# La Belle-Roche (Sprimont, Belgium) : the Oldest Archaeological Site in the Benelux. A Report on a Field Trip.

## La Belle-Roche (Sprimont, Belgique) : le plus vieux site archéologique du Benelux. Compte-rendu d'excursion.

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**Abstract**

The report on the field trip to the La Belle-Roche site (Sprimont, Belgium) during the Symposium "Five Million Years : the Human Adventure" allows us to carry out a synthesis of the multi-disciplinary research which has gone on there for the last 10 years. This fossil cave has yielded deposits from the Early Middle Pleistocene, a remarkably rich and varied fauna of the Upper Cromerian (around 500,000 years old) and a prehistoric industry involving pebble tools which is by far the oldest trace of human occupation in the Benelux.

**Résumé**

Le rapport d'une excursion sur le gisement de La Belle-Roche (Sprimont, Belgique) a permis de réaliser une synthèse des recherches pluridisciplinaires qui s'y sont déroulées depuis 10 ans. Cette grotte fossile conserve des dépôts du Pléistocène moyen ancien, une faune remarquablement riche et variée du Cromérien supérieur (environ 500.000 ans) et une industrie préhistorique à galets aménagés qui est de loin la plus ancienne trace d'occupation humaine du Benelux.

Key words : palaeokarst, Belgium, pebble tools, Cromerian fauna, multi-disciplinary research, Early Middle Pleistocene.

Mots clefs : paléokarst, Belgique, galets aménagés, faune cromérienne, recherches pluridisciplinaires, Pléistocène moyen ancien.

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## Introduction

Within the framework of the international symposium "Cinq millions d'années, l'aventure humaine" ("Five Million Years, the Human Adventure"), Brussels, September 1990), the field trip to the palaeokarstic site of La Belle-Roche seems worthwhile due to the fact that one of the layers of fill conceals the most ancient artefacts heretofore recognized in the Benelux. Besides, the multi-disciplinary studies undertaken there and the abundance of palaeontological data discovered there provide for an exact definition of the chronological and palaeoecological context of this lower palaeolithic occupation. From this fact, it is clear that La Belle-Roche is destined to become a reference site for the Early Middle Quaternary of Europe. Finally, it should be underlined that the discovery of human remains, which of course remains uncertain, would be of the highest interest since, due to its fauna, the site of La Belle-Roche seems chronologically quite close to the Mauer site (Heidelberg; see Kraatz, 1992).

## Situation

The karstic site of La Belle-Roche is to be found approximately 20 km South of Liège, Belgium, at the southwestern extremity of the commune of Sprimont (fig. 1). More precisely, it is situated on the right slope of the Ambleve river, south of and below the village of Fraiture, around 2 km from the confluence of the Ambleve and the Ourthe, near Comblain-au-Pont (fig. 2).

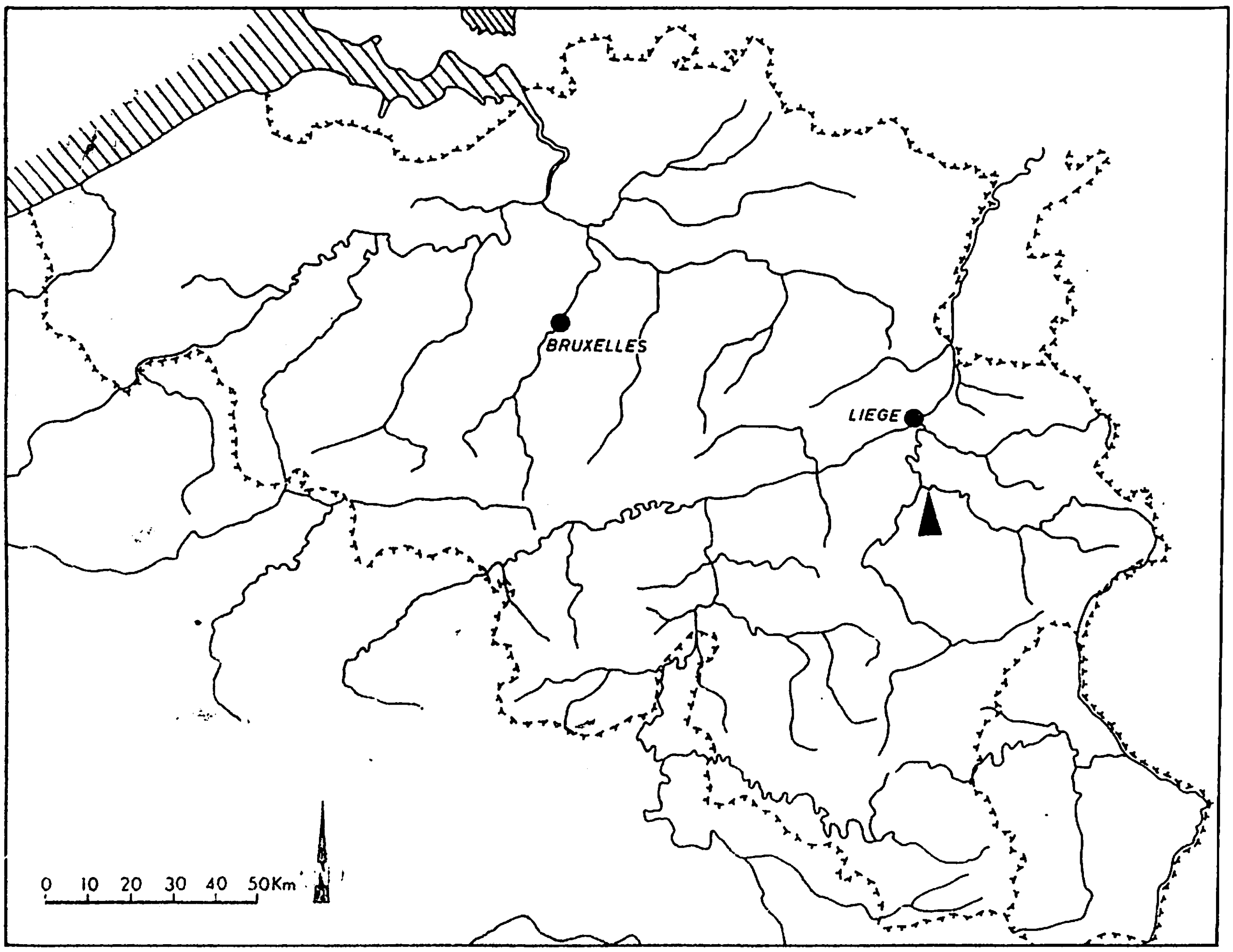


Fig. 1 Map showing the location of the La Belle-Roche site in Belgium

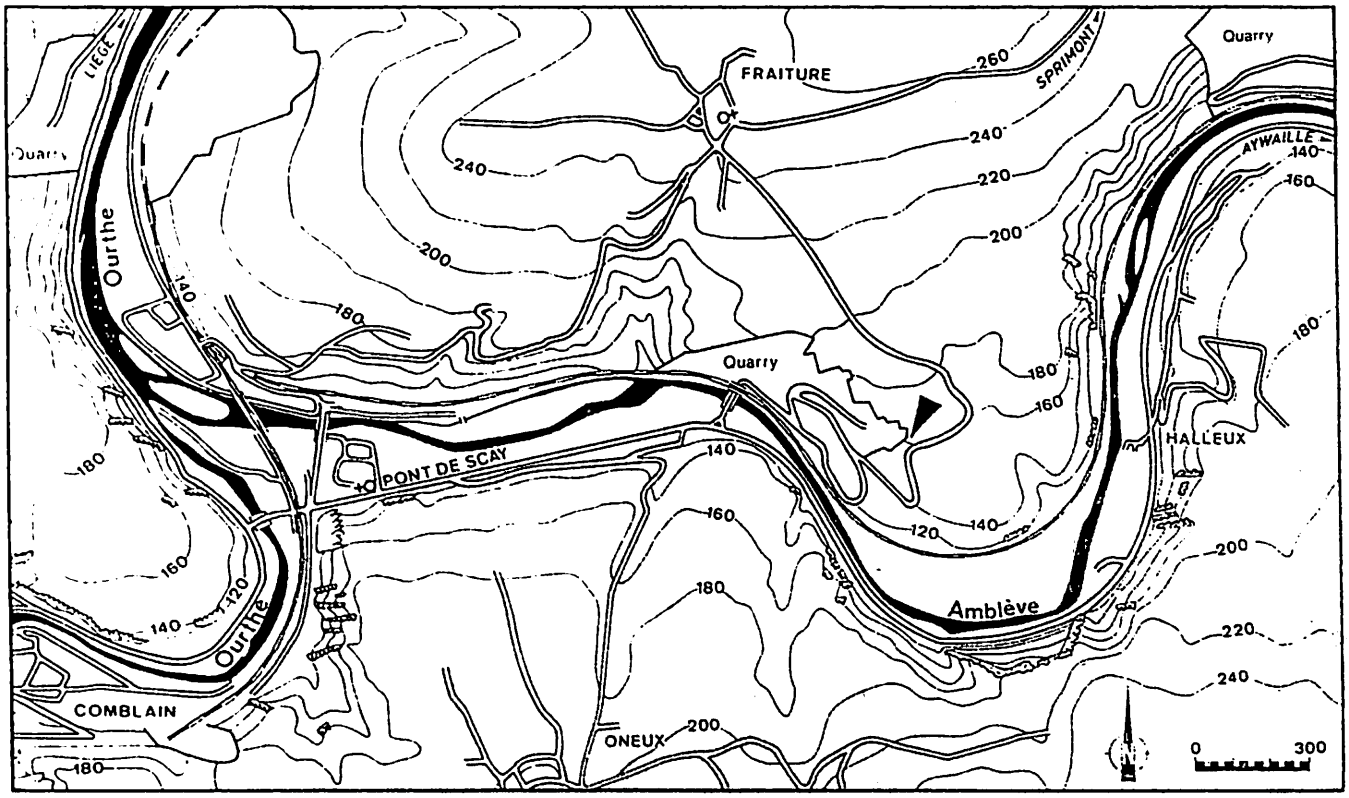


Fig. 2 Precise map showing the location of the La Belle-Roche site within the area of the confluence of the Ourthe and Ambleve rivers.

The cave appears in cross-section in the upper face of the quarry called La Belle-Roche, at the eastern extremity of its worked part, at an altitude of 160 m, or 60 m above the present stream level.

The cave was brought to light due to quarry work carried out on the upper level of the site. Although it had already been partially destroyed by quarrying and seems earlier to have been identified by amateur researchers (Cordy, 1981), it was only in 1980 that the site's real importance was recognized (Cordy, 1980), and that a salvage excavation and scientific studies were undertaken

## Saving the Site

Since its official discovery, the La Belle-Roche site has been excavated by the non-profit organization "Palaeontology and Karstic Archaeology" in close cooperation with the Department of Animal Palaeontology of the University of Liège (Prof. G. Ubaghs) and subsequently with the Research Group "Vertebrate and Human Evolution" of the same University. Given the continuity of salvage excavations still going on, only preliminary publications have reported discoveries and the advancement of research (Cordy, 1980, 1981... ).

Before the discovery of the fossiliferous level of the site, its western portion had already been destroyed. Since 1980, quarrying activity has gone on and continues to destroy the cave progressively and irremediably. Hence, excavations carried out have had as their objective saving the archaeological and palaeontological specimens and gathering a maximum of information about the fill before the site is definitively destroyed by the quarrying. During the first years, research was able to be carried on with all the meticulousness desired. However, since 1987, with the intensification of industrial exploitation, 'excavation campaigns', spread out over some six months, have been transformed into "salvage campaigns". This situation is quite evidently damaging both for the quality of artefact

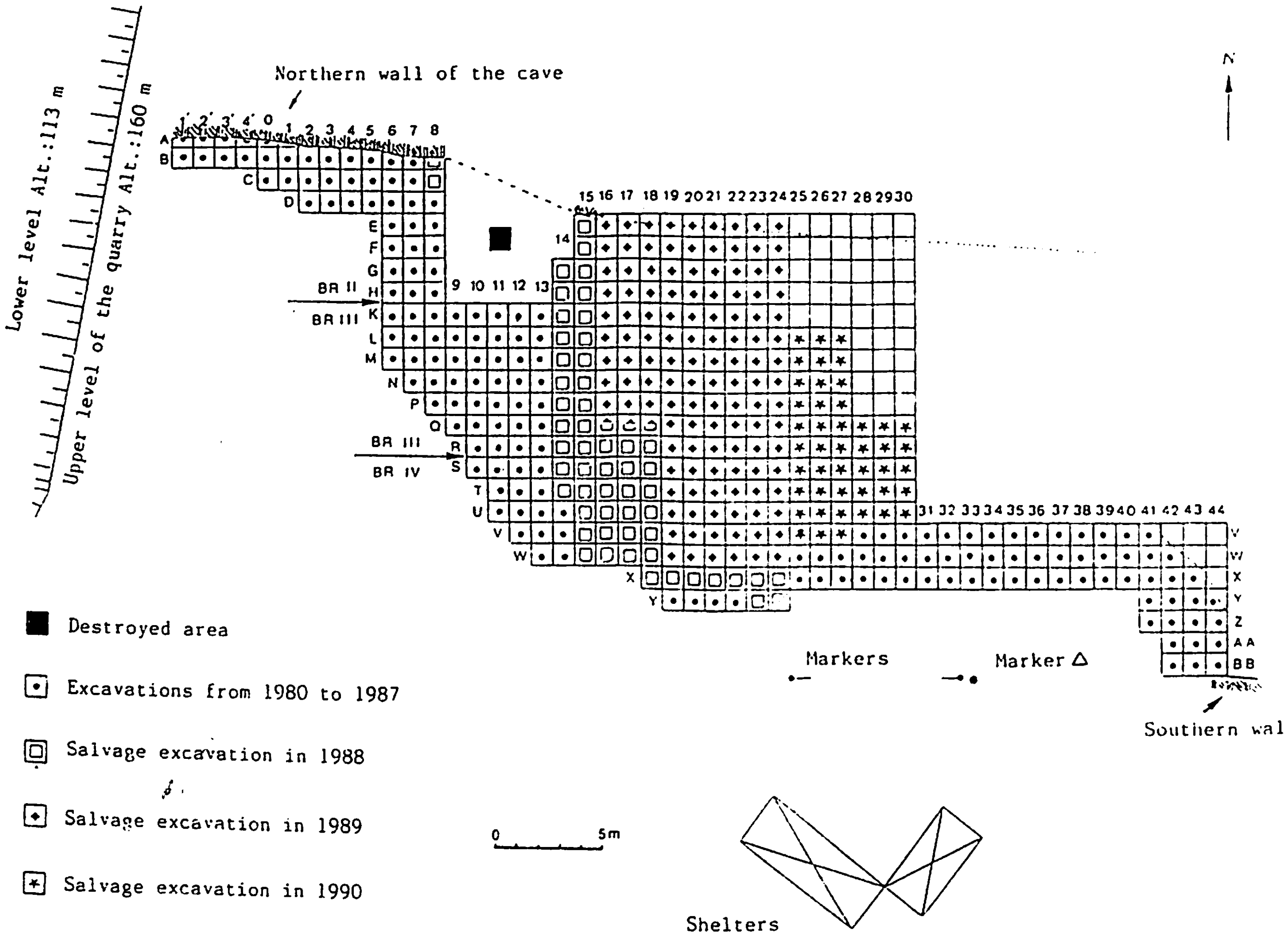


Fig. 3 Grid of the La Belle-Roche excavation

As of the end of the last salvage campaign in 1990, around 400 m² have been excavated since the site's recognition in 1980 (fig. 3).

## Description of the Site

The site occurs within a level of a karstic system whose general East-West orientation follows the stratification of carboniferous limestone beds. Various transversal and longitudinal sections bring four galleries to light which, parallel to one another, plunge into the interior of the hillside still intact (fig. 4).

This karstic level has been fossilized since all hydrological processes have long disappeared, and has been totally choked up with fill deposits. Its carving out must doubtlessly be seen in relation to the Ambleve's subterranean cut-off meandering when the stream flowed some sixty metres higher and be correlated with terraces attributed to the Middle Pleistocene.

The transversal face of the three fossiliferous galleries (II, III, and IV), which are in large measure interconnected, is spread out over 25 metres. The cave's length has been proven to extend over a hundred metres into the limestone massif (measurements by electric resistivity carried out by ISSEP, Belgium).

## Fill Description

All the cave's galleries are completely filled with more or less loose deposits, certain of which being fossiliferous. Only the fill of gallery I is to be distinguished from the others and has turned out to be sterile as much from a palaeontological point of view as from an archaeological one.

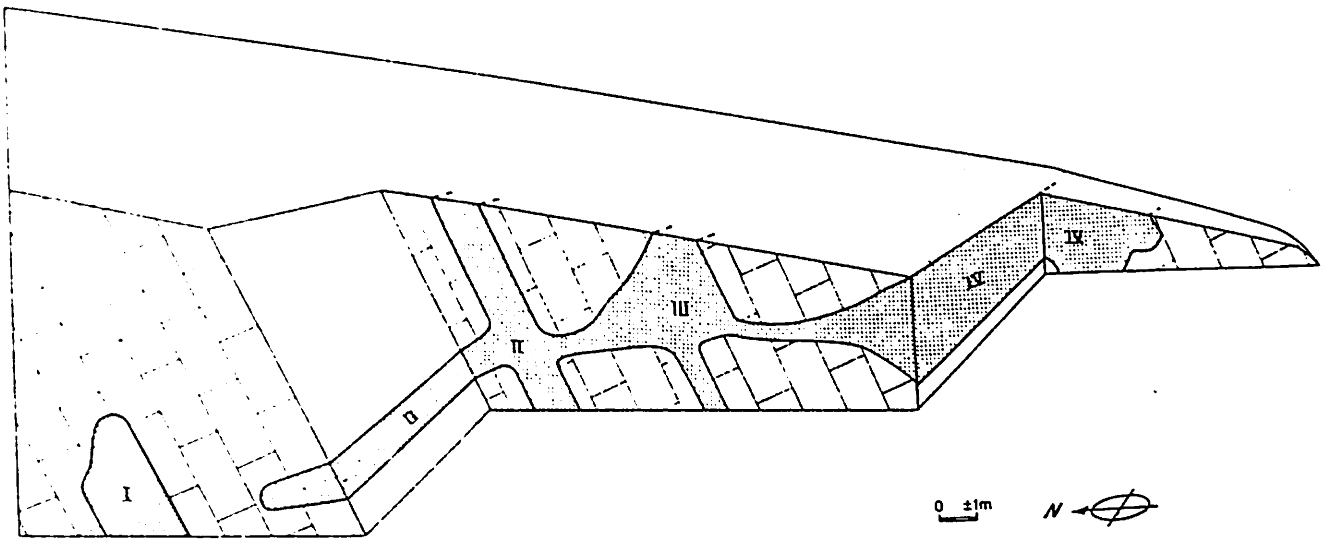


Fig. 4 Block diagram showing the disposition of the galleries and the initial cross-sections.

The deposits of the three other galleries are relatively homogeneous despite variations in thickness and sometimes in lithofacies of superposed layers and beyond local deformations due to sedimentary structure at the level of karstic pits. Five major phases of filling can be defined as follows (fig. 5 and 6) :

### 1. The "Aeolian" Wash-in Complex

A silt, probably of aeolian origin, initially clogged up the karstic pits. This sterile sediment was washed into the cave, probably by run-off.

### 2. The Fluvial Complex

The galleries' floors have been covered by a layer of fluvial origin formed essentially of pebbly and gravelly layers. Doubtlessly, this deposit was put in place by the Ambleve as shown by lithological composition (quartzite, sandstone, quartz and also some flint) when the cave was still undergoing full hydrological activity. At the end of this phase, the watercourse

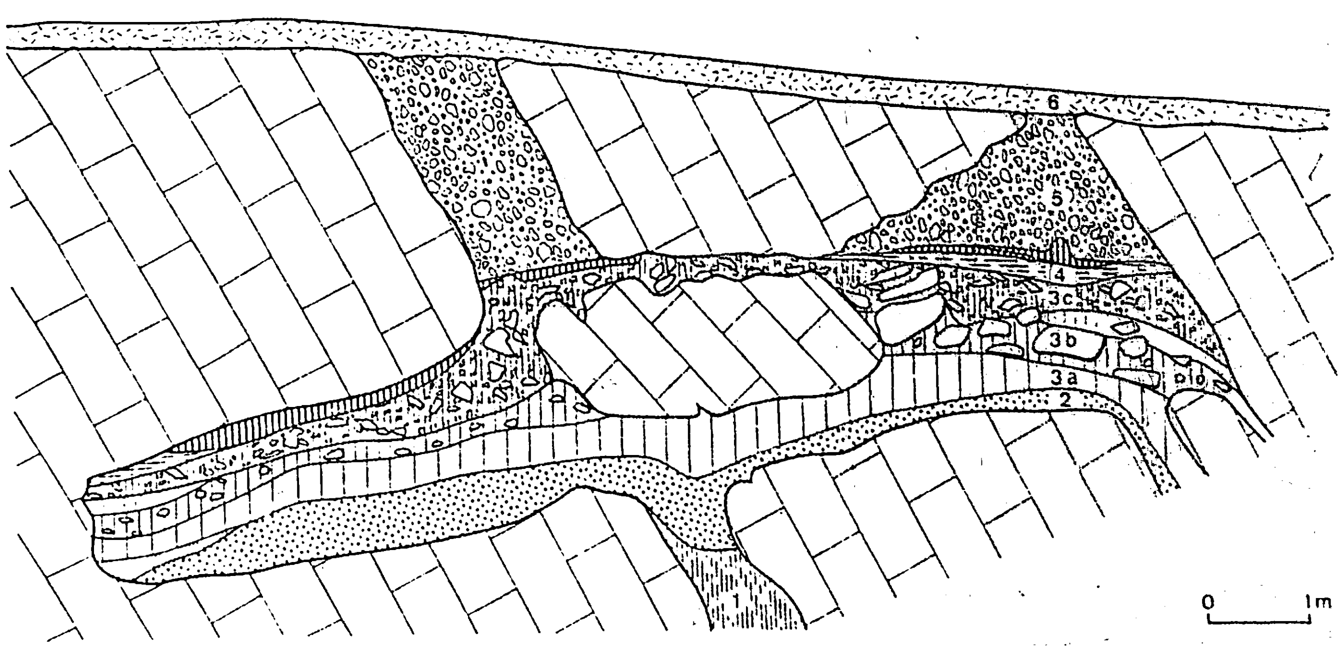


Fig. 5 Schematical stratigraphical cross-section of galleries I and II (see definition of layers in the text).

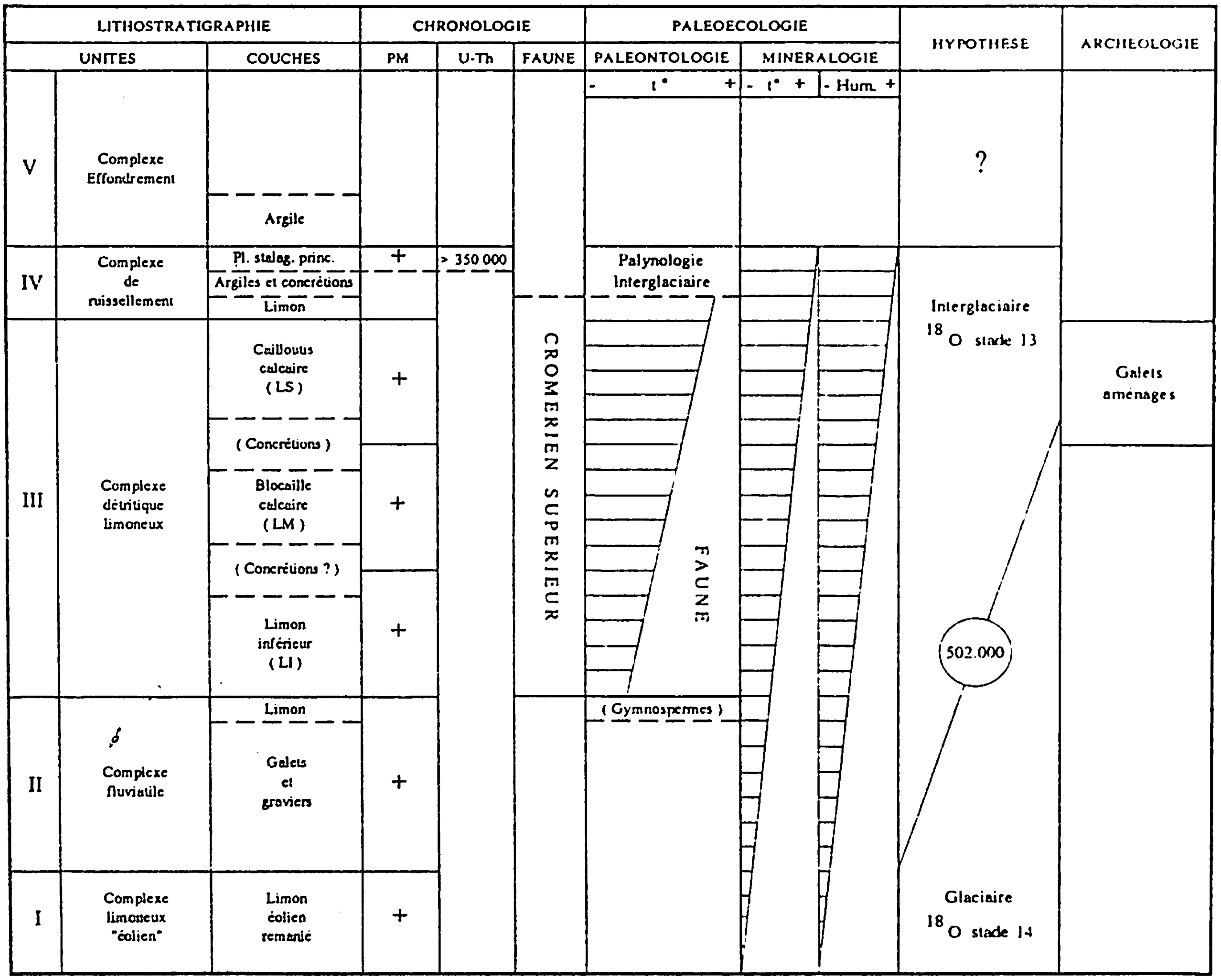


Fig. 6 Synthetic table of multi-disciplinary research. PM = palaeomagnetism; U-Th = Uranium-Thorium datation. Mineralogy = clay mineral evolution.

locally deposited greyish, fluvial, laminated silty lenses. The totality of these layers are sterile with the exception of the limon which sometimes contains limonite casts of Gymnosperm branches (probably of the genus *Pinus*) (Demaret-Fairon, 1984).

### 3. The Unsorted Silty Detrital Complex

These deposits, which this time are quite rich in faunal remains, are silty but progressively loaded from bottom to top with reddish, decalcification clay and limestone rock fragments. From a sedimentological point of view, this complex is granulometrically poorly classified and the cobbles do not present a well-defined orientation. Elsewhere, bone remains are dispersed from bottom to top and only exceptionally present anatomical connections. Finally, reworked concretions are sometimes observed in this complex. All these observations point to a secondary deposit, put in place after a mass movement probably in the form of mud flows; these flows would then have locally affected the karstic deposits which lie in an upper portion of the cave.

Three layers are distinguishable from bottom to top within this complex :

a) A lowest, brown-beige silt containing scattered quartzite pebbles similar to those of the fluvial complex. This layer contains few faunal remains except in its upper part where a relative concentration of fossils seems connected to a break in sedimentation. The quite sporadic occurence of some speleothems seems to confirm this sedimentary discontinuity.

b) Limestone rubble embedded within a rather reddish silty matrix follows. In gallery II, limestone blocks are relatively small and dispersed within the sediment; in galleries III and IV, this layer is characterized by collapsed blocks and by relatively angular rubble. From this layer on, bones become relatively abundant and varied; microfaunal remains can in places become quite rich. This time the quite sporadic development of a number of stalagmites clearly attests to a halt in sedimentation at the summit of this layer.

c) Rounded limestone cobbles, generally of decimetrical sizes, complete this detrital complex. The silty matrix has a reddish appearance due to its content in decalcification clay. The cobbles are easily distinguishable from the more angular blocks of the middle layer; quartz and quartzite cobbles are equally rarely observed. The rocks in this layer are frequently cemented together by a calcite impregnation and may sometimes exhibit a characteristic breccia. It is as rich in fossils as the middle layer and moreover contains scattered prehistoric artefacts.

### 4. The Clay-Calcite Run-off Complex

This lithostratigraphic unit is essentially linked to a run-off process and a very humid period. In question here is a complex of very thin interbedded layers of calcite, clay and clayey silt as well as a variable succession of laminar calcitic deposits and clayey run-off deposits. Typically, it begins with layered lenses which can contain microfaunal remains particularly rich in Chiroptera. At the summit of this complex, the remains of a stalagmitic floor can in places develop so as to reach a thickness of more than fifteen centimetres. This clay-calcitic complex is quite close to the roof of the galleries. Apart from the lower layer, these deposits are sterile.

### 5. The Collapsed Complex

In the high parts of the cavities and in the vents, the galleries are filled with deposits resulting from the mechanical breaking down of the walls and roofs and from the limestone's chemical alteration (essentially dolomitic sand and decalcification clay). This complex typically begins with a red laminated clay layer containing debris from the roof and wall speleothems.

### 6. Surface Colluvium

On the surface, above the fossil cave, one may observe a relatively recent colluvial deposit containing some mesolithic and neolithic artefacts. Since the cave's filling-in, the rock above the fossiliferous level has doubtlessly been considerably eroded by periglacial processes linked to glaciations which have succeeded one another during the past five hundred thousand years. This erosion has probably brought on the destruction of an upper part of the cave, which perhaps corresponded to the site of prehistoric human occupation.

## Dating

The filling of this karstic level is chronologically defined by two dating systems. On the one hand, palaeomagnetism, normal in all the deposits, testifies to a date later than the last reversal of the geomagnetic field, the Brunhes-Matuyama boundary, which is dated at about 730,000 BP (Morley and Hays, 1981; Zubakov and Borzenkova, 1990). On the other hand, numerous 234Uranium/230Thorium datings have been carried out on the main stalagmitic floor which completely seals the fossiliferous deposits. All datings attribute an age of over 350,000 years (the method's limit) for the concretion formation and *a fortiori* for the artefacts and fossils (Gewelt *et al.*, 1984; Gascoyne and Schwarcz, 1985; Gewelt, 1985; Quinif, unpublished results).

The study of the fauna, which is exceptionally rich (around 25,000 indexed remains) and varied (some fifty species) (tables 1 and 2), allows us to put forward a more precise date. In fact, the association and the degree of evolution of carnivores such as *Ursus deningeri*, *Panthera leo fossilis*, *Panthera gombaszoegensis*, *Canis mosbachensis* and *Xenocyon lycaonoides*, herbivores such as *Equus mosbachensis*, *Hemitragus bonali*, *Dicerorhinus etruscus* and Rodents such as *Pitymys gregaloides* and *Arvicola cantiana* correspond perfectly with the Early Middle Pleistocene and more particularly with the Upper Cromerian. This fauna can quite assuredly be correlated with that of sites such as the l'Escale cave (St. Estève Janson) in France, Westbury-sub-Mendip and Boxgrove in Great Britain, Mosbach and Mauer in western Germany and Vertesszöllös in Hungary.

This biozone is approximately associable with the oxygen isotope stage 13 and perhaps extends to stage 15 (Cordy, 1982, 1991); the site's age is thus situated at around 500,000 years ± 70,000 years after datings classically proposed for these stages (Morley and Hays, 1981; Zubakov and Borzenkova, 1990).

## Palaeoecology

From a palaeontological viewpoint, the fauna, and especially the microfauna, clearly indicate that the detrital, silty complex (3) corresponds to a period of palaeoclimatic transition. In the first half of the deposits, the climate appears cold and continental, undoubtedly in relation to a glacial period. The presence of arctic Rodents belonging to the *Dicrostonyx* and *Lemmus* genera, linked to that of a typically continental Lagomorph, *Ochotona* cf. *pusilla*, attests to this interpretation. Even though the occurrence of Reindeer is very rare, it entirely confirms this model. In the second half of the deposits, the disappearance of the above-mentioned animals and the appearance of typically sylvicolous species as, for example, the Red Deer (*Cervus elaphus*) and the Roe Deer (*Capreolus* sp.) or the Wood Mouse (*Apodemus* sp.) among the Rodents are sufficient indices of a warming of the climate and of a redevelopment of wooded regions. The appearance and the spectacular development of Chiroptera at the summit of the detrital deposits right under the clay-calcite complex totally confirms the hypothesis of an undoubtedly interglacial climate.

This palaeoclimatic model is confirmed by the flora, which provides some supplementary data. On the one hand, pollen analyses undertaken on samples of the silty matrix (layer 3c), the breccia (3c) and the stalagmitic floor (4) display a typical interglacial succession. It is first characterized by the dominance of *Betula* (48%) and *Fraxinus* (31%), and the presence of mesophilous trees such as *Corylus* (3%), *Carpinus* (2%) and *Alnus* (2%). It continues then by the combined extension of *Pinus* (32%), *Corylus* (12%), *Alnus* (11%), *Picea* (9%), *Quercus* and *Tilia* (both 1%). Afterwards, the regression of all trees, except *Betula* (12%) and *Quercus* (3%), seems to correspond to cooler climatic conditions, still of interglacial character, as indicated by the weak maintenance of *Corylus* (5%), *Fraxinus* (1,5%), *Carpinus*, *Fagus*, *Tilia* and *Ulmus* (all four less than 1%). On the other hand, the fossilization of Gymnosperm branches (probably *Pinus*) (Demaret-Fairon, 1984) may indicate that the glacial conditions corresponding to the beginning of the alluvial deposits were not extreme and permitted the development of arboreal species.

Finally, detailed analysis of the clayey minerals in all the deposits, among other things, allows our defining the overall characteristics of the paleoclimate. The result is that two climatic gradients quite definitely exist throughout the totality of the fill : a temperature gradient ranging from periglacial conditions ("aeolian" complex 1) to quite temperate conditions (complex 4) and a humidity gradient ranging from relatively dry conditions (complex 1) to very humid conditions (complex 4, clay-calcite run-off).

## Prehistoric Industry

The prehistoric industry has been found essentially disseminated in the upper part of the fossiliferous sediments (layer 3c). It should be underlined that the artefacts are not found rigourously *in situ*, but have undergone a limited gravitational displacement and reworking within the cave. Numerous preliminary descriptions of artefacts have already been published (Cordy,

Table 1 List of Macromammals of La Belle-Roche (Sprimont)
Liste des grands mammifères de la Belle-Roche (Sprimont)

| | | |
|---|---|---|
| *CARNIVORA* | CARNIVORES | CARNIVORES |
| *Ursus deningeri* | Ours de Deninger | Deninger's Bear |
| *Crocuta cf. brevirostris* | Hyène brévirostre | Short-faced Hyena |
| *Panthera leo fossilis* | Lion des cavernes | Cave Lion |
| *Panthera gombaszoegensis* | Panthère de Gombaszög | Gombaszög's Panther |
| *Felis cf. sylvestris* | Chat sauvage | Wild cat |
| *Canis mosbachensis* | Loup de Mosbach | Mosbach's Wolf |
| *Vulpes cf. praeglacialis* | Renard | Alopecoïd Fox |
| *Xenocyon lycaonoides* | Chien sauvage | European Hunting Dog |
| *Meles meles* | Blaireau | Badger |
| *Mustela cf. putorius* | Putois fossile | Polecat |
| *Mustela cf. palerminea* | Hermine | Primitive Stoat |
| *Mustela cf. praenivalis* | Belette | Primitive Weasel |
| *cf. Lutra sp.* | Loutre | Otter |
| *PERISSODACTYLA* | PERISSODACTYLES | PERISSODACTYLS |
| *Equus mosbachensis* | Cheval de Mosbach | Mosbach's Horse |
| *Dicerorhinus etruscus* | Rhinocéros étrusque | Etruscan Rhinoceros |
| *ARTIODACTYLA* | ARTIODACTYLES | ARTIODACTYLS |
| *Cervus elaphus (acoronatus ?)* | Cerf acoronate ? | Red Deer (Crownless ?) |
| *Capreolus capreolus* | Chevreuil | Roe Deer |
| *Prémégacéridé indét.* | Prémégacéros | ? Verticornis Deer |
| *Rangifer tarandus* | Renne | Reindeer |
| *Hemitragus bonali* | Tahr | European Tahr |
| *cf. Bison schoetensacki* | Bison des steppes | Woodland Wisent |
| *LAGOMORPHA* | LAGOMORPHES | LAGOMORPHS |
| *Lepus sp.* | Lièvre | Hare |
| *Ochotona cf. pusilla* | Lièvre des steppes | Steppe Pika |
| *Oryctolagus cf. cuniculus* | Lapin | Rabbit |

1980; Cordy and Ulrix-Closset, 1991; Ulrix-Closset and Cordy, 1991).

La Belle-Roche lithic tools were essentially fabricated from flint pebbles, with quite worn cortex and yellow ochre in colour. The worked surfaces and retouching present a whitish patina and are sometimes naturally blunted a bit. Study of this material can prove difficult due to the frequency of physical and chemical alterations in the raw material. On certain pieces, recent nicks reveal beneath the patina, which serves as a protective pellicle, a flint which is quite altered throughout. On rare occasions, quartz as well as a few quartzite pebbles, have also been worked. The origin of the raw material must doubtlessly be sought in the alluvial deposits of the river; for that matter, pebbles similar in nature and sizes are observable in the cave's fluvial deposit (complex 1).

The archaic character of the industry and its alteration impose a certain prudence as to its interpretation. However, the discovery of a whole series of artefacts presenting characteristics typical of human "pebble industry" and the

Table 2 List of Micromammals of La Belle-Roche (Sprimont)
Liste des micromammifères et autres vertébrés de la belle-Roche (Sprimont)

| | | |
|---|---|---|
| *RODENTIA* | RONGEURS | RODENTS |
| *Allocricetus bursae* | Hamster de Brassö | Schaub's Dwarf Hamster |
| *Cricetus sp.* | Grand Hamster | Common Hamster |
| *Apodemus sp.* | Mulot | Field Mouse |
| *Arvicola cantiana* | Grand Campagnol | Primitive Water Vole |
| *Pitymys gregaloides* | Campagnol grégaloïde | Gregarious Pine Vole |
| *Microtus gregalis* | Campagnol des hauteurs | Gregarious Vole |
| *Microtus arvalis* | Campagnol des champs | Common Vole |
| *Microtus agrestis* | Campagnol agreste | Field Vole |
| *Clethrionomys sp.* | Campagnol roussâtre | Bank Vole |
| *Lemmus cf. lemmus* | Grand Lemming | Norway Lemming |
| *Dicrostonyx sp.* | Lemming à collier | Arctic Lemming |
| *Muscardinus sp.* | Muscardin | Dormouse |
| *Eliomys sp.* | Lérot | Garden Dormouse |
| *INSECTIVORA* | INSECTIVORES | INSECTIVORES |
| *Talpa sp.* | Taupe | Mole |
| *Sorex sp.* | Musaraigne (3 espèces) | Shrew (3 species) |
| *Crocidura sp.* | Crocidure | White-Toothed Shrew |
| *CHIROPTERA* | CHIROPTERES | BATS |
| *Myotis bechsteini* | Vespertilion de Bechstein | Bechstein's Bat |
| *Myotis dasycneme* | Vespertilion des marais | Pond Bat |
| *Myotis emarginatus* | Vestpertilion oreilles échancrées | Geoffroy's Bat |
| *Myotis nattereri* | Vespertilion de Natterer | Natterer's Bat |
| *Myotis cf. mystacinus* | Vestpertilion à moustaches | Whiskered Bat |
| *Plecotus cf. auritus* | Oreillard | Long-Eared Bat |
| *AVES* | OISEAUX | BIRDS |
| *Strigiformes ?* | Rapaces indét. | Raptors undet. |
| *REPTILIA* | REPTILES | REPTILES |
| *Ophiosaurus sp.* * | Orvet des Balkans | Balkan's Slow Worm |
| *AMPHIBIA* | AMPHIBIENS | AMPHIBIANS |
| *Anura* | Anoures indét. | Frogs undet. |
| *PISCII* | Indét. POISSONS | Undet. FISHES |

(*Det. by M.-Cl. Groessens, UCL Belgium)

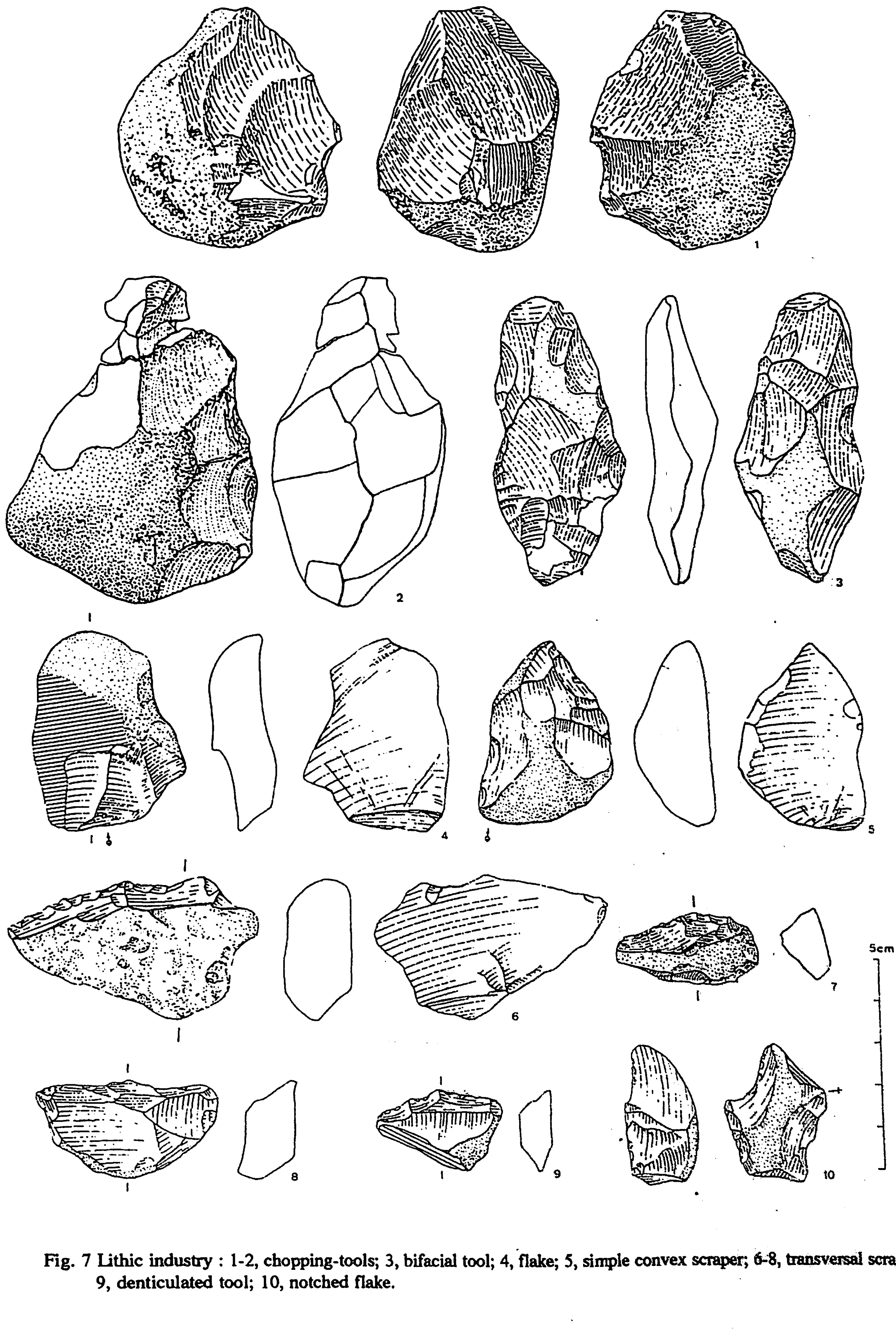


Fig. 7 Lithic industry : 1-2, chopping-tools; 3, bifacial tool; 4, flake; 5, simple convex scraper; 6-8, transversal scraper; 9, denticulated tool; 10, notched flake.

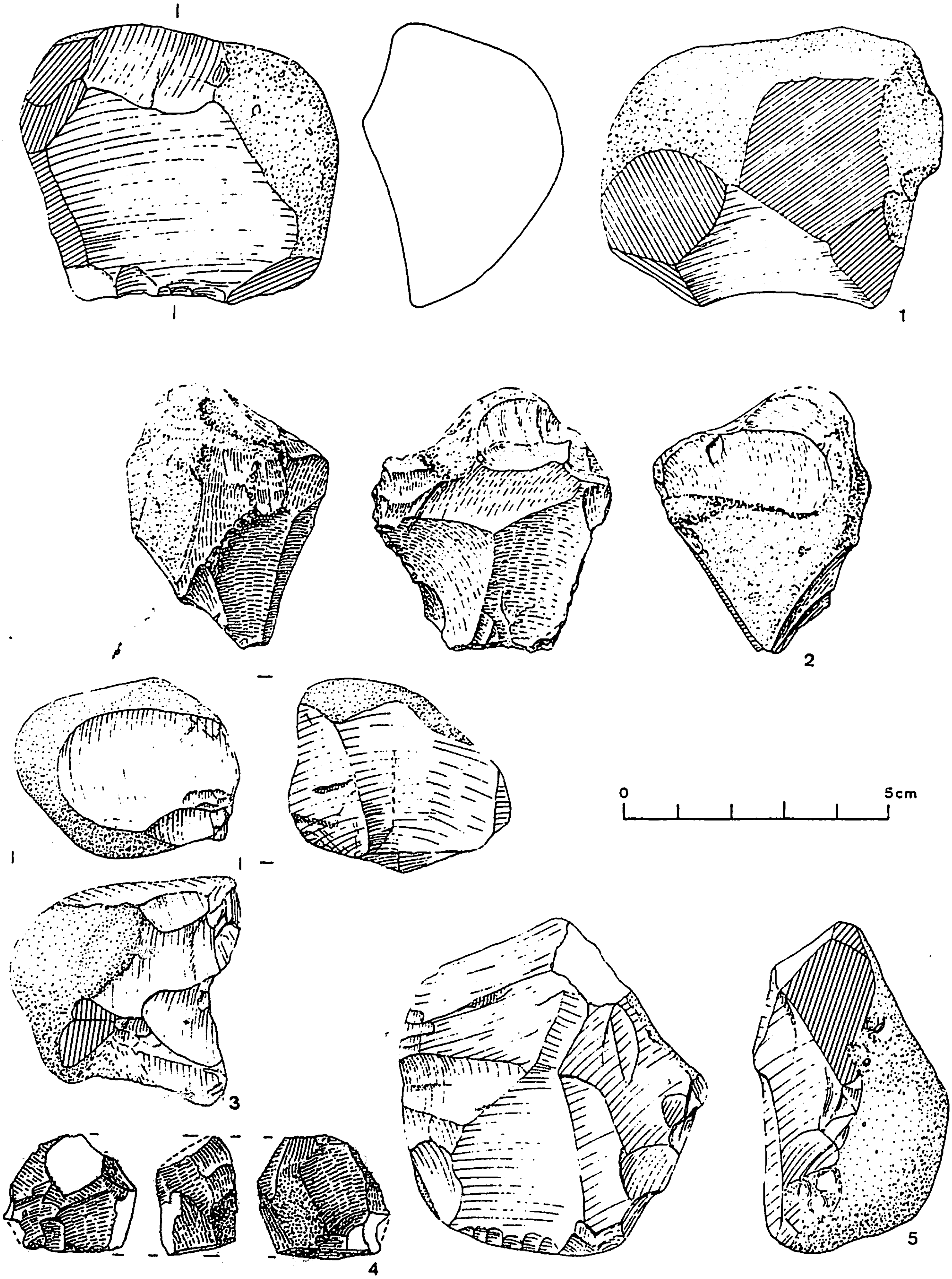


Fig. 8 Lithic industry : 1, 2, 3 and 5, flake cores; 4, polyhedron.

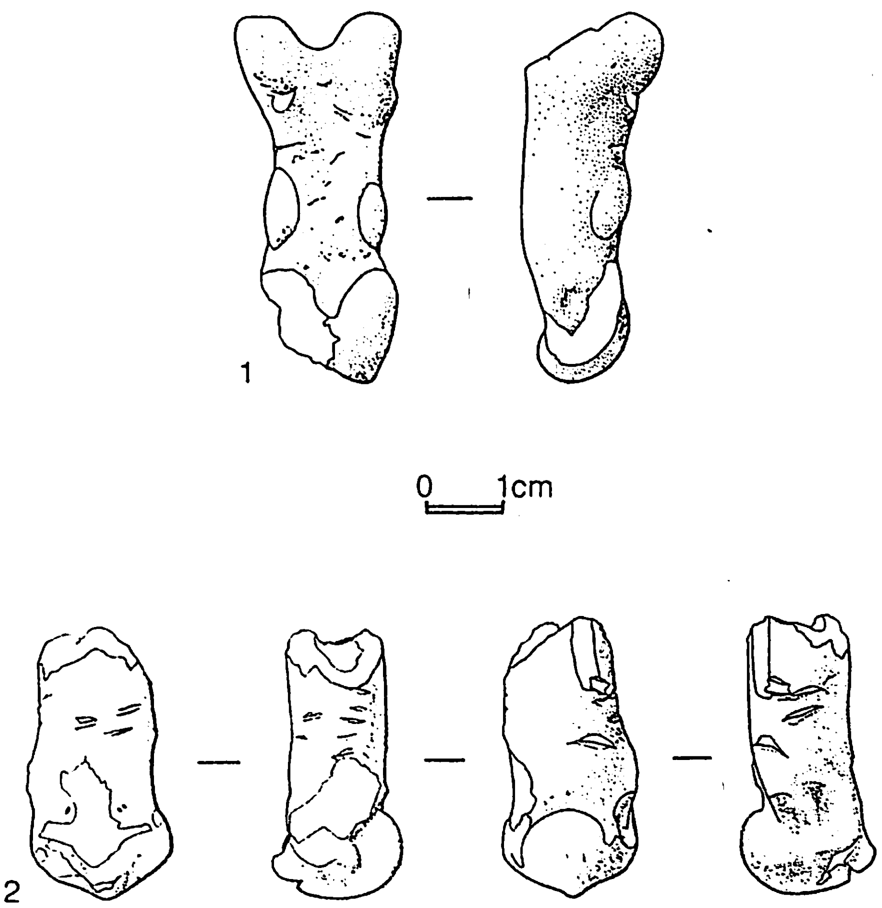


Fig. 9 Bones with cutmarks.

discovery of an indisputably bifacial piece allows us to unreservedly affirm the anthropological character of a large part of the pebble tools and flakes gathered at La Belle-Roche.

Apart from the bifacial piece, La Belle-Roche artefacts primarily comprised of pebble tools : various chopping tools, atypical worked pebbles, unprepared cores and, more rarely, choppers. On the other hand, the industry also includes flakes among which one observes a small number of tools. The flakes are generally short and relatively thick, yet there do exist a few rare, thin flakes. The striking platform, cortical or smooth, usually forms an open angle with the ventral face; sometimes it is quite reduced, even punctiform. The tools on flakes are predominantly scrapers : simple convex scrapers and a series of transversal scrapers. We also point out notched flakes, some denticulated tools and small polyhedra.

Among the bone remains gathered at La Belle-Roche, figure two bones of *Ursus deningeri*, (a phalange and a metapodial), which present short, rather deep, angular cutmarks, sometimes with removal of material. Taking their position on the bone into account, these cutmarks seem to be interpretable as traces of butchering and perhaps also of skinning the animal.

## Safeguarding the Site

The field trip to the palaeokarstic site of La Belle-Roche ends with a visit to the municipal museum of Comblain-au-Pont which in two showcases presents a choice of fossils characteristic of the site and excellent casts of the most representative artefacts. Presently, all the artefacts (over 200) and the gathered fossils (almost 25,000) are conserved at the University of Liège ("Vertebrate and Human Evolution" Research Group) in order to record restoration and study in a computerized data bank. A project for a future site museum is envisaged by the commune of Sprimont. The problem of the conservation of this site of international reference, unique in the Benelux, must also be envisaged. A project for extension of the quarry would in the future endanger the site with rapid destruction and would render even the present salvage excavation of the site feeble. For that matter, the pace at which the present salvage must proceed prevents us from working under the rigourous conditions indispensable for taking maximal advantage of this exceptional site. La Belle-Roche constitutes a striking example of the conflict between traditional economic and scientific and cultural interests linked to the safeguarding and appreciation of a common Patrimony.

**Acknowledgments**

Since its discovery in 1980, the scientific exploration of the La Belle-Roche site would not have been possible without the financial aid of the Ministry of the French-speaking Community of Belgium, of the Walloon Region, of the National Fund for Scientific Research and various grants from the University of Liège. The town of Sprimont has also provided numerous services on the excavation site. Finally, the Ministry of Labour and Employment and the Ministry of the Budget have provided a series of subsidized employments for excavators and technicians (CST, TCT, PRIME), altogether necessary for the site's salvage. Let us acknowledge here our deepest gratitude to all these institutions and their respective authorities.

We also wish to thank the various quarry's owners and successive authorities who have allowed us until now to pursue the salvaging of this site.

We wish as well to express our gratitude to all our colleagues who have collaborated in the scientific evaluation of this site and to the excavators, employed or volunteers, without whom the excavation salvage would not concretely have been accomplishable.

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