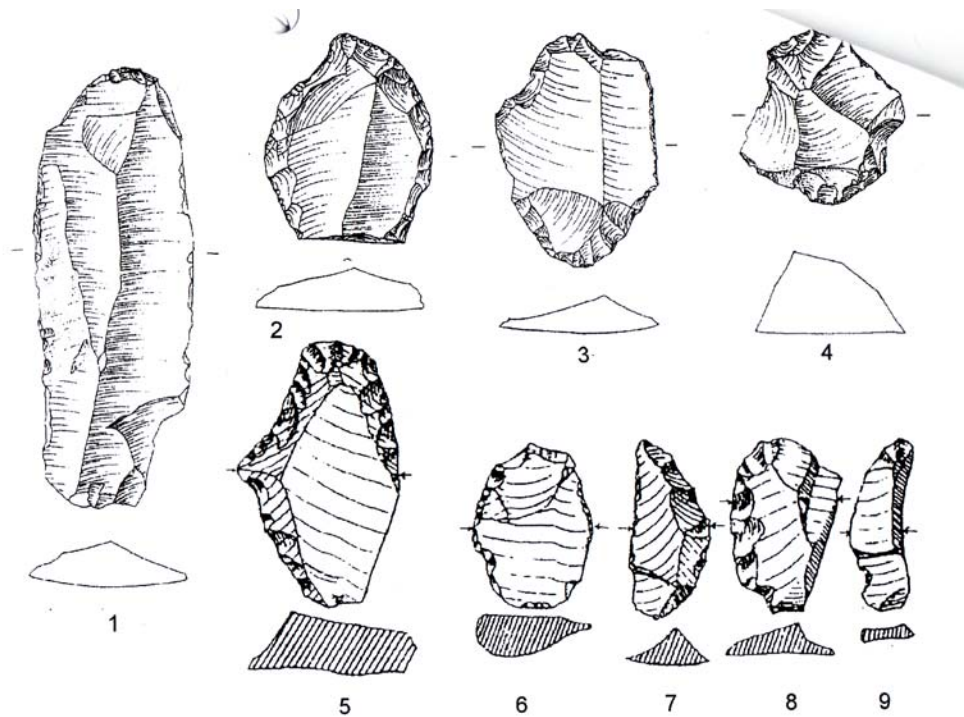


FIGURE 3. Selected stone tools of the Badegoulian sites Wiesbaden-Igstadt (1-4) and Kastelhöhle-Nord, Middle Horizon (5-9, after Bay 1959).

Fig. 23. Selected tools of the Badegoulian sites of Wiesbaden-Igstadt (1-4) and Kastelhöhle-Nord, Middle Horizon (5-9). After Terberger & Street 2002, 695.

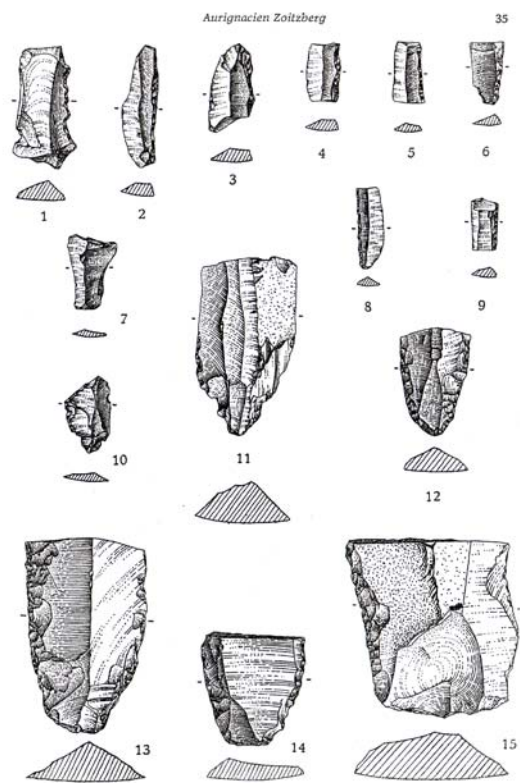


Abb. 14: Gera, Zoitberg. 1/1.

Fig. 24. Selected tools from Zoitberg in Thuringia. Note the backed bladelets. After Feustel 1965.

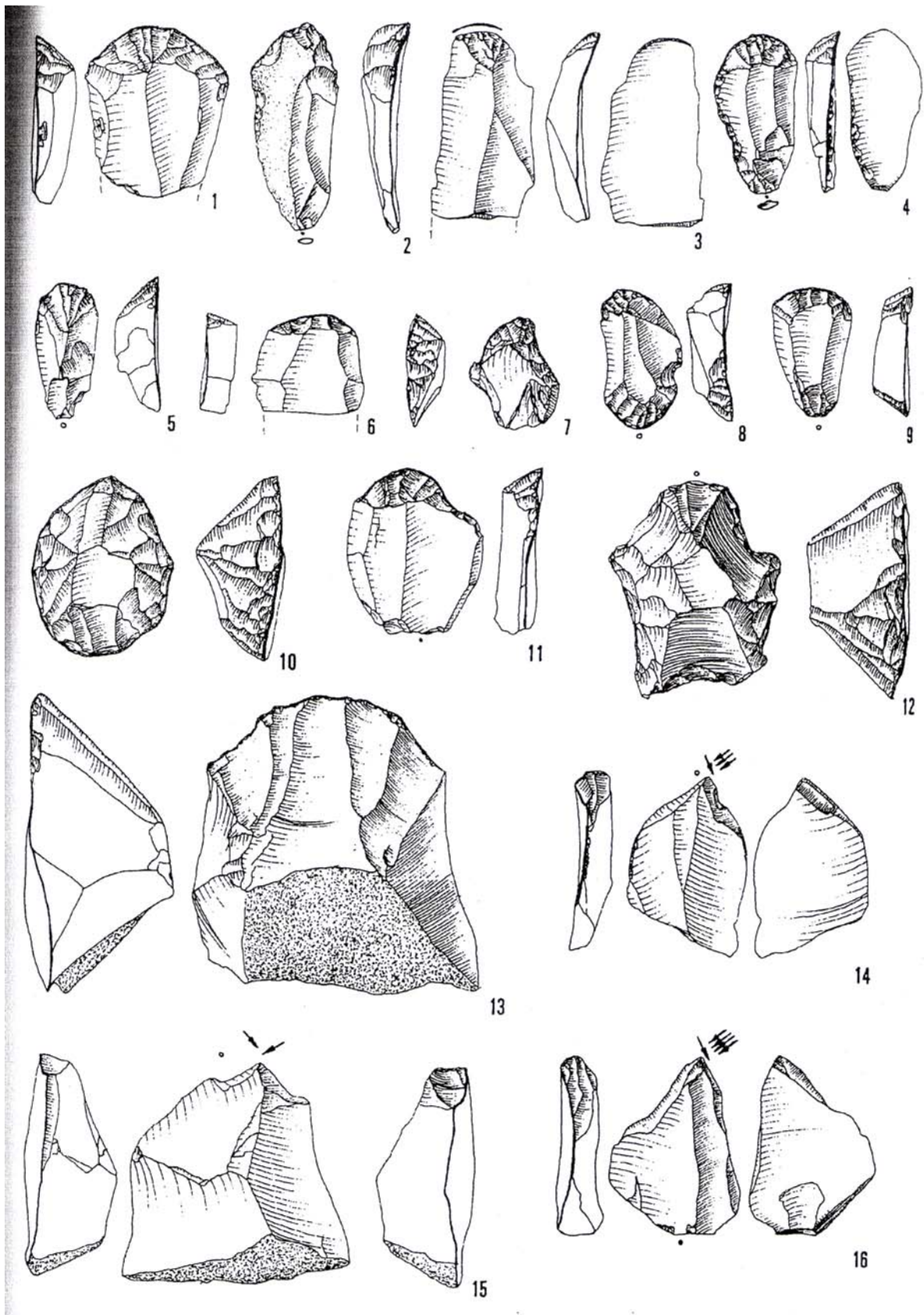


Fig. 25. Selected scrapers and burins from Langmannersdorf. After Hahn 1977.

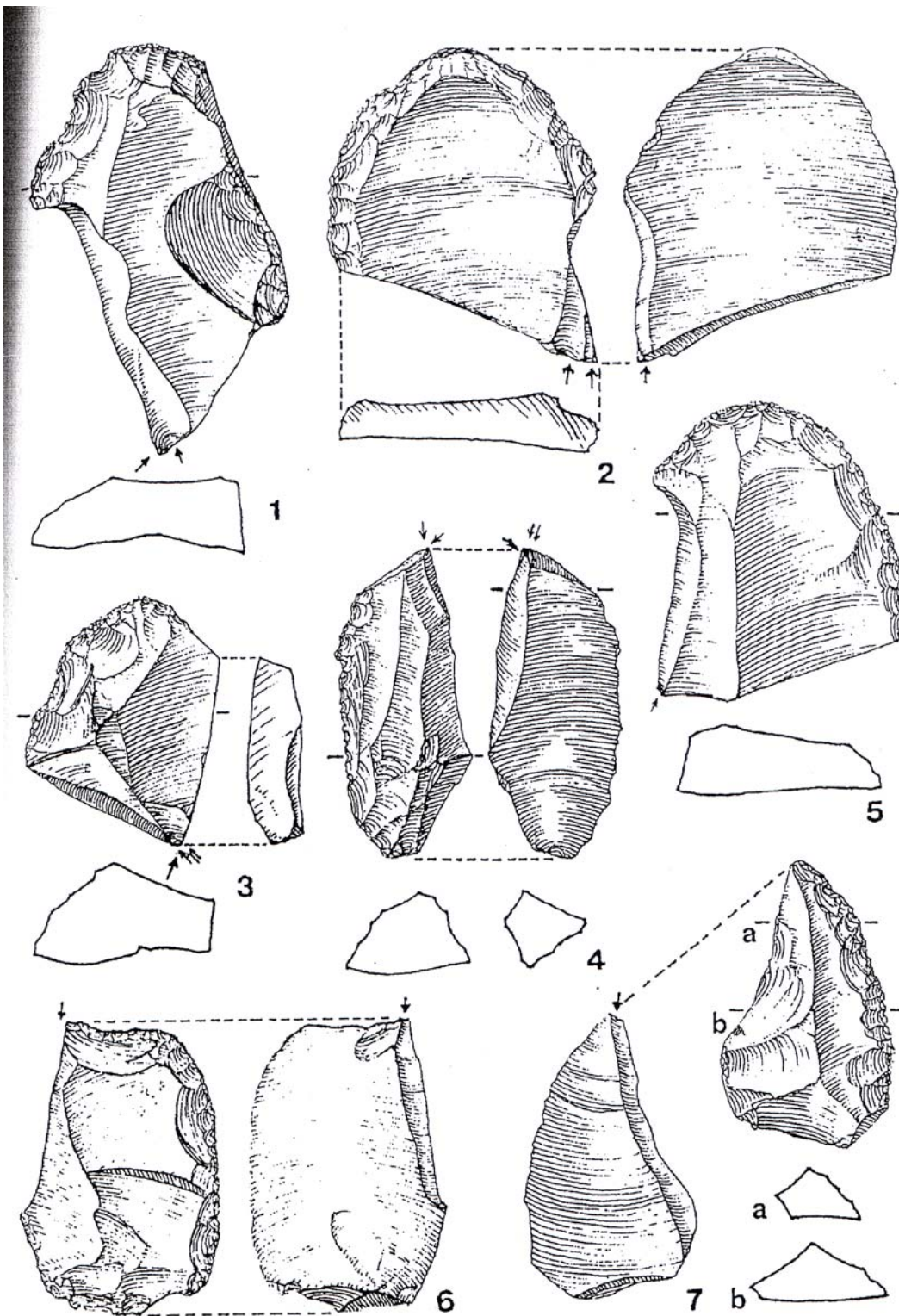


Fig. 26. Selected scrapers and burins from layer 3/2 in Grubgraben. After Brandtner 1996.

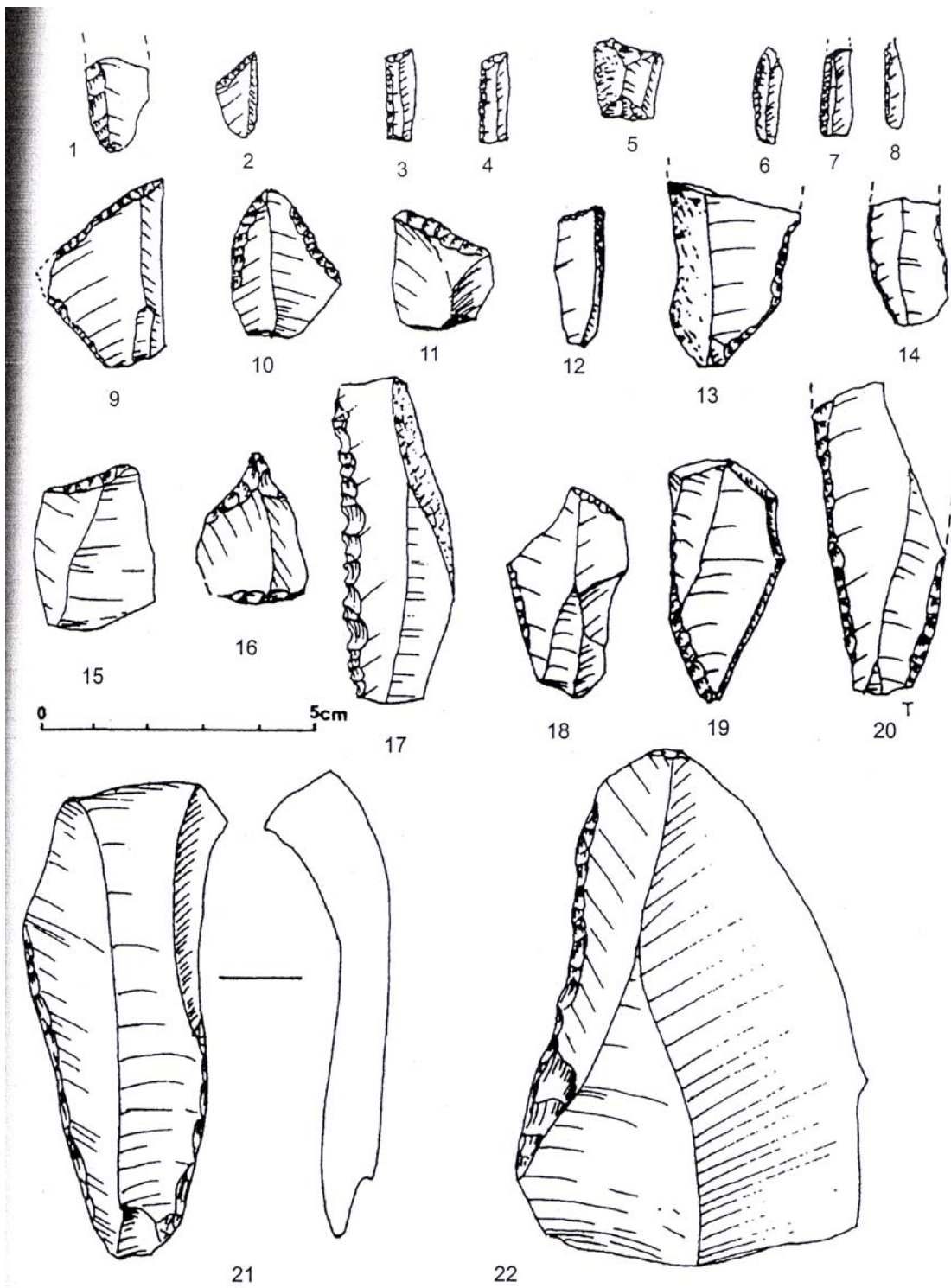


Fig. 27. Selected retouched blades and backed bladelets from Grubgraben. After Montet-White 1990.

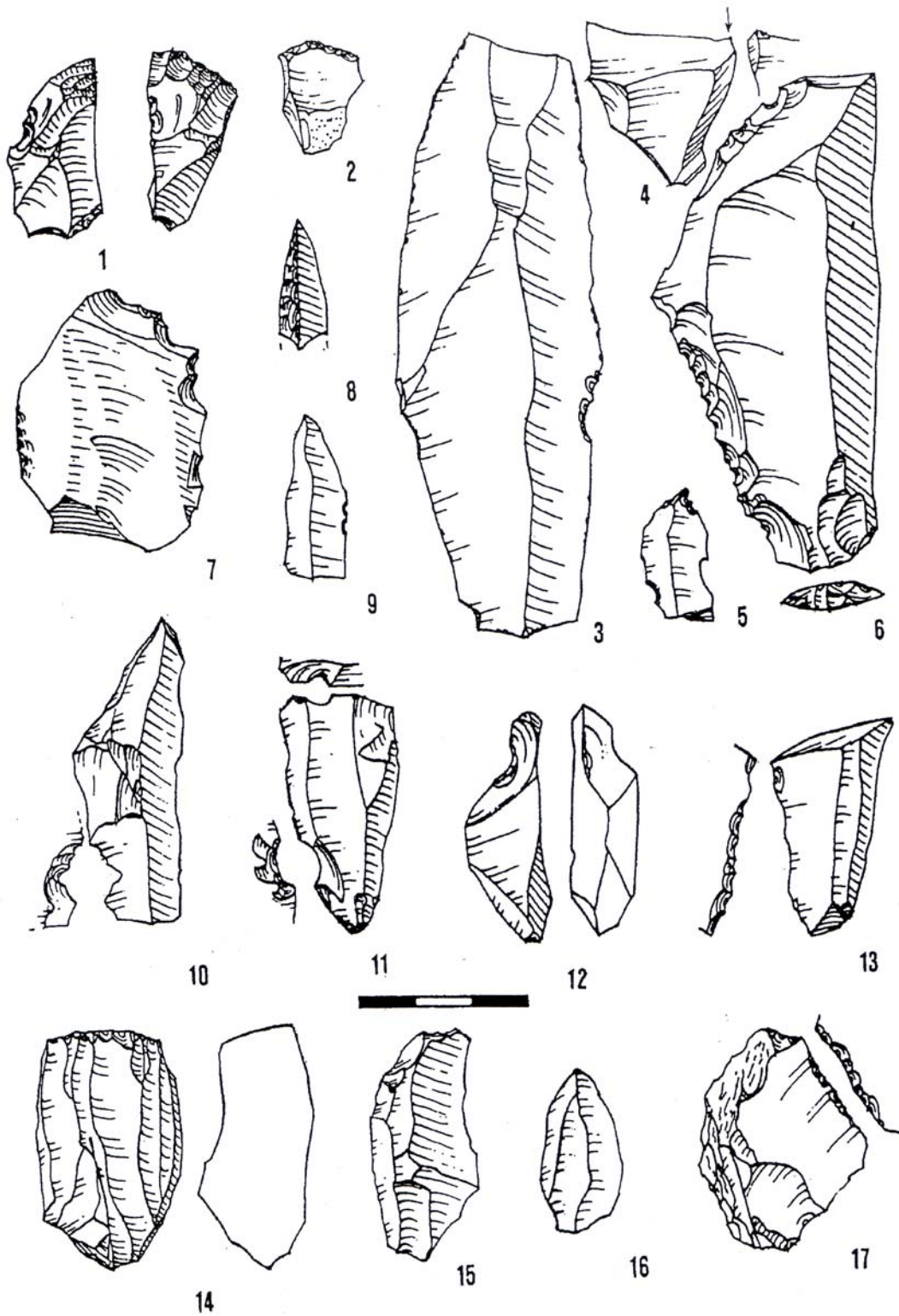


Fig. 28. Selected cores, scrapers, retouched pieces and blades from Stránska skála IV. After Svoboda 1991.

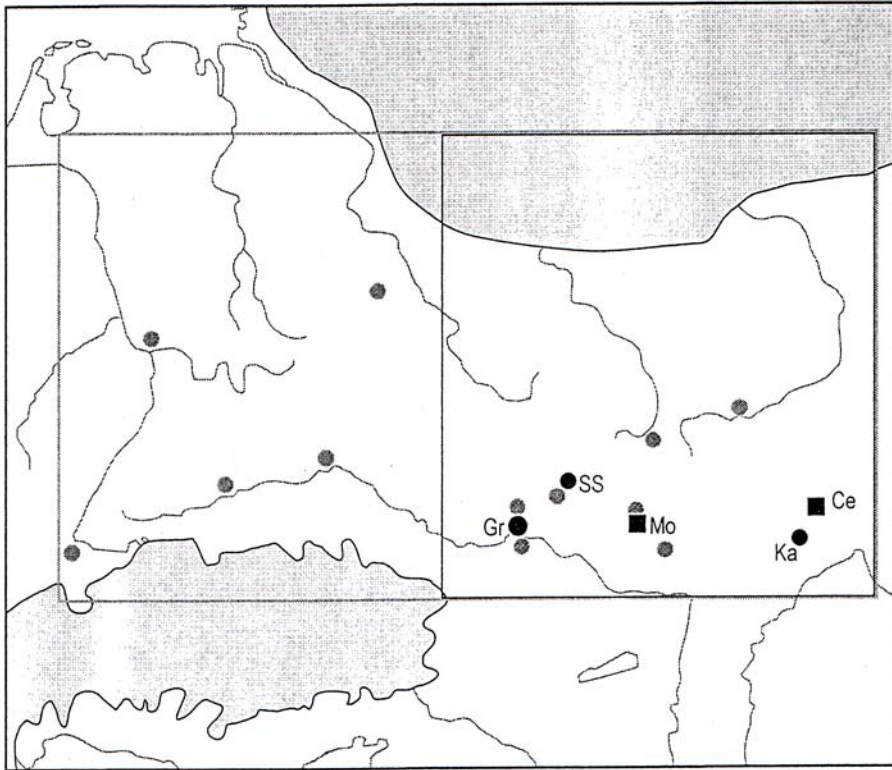


Fig. 29. Settlements from the suggested “Grubgrabien” are black dots. Sites from the Epigravettien are black squares. The grey dots are other sites from the Last Glacial Maximum. Ce=Cejkov. Gr=Grubgraben. Ka=Kasov. Mo=Moravany. SS=Stanska Skála. After Terberger 2003.