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Forms and Techniques

Before embarking on a survey of those forms and techniques of Palaeolithic 'art' which have survived, it is worth remembering that they probably represent only the tip of the iceberg: although it cannot be proved (unless one day a waterlogged, desiccated or frozen site of the last Ice Age is discovered, in which everything is preserved), it is virtually certain that a great deal of artistic activity involved perishable materials which are gone for ever: work in wood, bark, fibres, feathers, or hides (as mentioned earlier, some decorated wooden rods are known from late Middle Stone Age levels of Border Cave, South Africa, dating to c 37,000-50,000 years ago¹); figures made in mud, sand or snow; and, of course, body painting which, through finds of red ochre in living sites and in graves, is thought to have very remote origins.

Music

In addition, dance and song leave no traces at all, and such things as reed-pipes, wooden instruments, and stretched-skin drums will have disintegrated; however, a few musical instruments have survived from the Upper Palaeolithic – there are about 30 'flutes', spanning the Aurignacian and Gravettian (18), the Solutrean (3) and the Magdalenian; a handful come from Hungary, Yugoslavia, Austria and the USSR, but most are from France, with 14 from the supersite of Isturitz alone.² The majority are broken; the French ones are made of hollow bird-bones, while the eastern specimens are of reindeer or bear-bone; they have between three and seven finger-holes along their length, and are played like penny-whistles rather than true flutes. Experiments with a replica by a modern musicologist have revealed that, once a whistle-head is attached to direct the air-flow, one can produce strong, clear notes of piccolo-type, on a five-tone scale.³ It should be noted that a possible flute, comprising a fragment of a very small hollowed-out bone into which someone had begun to make two holes, came from a pre-Aurignacian layer of the Haua Fteah cave, North Africa, dating to c 45,000 years ago.⁴

A few shaped, polished and engraved bird-bone tubes have been found which have no holes, and have been interpreted as trumpet-like 'lures' for imitating the call of a hind in the rutting season – one fine example from the Magdalenian site of Saint-Marcel even has a series of what look like cervid ears engraved on it.⁵ Many perforated reindeer phalanges have been interpreted as whistles in the past, though often the hole was made by carnivore teeth or other natural breakage; those which were intentionally made do produce a shrill, powerful note. A few definite whistles in bird bone are also known, such as the Magdalenian specimens from le Roc de Marcamps, Gironde.⁶

A number of oval objects of bone or ivory, with a hole at one end, have been interpreted as 'bull-roarers' ('rhombes', or 'bramaderas'), a type of instrument which makes a loud humming noise when whirled round on a string: a particularly fine example made of reindeer antler is that from the cave of La Roche Lalinde (Dordogne) (Fig. 34). The well-known parietal engraving from Trois Frères of a 'sorcerer' with a bison-head (Fig. 104) has often been interpreted as playing a musical bow, but this seems an extremely tenuous idea, and the enigmatic marks in front of its mouth could be any one of a number of things (see later, p. 152).

As for percussion, a number of mammoth bones, painted with red ochre, from the site of Mezin, near Kiev, dating to c 20,000 BC, are thought to be musical instruments – a hip-bone xylophone (osteophone?), skull and shoulder-blade drums, and jawbone rattles – and have been played by Soviet archaeologists, who even cut a record of their jam-session.⁷

Finally, there are possible lithophones in a number of caves: 'draperies' of folded calcite formations often resound when struck with a hard object (wooden sticks seem to produce the clearest and most resonant notes), and this seems to have been noticed by Palaeolithic people, since some of the lithophones are somewhat battered, and are decorated with painted lines and dots.⁸ Apart from Nerja in Spain and Escoural in Portugal, all known examples are in the Lot region of France (Cougac, Pech Merle, Les Fieux, Roucadour); moreover, most of them are in or near large chambers which could have held a sizeable audience.

Red skins or tanned hides?

Virtually all peoples around the world paint their bodies on certain occasions, and we have no reason to doubt that the same was true during the Palaeolithic – indeed, this was probably one of the very first forms of aesthetic expression. Unfortunately, owing to the decomposition of bodies, we have to infer it from other evidence. Lumps of natural pigments are known from archaeological sites of very remote periods: for example, one piece of red mineral, with vertical striations resulting from use, was found in the Acheulian (c 250,000 BC) rock-shelter of Bečov, Czechoslovakia, which had been occupied by *Homo erectus*. The even earlier site of Terra Amata (c 350,000 BC) at Nice, France, produced 75 bits of pigment ranging in colour from yellow to brown, red and purple; most of them have traces of artificial abrasion and were clearly introduced to the site by the occupants, since they do not occur naturally in the vicinity.⁹

During the period of Neanderthal people (c 100,000–35,000 BC), such pigments become increasingly frequent, not only in occupation deposits but also in burials, which now occur for the first time. In France, for

example, the cave of Pech de l'Azé yielded 103 blocks of manganese dioxide (black/blue), plus 3 of iron oxide (red); 67 of them were rounded or polished into a 'crayon' shape, as if they had been used on some soft surface.¹⁰

A Neanderthal skeleton at Le Moustier was sprinkled with red powder; red pigment was also found around the head of the famous skeleton of La Chapelle aux Saints, near two skeletons at Qafze, Israel, and with many others. In addition, there is evidence for actual mining of haematite (iron oxide) in Southern Africa from c 45,000–50,000 BC onwards (it will be recalled that pigment was in use in Zimbabwe at least 125,000 years ago), and in Hungary from 30,000 BC.¹¹

It was in the Upper Palaeolithic period that pigments became really abundant, being transported in tens of kilos; in some French occupation sites, it is not rare to find habitation floors impregnated with red to a depth of 20 cm. Well over 100 sites with pigment are known, as well as at least 25 burials. As we shall see, some of these pigments can be linked to the decoration of cave-walls; but what about open-air sites or unpainted caves? Can we assume that the presence of pigments here necessarily indicates body-painting?

Unfortunately, matters are not so straightforward, for the simple reason that mineral pigments of this type have a number of properties. Ethnographic studies around the world show that ochre is often used in the treatment of animal skins, because it preserves organic tissues, protecting them from putrefaction and from vermin such as maggots. It is probably this kind of function which explains the impregnated soil in some habitation sites and the traces of red mineral on many stone tools such as scrapers. Similarly, red pigment may have been applied to corpses not so much out of pious beliefs about life-blood, as is commonly assumed, or in order to restore an illusion of health and life to dead cheeks, but rather to neutralise odours and help to preserve the body.¹²

Even if, as most prehistorians believe, the people of the Old Stone Age did indeed paint their bodies, the practice may have been purely functional in some cases, rather than aesthetic: ochre is very effective in cauterising and cleaning injuries, and is still used in parts of Africa to dry bleeding wounds – in fact, until the end of the last century, it was still used by country doctors in parts of Europe as an antiseptic in the treatment of purulent wounds. Another function which may have been important during the last Ice Age is that of protection against the elements and insects. Peoples such as Polynesians, Melanesians and Hottentots used red pigments to maintain bodily warmth and ward off the effects of cold and rain; among some North American Indian tribes, a mixture of red ochre and fat was often applied to the cheeks of women and children as a hygienic measure to protect their skins against the sun and dry winds; while in other parts of the world red paint has been used as a protection against mosquitoes, flies and other disease-carriers.

The more aesthetic uses of pigment on the body may well have arisen from practices such as these: for instance, the medicinal properties of ochre may have led to the painting of the dead or dying, as was commonly done by certain tribes in the New World. In Palaeolithic cases, it is often difficult to tell whether a body had its flesh painted or merely its bones. If the whole body was painted at death, or just before, the lumps of pigment placed with the corpse may represent supplies of body-paint for the afterworld.



Fig. 34 Engraved 'bull-roarer' with geometric/linear motifs and covered with red ochre, from La Roche at Lalinde (Dordogne). Magdalenian. Length: 18 cm, width: 4 cm. (J.V.)

But what of the living? As already mentioned, most authorities agree that Upper Palaeolithic people must have painted their bodies, but the evidence is very limited. The use-wear on lumps of pigment is often shiny, indicating that they were applied to soft surfaces, which could be human skin, but also animal hide; the traces of use on a rough surface may simply indicate removal of powder to be used in a liquid paste. Some French caves have yielded bone tubes or hollow bird-bones, often engraved, containing powdered pigment, and not all of this material can be linked to cave-art; at the Mas d'Azil, excavators found a flat cake of red ochre, pitted with holes, and associated with sharp bone needles, which they interpreted as evidence for tattooing in the Upper Palaeolithic.¹³ Finally, as will be seen below, some human figurines of the period were originally painted red – but the same is true of bas-reliefs of horses and fish!

Techniques in portable art

These will be reviewed in order of apparent complexity, but this should not be taken as a chronological progression: as we have seen in the preceding chapter, the phenomenon of Palaeolithic art is a complex web of forms and styles rather than a simple linear development.

Portable art is usually divided into what seem to be utilitarian and non-utilitarian objects (ie decorated tools versus art objects or ornaments), and their decoration is classed as figurative or non-figurative. A very wide variety of materials and forms was employed.

The study of the techniques used in the period rests on two main types of evidence: first, the traces left on the objects or images by the tools, together with precise observation of their technological characteristics (in a very few cases, production debris or what may be the original tools have survived in close proximity to the images); second, experiments with similar materials and tools have been carried out, followed by comparison between the modern results and the originals.

Slightly modified natural objects

Much of what is called '*parure*' (jewellery) belongs in this category – ie fossils, teeth, shells or bones which have been incised, sawn or perforated. Such techniques are by no means restricted to the Upper Palaeolithic: a growing number of specimens are known from the preceding (Mousterian) period, and can therefore be attributed to Neanderthalers: two bones (a wolf foot-bone and a swan vertebra), with holes bored through the top, from Bocksteinschmiede (Germany), dating to c 110,000 years ago; a carved and polished segment of mammoth molar, and a fossil nummulite with a line engraved across it (making a cross with a natural crack), from Tata (Hungary), dating to c 100,000 years ago; a bone-fragment from Pech de l'Azé (Dordogne), with a hole carved in it; a reindeer phalange with a hole bored through its top, and a fox canine with an abandoned attempt at perforation, from La Quina (Charente).¹⁴ As will be seen below, other forms of 'aesthetic expression' are also known from the Mousterian.

The earliest phase of the French Upper Palaeolithic, known as the Châtelperronian (c 35,000 BC), has yielded a few more examples: the best known are those from the cave of Arcy-sur-Cure (Yonne). These levels at the site also contained a Neanderthal tooth; in view of the discovery of a Neanderthal skeleton in a Châtelperronian layer at St Césaire (Charente



Fig. 35 Perforated and engraved deer canines from the Magdalenian burial at St Germain-la-Rivière (Gironde). (After Laurent)

Maritime),¹⁵ it is more than likely that the earliest Arcy ornaments can be attributed to Neanderthal craftsmanship. They include wolf and fox canines made into pendants by incising a groove around the top, at least one sawn reindeer incisor, a bone-fragment with a wide carved hole, a sea fossil with a hole bored through its centre, and a fossil shell with a groove cut around the top.¹⁶

The next layer at Arcy, representing the Aurignacian (c 30,000 BC), has material which features the same techniques, clearly drawing on what had been developing for millennia: perforated fossils, a bone pendant with a wide carved hole, and so forth. Even older Aurignacian sites, such as the cave of Bacho Kiro in Bulgaria (over 41,000 BC), contain perforated animal-tooth pendants.¹⁷

The Aurignacian therefore has no sudden appearance of this kind of material, but there seems to be a marked increase in its abundance, perhaps linked to advances in lithic technology which improved or facilitated the working of decorative objects. The three main classes of '*parure*' are beads (of ivory, bone, stone, fossil wood, etc), animal teeth, and shells.

The animal teeth, perforated through the root, are mostly bovine incisors and the canines of fox, stag, wolf, bear or lion – fox teeth are often the most abundant in the Aurignacian and Gravettian, especially in central and eastern Europe.¹⁸ For example, the old man buried at Sungir, near Moscow, about 24,000 years ago, had two dozen perforated fox canines sewn on the back of his cap,¹⁹ and more were found with the two children buried at the site. Over 50 perforated fox canines were found in Kostenki XVII (USSR) and are dated to 32,000 years ago,²⁰ while 150 covered the head of the child buried beside Kostenki XV. In western Europe, on the other hand, and particularly in the Magdalenian, stag canines were the favoured decoration – the best known are the 70 perforated specimens found round the neck or chest of the woman buried at St Germain-la-Rivière (Gironde), 20 of which are engraved with crosses or parallel lines.²¹

The popularity of canine teeth continued to the end of the Upper Palaeolithic, but in the Magdalenian there was an increase in the practice of sawing reindeer incisors, which (as mentioned above) is already present in the Châtelperronian period at Arcy: over 50 have been found at La Madeleine and Gönnersdorf, and over 200 at Petersfels (Germany). Their occasional discovery in rows shows that, as among some northern peoples in historical times, their roots were sawn through and they were then cut from the mouth as a group, still held inside a strip of gum which was handy for hanging them as a string of eight 'pearls'.²² Occasionally one encounters the teeth of other species used as pendants: eight perforated human teeth are known from sites in France (one from the Aurignacian site of La Combe, the rest from Magdalenian sites such as Bédeilhac), and one from the Gravettian of Dolní Věstonice (Czechoslovakia);²³ there are pierced seal-teeth from the Magdalenian of Isturitz, and many sites have imitations of canines (especially stag canines) made out of ivory, stone or bone.²⁴

As for shells, only a few species were selected: primarily small, globular gastropods (such as *Littorina* and *Cypraea*) which could easily be sewn to clothing; long forms (such as *Dentalia* or *Turritella*) which could be easily strung; and a few scallops (*Cardium*, *Pectunculus*).²⁵ Many of these species are inedible, and their function was clearly decorative rather than nutritional: most were perforated with a pointed tool. They are often found in considerable quantity, even in early sites – there were 300 in the Aurignacian Cro-Magnon burial alone (and hundreds more in other burials), while living-sites such as Isturitz (Pyrénées-Atlantiques) or the abri Blanchard (Dordogne) contained hundreds of periwinkles. Fossil shells were also utilised and sometimes came from great distances – for example, those at Mezin (USSR), a site dating to 21,000 years ago, came from a distance of at least 600 km.²⁶ The shells of land molluscs were rarely used, no doubt because they are thinner and more fragile.

Research shows that Dordogne sites (such as Laugerie-Basse, abri Pataud, abri Castanet) generally yield a high proportion of species from the Atlantic, particularly those which are common along the coast of Charente, but shells from the Mediterranean are also clearly represented. One finds the same ratio at the Atlantic end of the Pyrenees; but sites in the Central Pyrenees, such as Lespugue, at a distance of 200 km from either coast, contain a more even ratio, while further to the east, in Ariège, the proximity of the Mediterranean is reflected quantitatively in the shell collections,²⁷ although even here Atlantic shells dominate slightly – this is no doubt because all rivers in the French Pyrenees (apart from those at the eastern extremity), like those of Dordogne, flow out to the Atlantic, and this must have determined the movement of people and materials to a considerable extent.

It is theoretically possible that all the shells came inland in an exchange network involving 'maritime peoples' for whom we have no evidence whatsoever thanks to the drowning of the coastlines of the last Ice Age through the rise in sea-level since that time. Certainly a great deal of exchange went on: for example, Mediterranean shells have been found in the German site of Gönnersdorf, 1,000 km away, and it is unlikely (though possible) that the site's occupants travelled to that coast for them.

It has been argued²⁸ that the great number of shells in the sites of Blanchard, Castanet and La Souquette means that this clutch of Aurignacian sites represents a market centre for exotic materials. Equally,

however, it could simply mean that these sites were centres of production, or the habitations of those who specialised in working these materials: there is ample evidence throughout the Upper Palaeolithic for craft specialisation, and for repeated contact with the coasts which involved not merely vague 'exchange networks' but also probably the seasonal movements of people, following herds, and dispersing or coming together in certain places at different times of year.²⁹

In the past it was often assumed that the shells served as pendants and ear-rings or, in groups, as necklaces or bracelets. However, as with beads it is evident from finds such as the burials at Grimaldi on the Mediterranean coast, or those of Sungir, that many were attached to caps and clothing. At Sungir, for example, the three burials had only a handful of perforated shells, but about 3,500 beads of mammoth ivory each, arranged in rows across the forehead and temples, across the body, down the arms and legs and around the ankles. Rather than being sewn on to garments one at a time, it is far more likely that the beads were strung on lengths of sinew, which were then attached to the clothing.

It has been estimated that a Sungir bead would have required about 45 minutes for its manufacture (cutting the tusk, drilling the hole, etc), which means that each body had 2,625 hours of 'beadwork' buried with it;³⁰ and the very standardised and uniform appearance of these objects suggests that they were produced by only a few people. In western Europe, far more ivory beads are known from living sites than from burials; only the context provided by a burial can indicate an ornament's true function, but it is likely that most of the finds from occupation sites were also attached to clothing. Some idea of the production sequence involved in beads can be gained from the Aurignacian material at Blanchard, which includes pieces at different stages of manufacture: small prepared rods of ivory were divided into sections, separated into pairs, and then worked into a dumbbell form and perforated, before the final shaping (most are round or basket-shaped).³¹

Other types of bead include fish vertebrae, which were sometimes strung together as necklaces, as in an example from a burial at Barma Grande.³² It is worth noting that ornamentation of this kind is by no means restricted to Europe: for example, it will be recalled (see above, p.29) that perforated bone beads are also known from the late Pleistocene of Australia (Devil's Lair), while the Upper Cave at Zhoukoudian, China, dating to 18,000 years ago, yielded over 120 decorative items such as pierced vertebrae of carp and other fish, perforated seashells, animal teeth, small pebbles, and engraved/polished bone tubes cut from the leg-bones of birds. Many of the perforations are coloured red, suggesting that whatever thread they were strung on was dyed.³³

As with any other category of portable art, there is a marked differentiation in the distribution of ornaments: many sites in Europe (including some burials) have none or a few, and others have hundreds. As mentioned above, this probably reflects the presence of specialised craftsmen, as well as the varying functions of different sites (including clothing manufacture?), and perhaps even, where rich burials are concerned, some form of incipient hierarchy.

Engraved or painted stones

It will be recalled that the engraving of a bear on a pebble from the cave of Massat was one of the first pieces of Palaeolithic portable art to be



Fig. 36 Engraved plaquette from *Le Puy de Lacan* (Corrèze), showing a duck-like bird, a fine bison head above it, and, to the right, the hindquarters of another bison. Total width: 20 cm. Magdalenian. (J.V.)

authenticated; and that a few sites have hundreds of incised slabs – mostly of sandstone, limestone, slate or stalagmite. Few examples of portable engraving are known from the early Upper Palaeolithic or from eastern Europe (one of the earliest is the geometric motif on a plaquette from the Châtelperronian Grotte du Loup, Corrèze,³⁴ and a late Mousterian limestone slab from the cave of Tsionskaïa in the Caucasus has a cross engraved on it³⁵), and in fact this particular type of art characterises the Magdalenian of western Europe.

The incisions on stone are sometimes deep and clear, but in many cases they are so fine that they are almost invisible – this is why so many engraved pieces are found discarded in the spoilheaps of earlier, less alert excavators, as at Enlène. Only under a strong light coming in from the side can one see the lines at all; indeed, this kind of fine engraving can almost be classed as a drawing rather than an incision!

Alexander Marshack has pioneered the ‘technological reading’ of Palaeolithic images; his studies of engraved stone, bone and antler under the microscope have enabled him to follow the mechanics, micromorphology and ‘ballistic trace’ of each incision – its point of impact and subsequent path – and to identify marks made in different ways: from left to right or right to left, as arcs, jabs, etc. He has also claimed that he can detect changes of tool and of hand: for example, he believes that at least seven different points were responsible for a fish with ‘arrows’ on a stone from Labastide (Hautes Pyrénées), and that four or five different points

were responsible for renewing the horns on the rhinoceros of La Colombière.³⁶

However, other scholars have argued that, at least where small stone plaques are concerned, a single burin can produce a wide variety of traces on them, depending on the part of the tool used, its position and angle, and the strength of the hand – for example, the section of the incision changes when a straight line is continued as a curve.³⁷ In any case, a tool may have been resharpened in the course of use. Experiments with slates of the type found at Gönnersdorf and Saut-du-Perron suggest that any changes in the incised marks are due to differences in tool-pressure, not to different tools.³⁸

The new technique of placing varnish replicas of engraved surfaces under the scanning electron microscope (see above, p.45) is now being used in an attempt further to elucidate this problem; criteria are being sought which would identify the use of the same tool in different kinds of incisions – for example, it has been found that every tool leaves distinctive secondary striations alongside the main incision whenever parts other than the point have momentary contact with the stone.³⁹

A different question concerning ‘plaquettes’ (defined as slabs of stone with parallel faces, under 20 cm across and 4 cm thick) is that of their usage. Scholars such as Henri Bégouën, who believed in hunting magic (see p.151), were inclined to see evidence of ritual in everything. Since many of the engraved plaquettes from Enlène were broken, and fragments of the same specimen might be found metres apart, he concluded that the breakage and dispersal were purposeful; since most of them had been burned, and appeared to lie with the engraved face downward, this too formed part of the ritual.⁴⁰

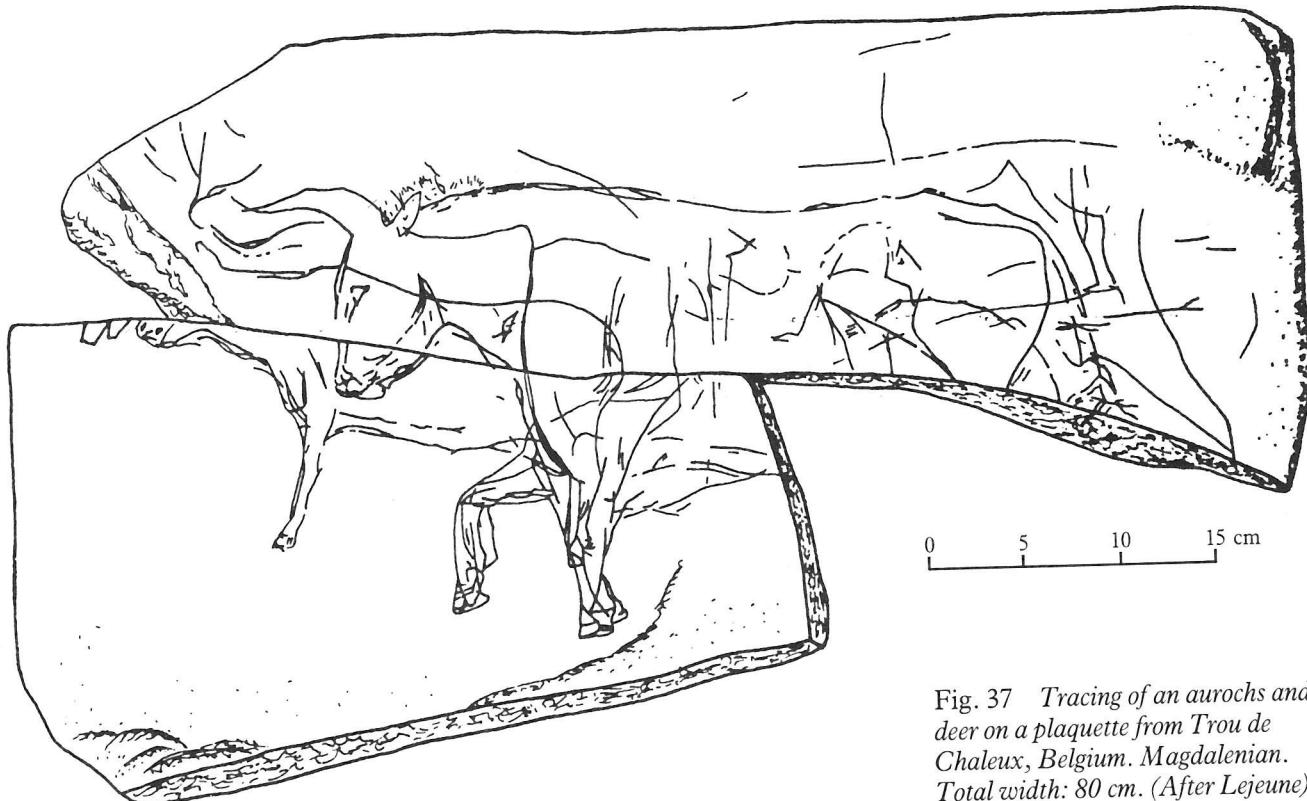


Fig. 37 Tracing of an aurochs and deer on a plaque from Trou de Chaleux, Belgium. Magdalenian. Total width: 80 cm. (After Lejeune)

It is not always the case that most lie with the engraving face-down (though this seems to be true for sites such as La Ferrassie and the abri Durif at Enval⁴¹); the fineness of many incisions makes it impossible to see them within the cave, and if plaquettes are collected from a cave-floor, as at Labastide, it is hard to remember which way up they were – in any case, some have engravings on both sides: at Enlène, about 16% are engraved on both sides; and, of 50 which are not but whose position *in situ* was noted, 27 had the engraving face-up and 23 face-down!⁴²

Moreover, in some caves, the upper face of a plaquette lying on the surface becomes coated with a deposit of clay or calcite and needs to be washed or treated with acid before the engravings underneath become visible.⁴³ As for dispersal, it is true that pieces have often been well scattered, and in some cases missing fragments have never been recovered; this may sometimes denote purposeful breakage, but people and animals trampling around on cave- or habitation-floors can also have drastic effects on the material lying there.

The question of burning is more interesting. There is a definite link between plaquettes and fire in some caves: many have marks of burning and charcoal, some (as at Labastide) have been found in hearths, while others have even been used in their construction, as at Mas d'Azil.⁴⁴ Breuil and Bégouën adopted the view that they had served as crude lamps, and this may be true in some cases. However, a theory has also been put forward that they represent a kind of heating device – sandstone has thermal qualities and a resistance to tension which make it suitable for a function of this kind. In France, old peasants in some areas still use heated sandstone plaquettes, wrapped in cloth, as bedwarmers!⁴⁵ It may therefore be thermal tension which shattered many stones, not some arcane ritual, although a few (eg at Labastide and Enlène) do bear marks of blows suggesting deliberate breakage.

It is difficult to assess how important these engraved stones were. In sites such as Enlène, Gönnersdorf, Labastide and Enval there are many of them (over 1,000, 500, 50 and 27 are known respectively), but there are hundreds more without engravings in these sites. Enlène has tens of thousands of plaquettes, brought in from a source some 200 m from the cave; excavation has shown that an area of over five square metres of cave-floor was paved with them, no doubt a measure against humidity, and this paving includes engraved specimens;⁴⁶ a similar area of cave-floor at Tito Bustillo (Asturias) had 83 plaquettes, 25 of which bore engravings ranging from animal figures to simple incisions.⁴⁷ At the late Magdalenian open-site of Roc-la-Tour I (northernmost France), hundreds of schist plaquettes were brought in as paving, but only about 10% have engravings.⁴⁸ Similarly, at Gönnersdorf, several tons of schist plaquettes were brought to the open-air site as elements of construction and as foundations for structures; only 5–10% of them were engraved, and these seem to be distributed at random among the others.⁴⁹ This suggests that the engravings lost all value once the ritual had been performed and they had been broken and dispersed; or simply that the engravings never had any ritual significance, and were done simply to pass the time, for practice, for storytelling, or perhaps even to personalise one's private bedwarmer! Future finds may help to clarify the situation further.

Occasionally, engraved specimens are stuck vertically in the floor – for instance, around hearths at La Marche; and a few painted stones are known from Enlène, Labastide, Parpalló, etc. Some are clear figures,

while on others simple staining by ochre in the soil may be involved: at Tito Bustillo, it was thought at first that some plaquettes had paint on, but careful study revealed that this was all contamination by pigments in the soil;⁵⁰ the same phenomenon occurred on the engraved plaquettes of the abri Durif at Enval, where red sand had coloured the side facing downwards, but at La Marche it is possible that some red traces on slabs are paint, while others seem natural.⁵¹

The best-known painted stones are those which characterise the very end of the Palaeolithic in western Europe – the small ‘Azilian pebbles’, first identified in the 1880s at the Mas d’Azil by Piette (see p.23). They have been found in 28 sites in France, 5 in Spain, 3 in Italy and 1 in Switzerland; but, of the nearly 2,000 known, over 1,400 are from the Mas d’Azil. Their motifs, usually in reddish ochre, are simple (mostly dots and lines), and seem to have been applied with the finger, less often with a fine brush; but, as will be seen later (p.182), a recent study has produced fascinating results from an analysis of the numbers and combinations of these marks.⁵²

It will be recalled (see above, p.27) that painted animal figures are also known on stones from the late Pleistocene Apollo 11 Cave in SW Africa, while engraved pebbles have been found at Kamikuroiwa, Japan (p.28), and non-figurative engraved specimens are quite common in the Azilian of western Europe.⁵³

Where engraved stones are concerned, it should be noted that, although it is the fine figurative examples which tend to get published, there are far more which are indecipherable, either because they are tiny fragments or because they are non-figurative (at Roc-la-Tour I, about 600 small engraved fragments have been recovered, but there are only 16 ‘readable’ figures so far⁵⁴). Some have a confused mass of superimposed lines (as on the slabs of La Marche, or the pebbles of La Colombière), but experiments with Gönnersdorf slabs show that a fresh engraving is very visible, due to the presence of white powder in the incisions. When this is washed off, the effect is like wiping chalk off a slate, and a new engraving can be made (the incisions can be made quickly and easily, without effort⁵⁵) – this suggests that some of these engravings had significance for only a very brief time, and the ‘associations’ of superimposed animals on a given surface are not necessarily meaningful; on the other hand, there were plenty of stones available, and each figure could easily have had one to itself if desired (as is generally the case at Enlène, for example), so the superimpositions may indeed have had some significance.

Painted bone, and engraving on bone and antler

Many of the above comments also apply to incisions on flat pieces of bone; but experiments show that, unlike stone, fresh bone is hard to engrave: the tool tends to skid when it cuts bone fibres, and extremely sharp tools are required. Moreover, it is necessary to pass the tool backwards and forwards, to widen the incision. One of the chief difficulties is that the initial marks can barely be seen, though it has been found that covering the bone with ochre beforehand makes incisions readily visible⁵⁶ – this may explain why some Palaeolithic specimens, such as the bone-fragment from Enlène with a grasshopper engraved on it, were covered in ochre when found;⁵⁷ decoration of bones with pigment also survives occasionally – it will be recalled that the mammoth-bone ‘musical instruments’ from Mezin were painted with geometric motifs, chevrons, and undulations.

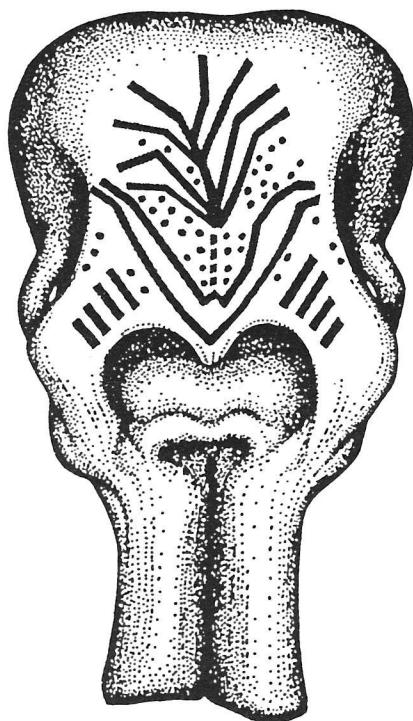
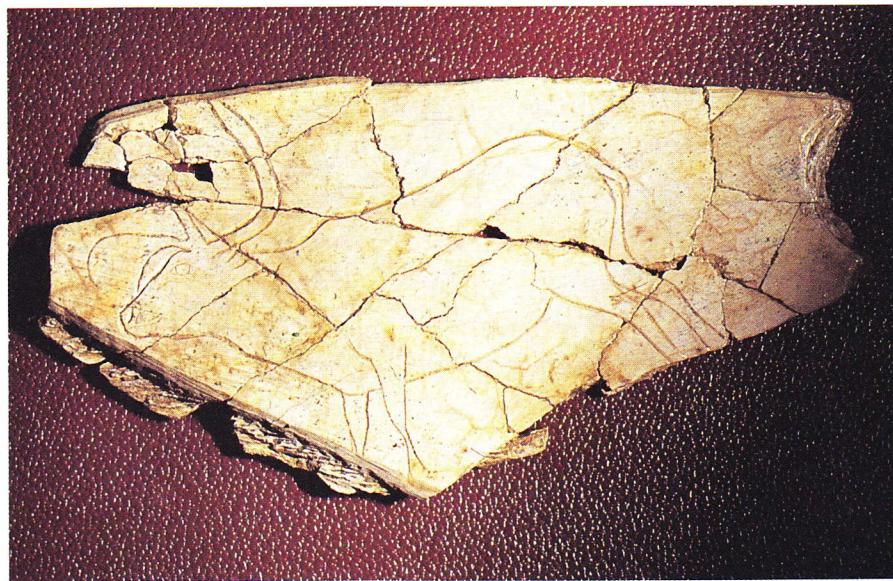


Fig. 38 *Reconstruction of the mammoth skull painted with red ochre, from Mezhirich (USSR). Maximum width: 60 cm. (After Pidoplichko)*

Fig. 39 Reindeer shoulder-blade from the rock-shelter of Duruthy (Landes) with a reindeer engraved on it. Magdalenian. The animal measures 9.5 cm from muzzle to tail. (PGB)

Fig. 40 Detail of a perforated antler baton from Duruthy (Landes) which bears a depiction in 'champlévé' of two ibex, perhaps fleeing a predator at left. Magdalenian. The photo shows one of the ibex (c 4 cm long). (PGB)



Similarly, a mammoth skull from dwelling No 1 at Mezhirich, Ukraine (c 12,000 BC), is decorated with zigzags and dots of red ochre; engraved lines on bone and ivory in eastern Europe are often highlighted with a filling of black, manganese paste, whereas red ochre tended to be used for this purpose in western Europe.⁵⁸

Shoulder-blades are the bone equivalent of plaquettes, having a smooth, large surface, and it is therefore surprising that they were not engraved in great numbers; nevertheless, decorated specimens are known from some sites, and the Mas d'Azil and Castillo each have over 30, together with undecorated ones; their engravings are both figurative and 'abstract'. Those from the Mas d'Azil, at least, were clustered together in a small area very poor in other finds.⁵⁹ At the abri Morin (Dordogne), 17 fragments with figurative engravings have been found, and 29 with non-figurative marks.⁶⁰

Although fibrous and relatively soft, such bones are by no means easy to decorate: Jean Bouyssonie, the French prehistorian, found that it took considerable muscular strength to engrave a fresh horse shoulder-blade, and the flint point often broke.⁶¹ In some cases, the tool does not incise the bone, but compresses its surface into a furrow.

Experiments also indicate that a burin is not the only tool which can engrave bone, although it is the one which is always mentioned in this connection. In fact, a wide range of stone tools are equally effective – awls, pointed backed bladelets, and even the edge of a broken blade are just as good; it is the sharpness which counts, not the precise form. A copy of a small bison engraving on bone from La Madeleine, using different kinds of incisions and tools (which displayed no traces of wear afterwards), took four hours; but a second attempt halved that time, showing that a practised Palaeolithic craftsman would doubtless have taken little time to produce this kind of image – similar results were obtained by Leguay, the pioneer of this type of work, who, over a century ago, tried engraving on bone in the prehistoric way using original stone tools from Palaeolithic sites, and found that it could be done quickly with a little practice.⁶² However, we still have much to learn about the engraving of bone and antler, such as whether specimens of different kinds and ages vary in their 'incisability', or how special processes such as soaking may have affected the work.

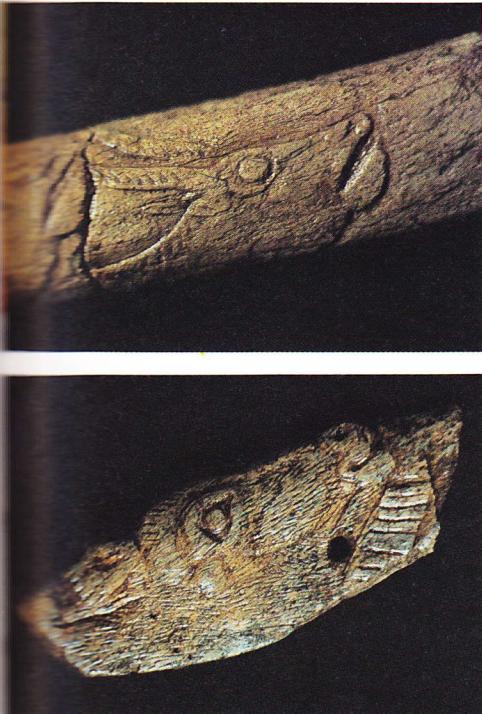
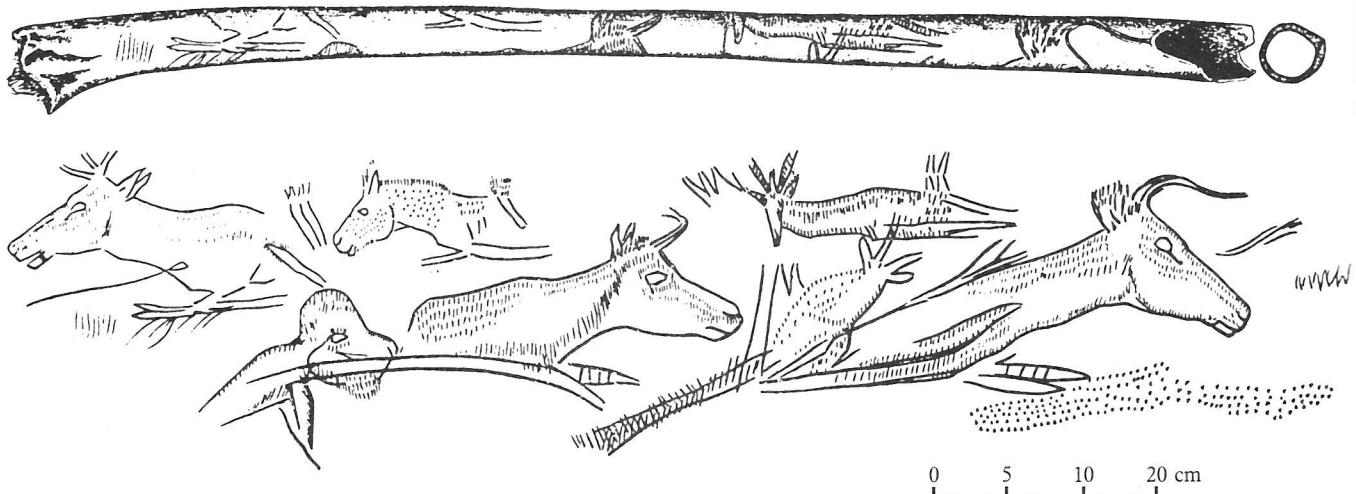


Fig. 41 Engraved and carved depiction of a bison calf, only a few cm in length, from Le Grand-Pastou (Landes). Magdalenian. (PGB)



Engraving on bone has a long history and early examples include: a fragment of bovine rib from an Acheulian layer at Pech de l'Azé, dating to c 300,000 BC, bears an intentional engraving comprising a series of connected double arcs, while several bones from Bilzingsleben (East Germany), of about the same date, have geometric designs engraved on them which are clearly purposeful, and nothing to do with cutting or working;⁶³ a Mousterian fragment from the shelter of Riparo Tagliente, Italy, also has a double arc incised on it;⁶⁴ La Quina, which, as mentioned above, had two perforated pieces in its Mousterian, also yielded a bovid shoulder-blade engraved with very fine, long parallel lines, while a Neanderthal burial at La Ferrassie (Dordogne) contained a small bone with a series of fine, intentionally incised marks which reminded the excavator of the notched bones of the Aurignacian – similar fragments with regular notches are known from the Mousterian of other European sites such as Cueva Morín and several sites in Charente;⁶⁵ the Bulgarian cave of Bacho Kiro has a Mousterian bone-fragment with a zigzag motif engraved on it;⁶⁶ while a Mousterian layer at Molodova-I, USSR, more than 40,000 years old, has a mammoth shoulder-blade decorated with little pits, patches of colour, and notches that form complex patterns including cruciform and rectangular figures in which some Soviet scholars have seen the outline of an animal.⁶⁷ It will be recalled (p.27) that a baboon fibula with 29 parallel engraved notches has been found at Border Cave in southern Africa, and dates to 35,000–37,500 years ago. When faced with examples of this kind, some scholars believe a genuinely continuous tradition of marking is represented, while others see them simply as sporadic recurrences of simple motifs.

In any case, only the Upper Palaeolithic has so far produced definite figurative designs, and these become particularly abundant and impressive in the Magdalenian. The technique of '*champlevé*' was invented, where bone around the figure is scraped away, making the design stand out as in a cameo (see Fig. 40); and the skill was developed of engraving on bone shafts and on batons of antler, not only lengthwise (there are numerous compositions involving lines of animals, or heads) but also around the cylinder. Here, amazingly, perfect proportions were maintained, even though the whole figure could not be seen at once: the finest examples include that of Lortet, with its deer and salmon; that of Montgaudier, showing seals and other figures; and the gannet bone from Torre, Spain, with its fine collection of human and animal heads (Fig. 42)⁶⁸

Fig. 42 Tracing of figures (deer, horse, isard, ibex, aurochs and human) engraved around the gannet bone from Torre (Guipúzcoa). Magdalenian. Length: c 16 cm. (After Barandiarán)

— all decorated bird bones belong to the Magdalenian, as do most depictions of birds.

A certain number of regional differences in these engravings have been apparent since Piette's time⁶⁹ (although inevitably there are exceptions to the rule): Dordogne specimens often have very deep incisions, almost bas-reliefs, whereas in the Pyrenees and Cantabria engravings are generally finer, with a mass of detail provided of the animals' coats. Scenes or '*tableaux*' are also more common in the Dordogne than elsewhere.

It should also be noted that the art of engraving on teeth, already seen in the simple motifs incised on pendants, was further developed in the Magdalenian, as in the series of bear canines from Duruthy (Landes), with their engravings of a seal, a fish, of 'harpoons', etc.⁷⁰

Carved bone and antler

As mentioned earlier (p.26), a carved and engraved bone is known from the Pleistocene of Mexico; but once again it is Europe, and particularly the Magdalenian of France, which can boast the finest and most numerous specimens of the art. Apart from the perforated and sectioned bones mentioned above, one of the earliest examples is the 'phallus' from abri Blanchard, carved in a horn-core. In the Gravettian, tools and weapons began to be decorated with both figurative and geometric motifs,⁷¹ though this practice really came into its own in the Magdalenian — for example, almost all portable decoration in Cantabrian Spain comes from this period, and increases through the period. However, it should be noted that much of the simplest 'decoration' of tools and weapons — particularly transverse incisions near the base — was probably intended to strengthen the adherence to the haft, no doubt aided by gum or resin, and to improve the grip of the user: it has been called 'technical aesthetics'.⁷²

Presumably, decorated objects were for long-term use, since there is little point in investing time and effort in engraving an implement which can be easily lost or broken — but this is not an absolute rule, since some sites, such as abri Morin, have 'harpoons' and spear-points with carefully made, figurative engravings.⁷³ It is worth noting that Garrigou interpreted the small, perforated Azilian harpoons of La Vache (Ariège) as ear-pendants! Semi-cylindrical rods of antler were carved with a variety of motifs, such as the well-known 'spiral' decoration found in a cluster of Pyrenean sites; perforated antler batons were also decorated, especially in the Magdalenian. Antler, unlike bone, is relatively easy to engrave.

In the mid-Magdalenian, one encounters figures of animals and fish ('*contours découpés*' or '*perfiles recortados*')⁷⁴ and circular discs ('*rondelles*' or '*rodetes*')⁷⁵ cut out of thin bone. The discs were often cut from shoulder-blades, and several examples of the latter are known with circles removed from them (see Fig.44); many are engraved, either with animal or human figures or with abstract designs like sun-rays, and some have tiny perforations round the circumference (Fig.43). Those with a central perforation have occasionally been interpreted as buttons, which seems an unlikely function, in view of their fragility. Similar discs are also known in other materials: for example, the grave of Brno II (Czechoslovakia), dating to c 23,000 BC, had specimens not only in bone but also in stone, ivory, and cut/polished mammoth molar,⁷⁶ while Gönnersdorf has some in slate.

Animal figures are occasionally large, such as the 22 cm bison from Isturitz, found in two pieces 100 m apart, and probably cut from a pelvic

bone;⁷⁷ but the majority of the (approximately) 150 ‘*contours découpés*’ known are animal heads (about two-thirds of them horses) cut from a horse hyoid (bone of the tongue), the natural shape of which already bears some resemblance to a herbivore head.⁷⁸ Many are perforated – some through the nostril or eye, presumably for figurative effect, and others probably to serve as pendants – and they have differing degrees of detail engraved on them: eyes, muzzle, coat, and so forth (Fig. 45).

Almost all of them have been found in the French Pyrenees, although sites in Asturias and Cantabria have recently produced a few very fine specimens of exactly the same type. No doubt the most outstanding find, hidden in a corner of the cave of Labastide (Hautes Pyrénées), is what seems to be a necklace of 19 identical perforated heads, apparently of the isard (Pyrenean chamois) with its cold-season markings, together with one perforated bison head, all cut from horse hyoids;⁷⁹ this remarkable ensemble was clearly made by a single artist.

It is worth noting that, like portable art as a whole, the distribution of ‘*contours découpés*’ is extremely uneven: of those in France, about two-thirds come from three Pyrenean sites (the ‘supersites’ Mas d’Azil and Isturitz, plus Labastide because of its necklace); if those from Arudy are added, it means that over 75% come from only four sites.⁸⁰ Bone discs are rather more widespread, but over half of them come from the Pyrenees, with Isturitz and the Mas d’Azil again the richest sites.

The antler spear-throwners of the Magdalenian tend to have two kinds of decoration: animal heads or forequarters carved in relief along the shaft (a type found in both France and Switzerland); or figures carved in the round at the hook-end of the object, where the roughly triangular area of available antler dictates the posture and size of the carving.⁸¹ However, within these constraints the artists produced a wide variety of images – fighting fawns, a pheasant, mammoths, a leaping horse and so forth (Figs. 18, 103).⁸²

Many of the finest of these carvings have been found in the Pyrenees, and none finer than the intact spear-thrower from Mas d’Azil with its image of a young ibex which stands, turning its head to the right and looking back to where two birds are perched on what seems to be an enormous turd emerging from its rear end (see Fig. 46); this composition is all the more startling because of the almost identical specimen found a few years later at Bédeilhac, a few miles away – this one had lost its shaft, and the ibex is kneeling and turns its head to the left, but otherwise is identical in all respects. Broken specimens have also been tentatively identified from other sites in and near the Pyrenees, with the result that up to ten examples are known; if one allows for preservation, recovery, recognition and publication it becomes obvious that these must represent a tiny fraction of the dozens – perhaps hundreds – originally produced. One can therefore argue for a high output by an individual artist or a small group of artisans with a favourite theme, since all the examples are attributed to the Middle Magdalenian, a period which spans a few centuries in the Pyrenees.⁸³ Even more remarkable is the virtually identical pose struck by Bambi and two birds (though without the turd!) in the Disney cartoon made before the two intact spear-throwers were discovered.⁸⁴

Statuettes and ivory carvings

The simplest free-standing figurines known from the Upper Palaeolithic are terracotta models; their existence originally came as a surprise, since



Figs. 43/44 *Engraved bone disc, with a central perforation and 16 others around the edge, from Le Mas d’Azil (Ariège). The engraved motif may be non-figurative. Magdalenian. Maximum diameter: 5 cm. (J.V.). Below: a shoulder-blade from which a bone disc has been cut. Le Mas d’Azil (Ariège). Magdalenian. Total length: 24 cm. (J.V.)*

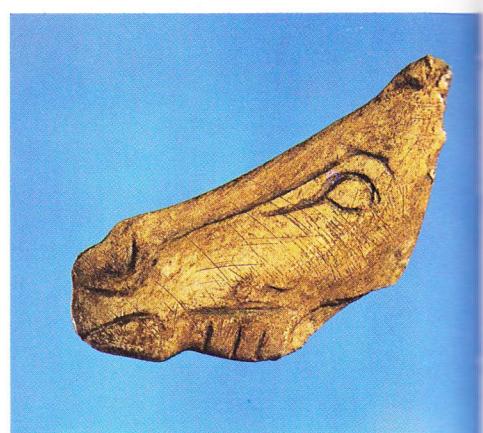


Fig. 45 *Bone ‘contour découpé’ of a horsehead, from Enlène (Ariège). Magdalenian. Length: 5 cm. (J.V., collection Bégoüen)*



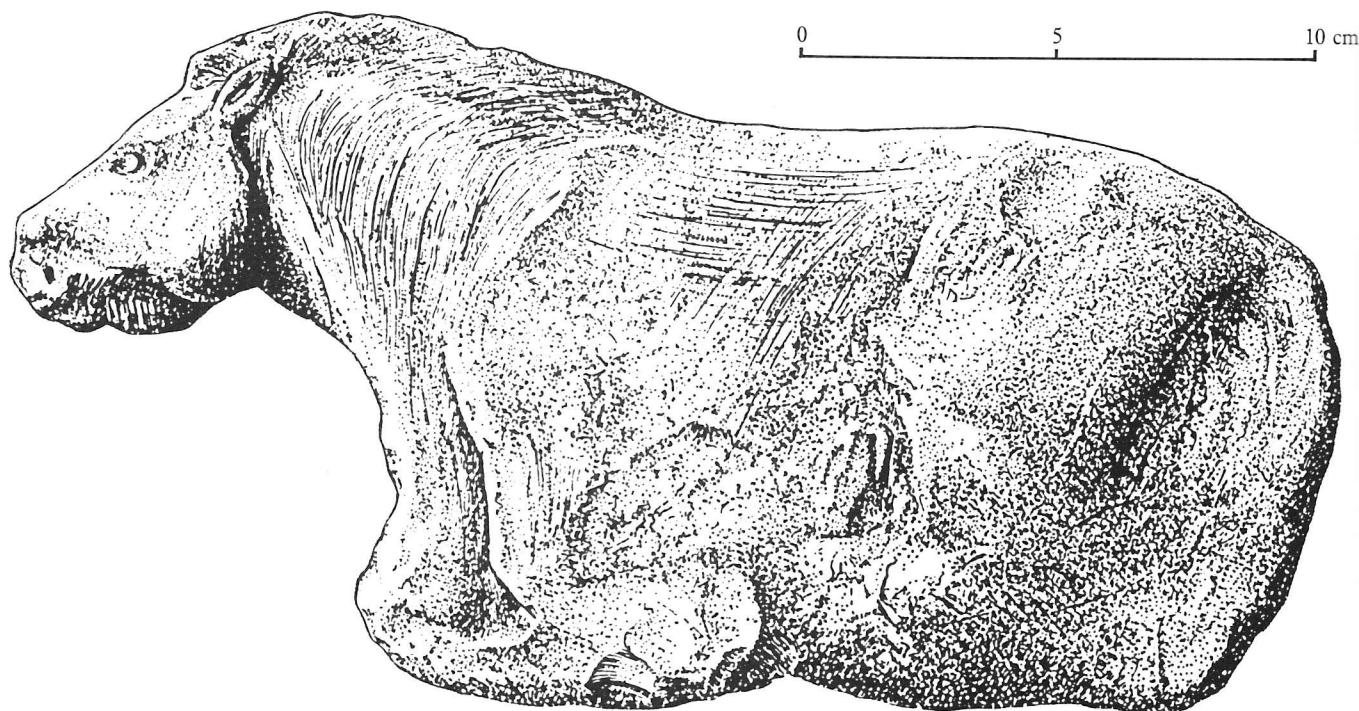
Figs. 46/47 Antler spear-thrower showing a young ibex with emerging turd, on which two birds are perched. *Le Mas d'Azil (Ariège)*.

Magdalenian. Total length: 29.6 cm. (JV). The detail shows the other side of the ibex. Length: c 7.5 cm. (JV). The figure resembles a pose in Walt Disney's 'Bambi', featuring the fawn with two birds: this cartoon feature was released to movie theatres in 1942. The Mas d'Azil spear-thrower was discovered between 1939 and 1941, but the first illustration of it was published only in 1942 (by M. & S.-J. Péquart in 'la Revue Scientifique' vol. 80, Feb. 1942); the authors had not yet seen 'Bambi' but made a comparison (pp. 94/5) with the fawns in Disney's 'Snow White' of 1937. In a subsequent publication (1960/3, p. 299) they also refer to 'Bambi' and reveal that illustrations of the carving and of Bambi had been placed side by side in the archives of the Louvre as a comparison!

one of the dogmas of archaeology was that fired clay was invented later, in the Neolithic period, and that the people of the Ice Age were incapable of making it. This was clearly nonsense, as shown by the mastery of clay in that period (see below, p. 93) and by the fact that any fire lit on a cave-floor will have hardened the clay around it: indeed, lumps of fired clay around hearths bear a marked resemblance to crude potsherds. The recent discovery that pottery in Japan dates back at least 12,000 years merely underlines the fact that, if Ice Age people did not make pottery, it was through lack of need rather than through ignorance.

Nevertheless, a number of terracotta figurines have survived and been recovered in different areas: a few examples are known from the Pyrenees, North Africa, and Siberia;⁸⁵ but considerable quantities – 77 fairly intact, together with over 3,000 fragments (and others poorly fired, which have disintegrated) – have been found in Czechoslovakia, at the open-air sites of Dolní Věstonice, Pavlov and Predmost, where they are securely dated to the Gravettian, c 22,400 BC. They comprise small figurines of animals and humans, and display some spatial differentiation (ie herbivores in one hut, but human figurines in the centre of another, together with carnivores); a hearth or 'oven' for their manufacture has also been found.⁸⁶ The best known of these figurines is the 'Venus' of Dolní Věstonice, made of a mixture of clay and bone powder.

The Upper Palaeolithic also produced carvings in other materials such as soft stone, as at Isturitz and Bédeilhac (figurines which seem to have been deliberately and systematically broken),⁸⁷ and occasionally in steatite, coal, jet or even amber;⁸⁸ there are also great numbers of 'pierres



figures', entirely natural objects which bear a fortuitous resemblance to something figurative – it is an open question as to whether this resemblance was noticed or considered significant by Palaeolithic people.⁸⁹

Sculpture is almost impossible in bone, which is hard and fibrous. Consequently, the great majority of figurines are in limestone, sandstone or ivory. The rock-shelter of Duruthy, Landes, has yielded fine horse carvings in each of these materials (see Figs. 48, 51),⁹⁰ while the cave of Lourdes produced the best-known ivory horse. Human figures were carved out of horse teeth at Mas d'Azil and Bédeilhac.

The famous 'Venus' of Willendorf is made of a particular type of oolitic limestone not found in Austria and was thus brought in from elsewhere.⁹¹ Let us note that this figurine, like a few others, still bears traces of red ochre. Stone figures were presumably carved with powerful flint tools, and some traces of the process can occasionally be seen, as on the 'Venus' of Tursac, made from a pebble.

Mammoth ivory was used quite extensively in the Ice Age, not only for statuettes but also for beads, as we have seen, and for bracelets and armlets such as those found on the Sungir skeletons, or the various objects of Mezin (USSR) with their rich decoration of chevrons, zigzags and other geometric motifs.

Ivory is easy to engrave along its fibres, but not across them; a kind of '*champlèvé*' could be achieved, as in the Aurignacian human figure with raised arms from Geissenklösterle, Germany.⁹² However, three-dimensional figurines were mastered in this material at a very early stage: indeed, some of the earliest known pieces of Ice Age art are ivory statuettes, including the human head and female figures from Brassempouy (Landes), the animal and human figurines from Vogelherd (Germany), and those of Geissenklösterle (fragments of two mammoths and a feline).

Fig. 48 Drawing of a stone statuette of a kneeling horse, Duruthy (Landes). Magdalenian. (After Laurent)

Scholars have usually assigned the Brassemouy statuettes to the Gravettian, simply because one or two 'Venus', such as that of Tursac and perhaps that of Lespugue, came from a layer of that period;⁹³ among the very few 'Venus' in western Europe with a stratigraphic context, there are also specimens from the Magdalenian (eg Angles sur l'Anglin⁹⁴), and consequently all 'Venus' figurines have been unjustifiably lumped into either the Gravettian (for the most part) or the Magdalenian. It is extremely difficult to discover from Piette's excavation reports precisely where the Brassemouy statuettes came from (assuming that those he found came from the same layer as those dug out like potatoes by earlier workers); but Breuil, who visited Piette's dig in 1897, saw the relevant layer, and kept samples of the associated industry, stated quite clearly on several occasions that the figurines came from the earliest Aurignacian, and perhaps even the Châtelperronian.⁹⁵ In short, Palaeolithic figurative art produced some of its greatest masterpieces – the Brassemouy head, the Vogelherd animals,⁹⁶ and the male statuette from Hohlenstein-Stadel, Germany (Fig. 49),⁹⁷ which dates to c 30,000 BC – in its initial phase, which suggests strongly that they must have been preceded by a long tradition in carving materials which have not survived.

Experiments have been carried out in carving 'Venus' in ivory as well as in stone and other materials; to make an ivory figure, a piece of tusk was first prised out by cutting two deep grooves into the material; this was then

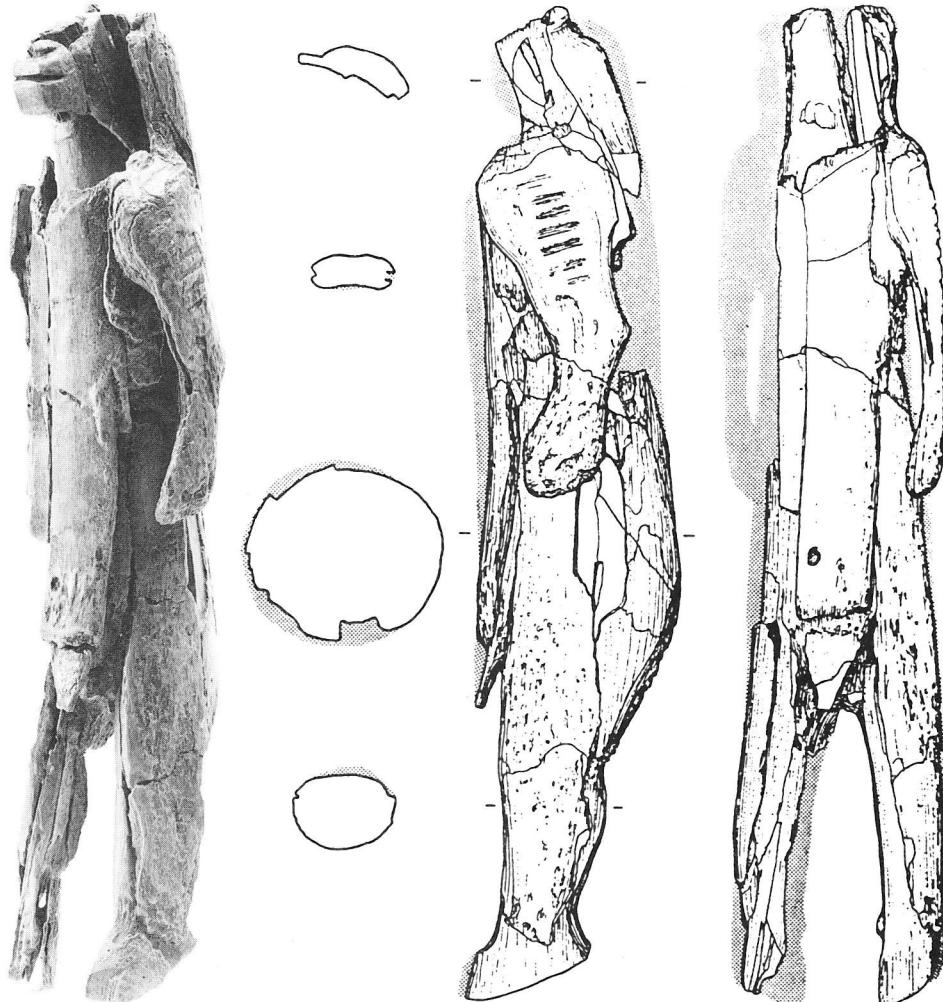
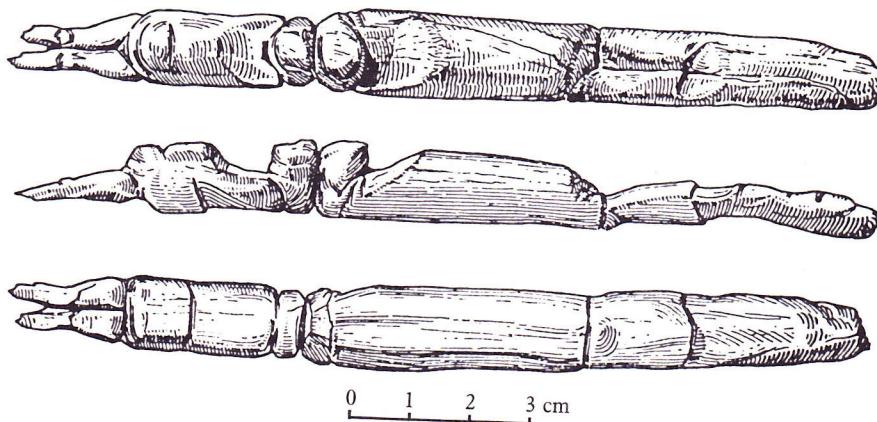


Fig. 49 *Ivory statuette of a human with a feline head, from Hohlenstein-Stadel (Germany), together with drawings of the figure before the face was fitted (after Hahn).*
Aurignacian. Height: 28.1 cm.
(Photo Ulmer Museum)

rubbed into a rough shape with sandstone, and a burin and broken blade were used to carve the legs and other areas. It is thought that long handling of the figures will have smoothed away any striations left by the work.⁹⁸

Carving ivory is very hard, and takes many hours, even days, of effort. Ivory statuettes were also made in composite form, as in the case of the Czech male figurine from Brno II, dating to c 23,000 BC, whose head, trunk and arm were fitted together to make an articulated 'doll'.⁹⁹



Some idea of how the human figurines of the Soviet Union were made is provided by the finds at Kostenki and other sites which are so numerous that there are examples of every stage of manufacture, from rough-outs to final polishing;¹⁰⁰ one piece of ivory recovered from Gagarino, a site which has yielded eight ivory 'Venus', has been carved to form two human figures of different lengths, attached at the head like Siamese twins.¹⁰¹ Although it is possible that this may have some special significance (especially since the two children at Sungir were buried head to head), it seems more likely that the piece is simply two separate figurines, made together, which have not yet been separated (Fig. 50).

It is worth noting that there are regional differences in the material used for the 'Venus' and in their locations: in the Pyrenees, eastern Europe and Siberia they are predominantly of ivory, while those of Dordogne are in stone, those of Grimaldi are steatite, and those of central Europe employ ivory, stone and terracotta.¹⁰² Most western specimens have been found in caves or rock-shelters, while almost all those from central and eastern Europe come from open-air settlements, and seem to have had a special role in the home (see below, p. 140).

As mentioned above, many of those from western Europe, including most Italian specimens, have no context, but the dated examples are scattered through the entire Upper Palaeolithic. It is therefore a somewhat pointless exercise to treat them as a homogeneous or contemporaneous group, as has often been done;¹⁰³ but, treated simply as a category of object, like spear-throwers or jewellery, they have a strange distribution: a virtually uninterrupted spread over 3,000 km from Brassempouy (Landes) to the numerous specimens from Kostenki and other Russian sites; and then a 5,000-km gap between Kostenki and the Siberian sites (such as Mal'ta) around Lake Baikal.

There are many such enigmas in the regional variations and the distribution of different types of portable art. In some cases, it is the availability of materials which is the cause: central and eastern Europe clearly had great quantities of mammoth bones, which were often used for

Fig. 52 *Figure of a human drawn around a natural phallus-like stalagmite protruding from the wall in Le Portel (Ariège). Probably Magdalenian. Height: 38 cm. (J.V.)*

Fig. 50 *Two ivory figurines still joined at the head, from Gagarino (USSR). Probably Gravettian. (After Tarassov)*

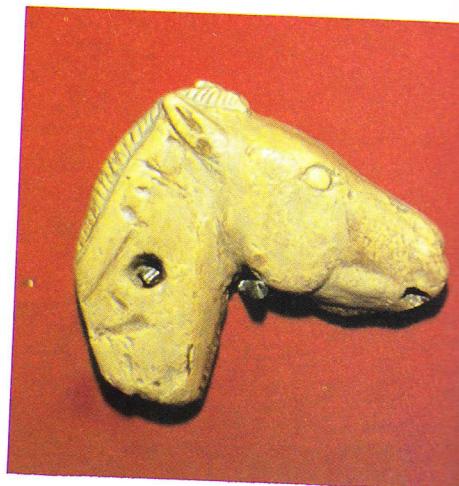


Fig. 51 *Horsehead carved in limestone, from Duruthy (Landes). Magdalenian. Length: 7.1 cm, height: 6.2 cm. (PGB)*

the construction of dwellings,¹⁰⁴ and this helps explain the dominant use of ivory for carving; the raw material's properties, shape and volume will, in turn, have determined the nature and extent of the decoration or images. Some materials (ivory, antler, certain stones) were suitable for sculpture, others (bone, stone, antler) for engraving. In some cases, the shape placed clear limits on the composition – figures on spear-throwers have already been mentioned, and the same is true of antler batons, long bones or ribs which tend to have linear arrangements of figures. Similarly, hyoid bones were merely made to look more like animal heads than they already do, which explains why some '*contours découpés*' are slightly too long or short to be truly naturalistic.

The basic question, of course, is whether the composition was chosen to fit the support, or vice versa: this is particularly pertinent to plaquettes



Fig. 53 Vertical bison painted at Castillo (Santander), utilising the shape of a stalagmite for its back, tail and hind leg (with explanatory drawing, after Ripoll). Probably Magdalenian. Length: 80 cm. (JV)





Fig. 54 Deeply engraved motifs on limestone block (60 cm high) from abri Cellier (Dordogne). The principal oval is c 10 cm long. Aurignacian. These motifs have often been interpreted as vulvas. (JV)

which, unlike bones, come in a wide variety of sizes. Was a composition planned, and then a stone of suitable size selected? Or was the stone chosen first, and the figures made to fit? No doubt, both scenarios occurred frequently, and it is sometimes impossible for us to tell. In a few cases, however, reconstruction has cast light on the problem – at Gönnersdorf, for example, some big slates, more than a metre in length, have been reconstituted from over 50 fragments; on one of them, a large horse figure could be seen only after the reconstruction, whereas some figures were engraved on fragments, their form and size respecting the borders of the plaquettes. Clearly, these slabs were being engraved at every stage of the breakage process, and the figures corresponded to the size and shape of the slates available.¹⁰⁵

Almost all the Gönnersdorf figures are perfect, with only a few badly proportioned ‘failures’. Occasionally, however, we can see apparent mistakes in the engraving process (as distinct from multiple versions of some features; see below, p. 184): for example, a pebble from Mas d’Azil bears an engraving of a horse whose body turned out to be too big for the stone, so that the head’s position had to be altered accordingly.¹⁰⁶ In other cases, when a drawing proved too big, it was continued on the sides and even on the other side of the stone. If nothing else, slip-ups of this kind show that our ancestors were all too human, and that Palaeolithic art does not consist exclusively of masterpieces!

Intermediate forms – ‘pseudoparietal art’

As mentioned earlier, the division between portable and parietal art is simply one of convenience, since there is an area of overlap principally comprising blocks of stone which, although movable, could not be carried around and which may in some cases be fallen fragments of decorated wall. All are from well-lit rock-shelters.

Most of the best-known blocks are thought to date to the Aurignacian although, if they fell from the walls on to Aurignacian layers, they could be considerably older.¹⁰⁷ Certainly the decoration of blocks is known at the

Mousterian site of La Ferrassie (Dordogne), where a Neanderthal child burial lay beneath a large limestone rock with a series of small cupmarks (mostly in pairs) carved in it and apparently placed at random,¹⁰⁸ yet another example of the wide variety of symbolic behaviour in this early period.

Some Aurignacian blocks have deep engravings (almost bas-relief), others have paint on them. The best-known painted specimen is that from the abri Blanchard, where the rock was painted red, and then an animal figure (the bottom part of which survives) was painted on top, with a black outline and a reddish-brown infill.

Occasionally – as in the case of an Aurignacian block from Ferrassie, where the ‘broken side’ has been painted, not the smooth side which formed part of the shelter vault¹⁰⁹ – it is clear that the artwork was done after the fragment fell from the wall; but by and large one cannot be certain. However, there are so many painted chunks of rock in these early collapsed shelters that it seems highly probable that some of the back-walls and vaults must have been painted (and perhaps engraved) over wide areas – the fact that nothing remains on the walls themselves is simply an indication of how remote this art is: around 30,000 years old, more than twice as ancient as most surviving Palaeolithic parietal art is estimated to be.

Observation and experimentation show that some of the blocks were prepared by grinding and rubbing to produce flatter and better surfaces for engraving.¹¹⁰ Fine engraving is rare – most of the incisions are deep and wide, some of them clearly made by crudely joining together rows of cupmarks or hammer-blows, and all very weathered.

Brigitte and Gilles Delluc have devised a system of representing the different techniques used on these blocks – as well as in parietal deep engravings and bas-reliefs – in cartographic form, with different symbols and conventions to indicate the depth of the incisions, their shape in section (curved, angular, etc) and so forth.¹¹¹ Such ‘maps’ avoid many of the problems mentioned in an earlier chapter concerning copies of the art, and at the same time convey a great deal of information about the figure’s three dimensions.

Parietal art

The principal advantage of parietal art over portable is that, whereas the latter may have been made far away from its final resting place, and indeed in a period earlier than the layer in which it is found, wall-art is still just where the artist placed it. As will be seen in a later chapter, this simple fact provides us with a great deal of information. Like portable objects, parietal art encompasses an astonishing variety and mastery of techniques.

Slightly modified natural formations

In a few cases, it is hard to tell whether the use of natural features was intentional or not, but this is usually pretty clear:¹¹² for example, in the bosses of the Altamira ceiling used as bulging bison bodies (Fig.7); the shape of cave-walls and stalagmitic formations incorporated into animal backs and legs at Cognac (Fig.89), a bison back and tail at Ekain, or a bird at Altxerri; the little stalagmites turned into ithyphallic men at Le Portel (Fig.52); the antlers added to a hollow at Niaux which resembles a deer head seen from the front (Fig.55), or, in the same cave, the engraving of a

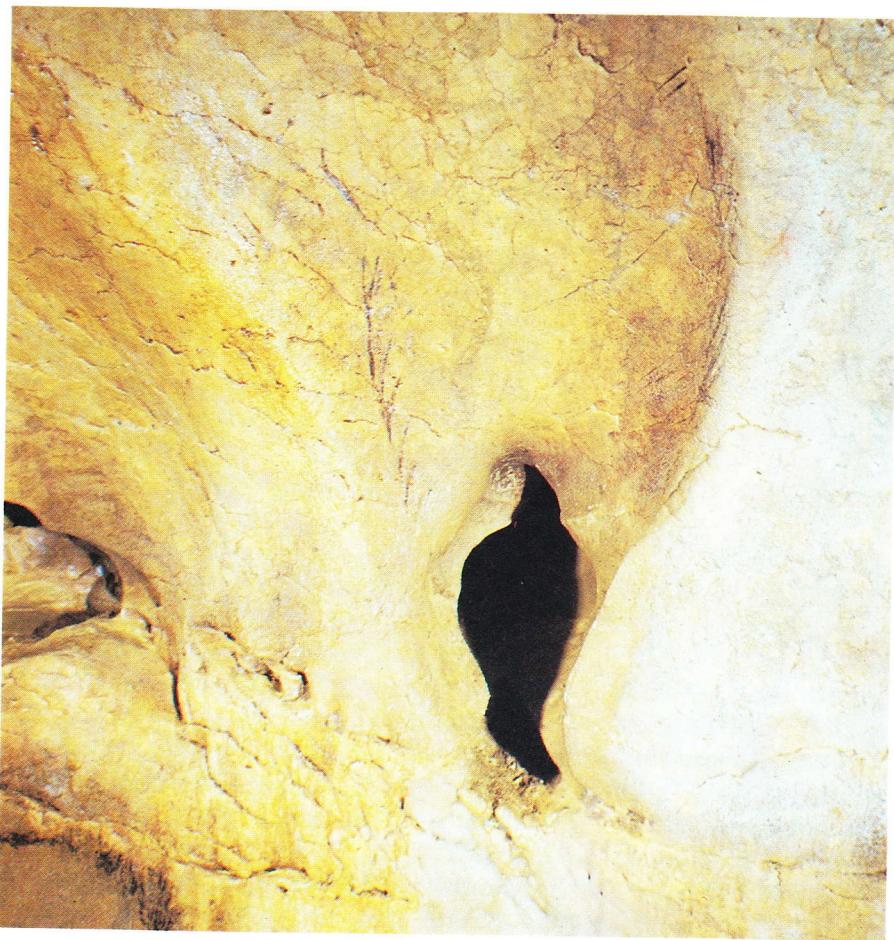


Fig. 55 This fissure in the *Salon Noir* at Niaux (Ariège) looks something like a deer head seen from the front, and the artist added two antlers. Probably Magdalenian. Total length: c 40 cm. (JV)

Fig. 56 Detail of one of the engraved owls at *Trois Frères* (Ariège) [see Fig. 92], showing the striations in the lines. The head is about 10 cm wide. (JV, collection Bégonien)

bison on the clay floor which began with, and was composed around, an eye formed by a cupmark left by water droplets There are countless other examples.

Finger markings

The simplest form of marking cave walls was to run one or more fingers over them, leaving traces in the soft layer of clay or '*Mondmilch*' (a white, clayey precipitate of calcium carbonate): as shown by the recent finds in Australia (p.28), the technique is extremely ancient, and may have been the first used: it is certainly a method which requires neither great effort nor any kind of tool. Finger-markings in the European caves may well span the entire Upper Palaeolithic and even part of the Mousterian; most scholars followed Breuil in attributing them to a very early phase, but those of caves such as the Tuc d'Audoubert and the Réseau Clastres are almost certainly Magdalenian.

It is possible that in some cases the *Mondmilch* was actually removed in this fashion – either for body decoration or for medical purposes, since in some Alpine regions in historic times it was used as an ophthalmic analgesic¹¹³ – but more often the fingermarks are splayed, and the *Mondmilch* compressed rather than removed, suggesting that marking was the aim.

In Australia, the lines made by fingers seem to be purely non-figurative; but in some European caves, such as Gargas and Pech Merle, they also include definite animal and anthropomorphic figures (Fig.59).¹¹⁴



Engraving

One possible source of inspiration for the finger technique is the abundance of clawmarks of cave-bear and other animals on the cave-walls; in a few cases these seem to have been incorporated into designs, such as a circle at Aldène (Hérault), or a hand at Bara-Bahau (Dordogne) (a very similar, well-carved hand is known in Koongine Cave, South Australia);¹¹⁵ and it is thought that some marks on cave-walls, at La Croze à Gontran (Dordogne) and elsewhere, are engraved imitations of these clawmarks.¹¹⁶

Engraving itself, which, as in portable art, is by far the most abundant technique on cave-walls, encompasses a wide variety of forms, the choice of which was largely dictated by the nature of the rock; incisions range from the fine and barely visible to the broad, deep lines already seen on the Aurignacian blocks; scratching and scraping were also used at times.

The deep engravings on the walls of Pair-non-Pair seem to have been done with stone picks, whereas the finer incisions of later periods can be attributed to sharp instruments producing a fine, V-shaped section. Jean Vertut was developing new techniques to visualise the profile of fine engraved lines, using microphotographic analysis and even computer enhancement of contrast and equidensities.¹¹⁷ It will be recalled (p.42) that his macrophotography reveals the very slight damage done by direct tracing methods, which affects our ability to assess the tools used in the incisions.

A robust tool must have been used for the deep engravings and bas-reliefs in the caves of Domme (Dordogne), and therefore the flint burin found in a narrow fissure in the Grotte du Pigeonnier here, in the immediate proximity of the parietal figures, may simply have been used for initial sketches, or for final details.¹¹⁸ In any case, such finds are not necessarily always of relevance to the art: for example, a burin-scraper

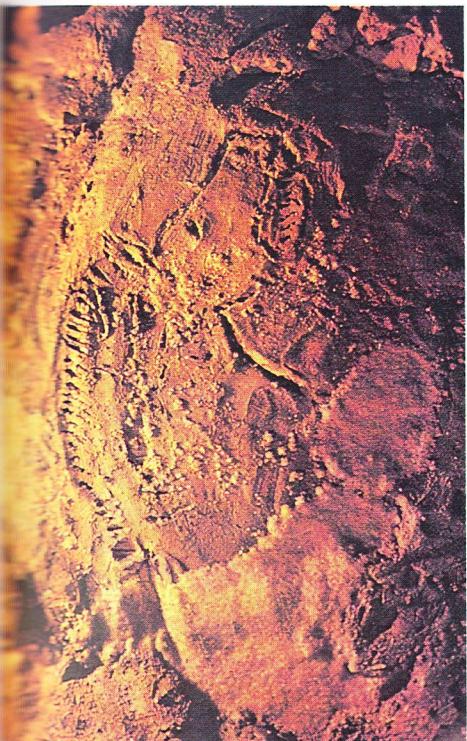


Fig. 57 Engraving of a vertical horsehead in clay, Montespan (Haute Garonne). Probably Magdalenian. Length: 15 cm. (Photo C. Rivenq)

Fig. 58 'Kneeling' reindeer engraved and scraped on a wall in Trois Frères (Ariège). Probably Magdalenian. Length: c 20 cm. (J.V., collection Béguen)





found in a fissure between the legs of the engraved feline of Trois Frères was traditionally assumed to be the artist's tool, left there when the job was done, but in fact nine other objects (flints, bones, a tooth and a shell) have also been found in fissures in this little 'sanctuary'.¹¹⁹

As in portable art, the burin was not the only possible tool for the engraver: almost any sharp flint could have been used, from carefully made retouched pieces to simple waste flakes. This is seen clearly at Lascaux, where use-wear was found on the sharp angles of 27 stone tools, including burins, backed bladelets, and simple blades and flakes.¹²⁰ Experiments showed that a similar wear and polish could be produced by passing a tool up to 50 times across the rock, thus making an incision 1 mm or 2 mm in depth. These tools were found only in those zones of Lascaux which have parietal engravings; they were absent in parts which do not. A few engraving tools were also found at Gouy, though their use-wear was less pronounced than on the Lascaux tools, no doubt because the rock is softer.

It will be recalled that fresh incisions on bone are almost invisible unless the surface is covered with ochre; a similar suggestion has been made for parietal engravings: namely, that the wall may have been coated with a substance such as clay or blood so that new lines stood out from those beneath.¹²¹ It is the great numbers of engraved figures one on top of another at Trois Frères or Lascaux which have led to hypotheses of this type, but in fact they are exceptions to the rule: by and large, parietal figures, whether engraved or painted, carefully avoid superimposition: even at Lascaux, juxtaposition is far more common than overlaps, while at Niaux there seems to be a positive concern to avoid pre-existing figures.

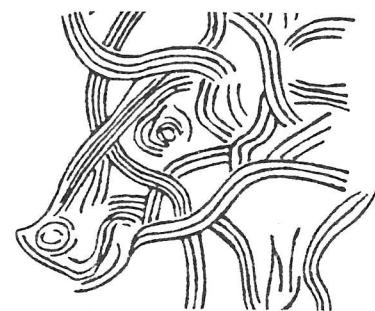


Fig. 59 *Digital tracings at Altamira (Santander) with depiction of bovine head, and tracing by Breuil. The head is just over 1 m in length. (JV)*

In most cases, fine engravings are almost invisible when lit from the front but ‘leap out’ when lit from the side. This fact is of some importance, for it provides an indication of whether the artist was right- or left-handed. Right-handed artists tend to have their light-source on the left, to prevent the shadow of their hand falling on the burin (or brush), and accordingly the majority of Palaeolithic parietal engravings are best lit from the left. Occasionally, however, one comes across the work of a southpaw – for example, the Pyrenean cave of Gargas has many engravings, including a fine, detailed pair of front legs of a horse; these had been known and admired for decades; but recently, visiting scholars lit the figure from the right instead of the left and were suddenly confronted with the rest of the horse, which nobody had seen before!¹²² It is possible, of course, that Palaeolithic artists used the lighting of engravings to their advantage, making them appear or disappear to great effect – alas, we shall never know.

In places where walls were too rough for fine incisions, engraving became almost a form of painting: it was either done more crudely, so that it is best lit from the front, or it was done by scraping. In both cases, the image came not from the relief and light/shadow of an incision, but from the difference in colour between the white engraving and the darker surrounding area of panel. This was the technique used on the Trois Frères feline, mentioned above, and on many other figures.¹²³

There are also different regional/chronological styles of engraving. The best example, one easily recognised and well dated (see p.58), is ‘striated engraving’, using multiple traces, found in a wide area of northern Spain, both in portable art (Parpalló, Rascaño, El Cierro, Castillo, Altamira, etc) and in parietal (Altzerri, Castillo, Altamira, Llonin, etc).¹²⁴ However, it is dangerous to assume that every use of a technique such as this belongs to a single chronological phase.

Work in clay

A different example of regional specialisation is work in clay, which (apart from the terracotta figurines discussed above) is restricted to the Pyrenees on present evidence – presumably because the limestone of most of the Pyrenean caves other than Isturitz was unsuitable for sculpture or bas-relief.

The simplest forms of clay decoration were finger-holes, finger-tracings, and engraving with tools in the cave-floor or in artificially set-up banks of clay. Patterns of dots made by fingertip have been found in the floor at Fontanet (Ariège), and apparently random holes were punched by fingers into the frieze on clay at Montespan (Haute-Garonne), which itself comprises horse figures and vertical lines drawn by finger. One of the finest engravings known is the vertical horse-head which begins this frieze (Fig.57).¹²⁵

Figures and signs were drawn in the floor at Bédeilhac and elsewhere, but by far the best-known cave-floor engravings are those of Niaux,¹²⁶ mostly located around the Salon Noir; apart from the bison mentioned above, they include figures such as two fish, horses, an ibex head, an aurochs, and something vaguely resembling a human fist. Drawings in clay at Massat include three heads of isard (the Pyrenean chamois).

Such drawings, for the most part, have survived only under rock overhangs or in recesses where the feet of unwary visitors could not reach them. It is therefore almost certain that originally there must have been

many more of them, and in far more sites, although at present they do seem to be limited to the Pyrenees, like other work in clay. Untold numbers of fine figures have probably been obliterated by casual visitors to caves in the days before Palaeolithic art became known; only in caves such as Fontanet, the Tuc d'Audoubert and Erberua, where the utmost care has been taken since their discovery, and visits severely restricted, can one be certain that all existing ephemeral traces of this kind have survived.

Since, as we have seen, Palaeolithic people could model clay into figurines, it is hardly surprising that they were equally capable of parietal modelling. Bas-relief exists in cave-floors, as in the series of little horses at Montespan (some almost in haut-relief, since they rise to 9 and 10 cm in height), and also on banks of clay: the best-known example is in a side-chamber at Bédeilhac, where there were four bison (two of them now destroyed), with other marks and a carefully modelled and accurate vulva nearby, with a small fragment of stalactite inserted at the position of the clitoris (Fig. 60).¹²⁷

Montespan has some broken haut-relief figures in clay, including at least one possible feline (thought by some scholars to be a horse), but they are so damaged that they pale into insignificance beside the classic examples of the technique: namely the two bison of the Tuc d'Audoubert (Figs. 61-2), which are about one-sixth normal size (63 and 61 cm long) and placed at the centre of a distant chamber, against some rocks. Around them are marks including heel-prints, a crude engraving of a third bison in the cave-floor, and a small clay statuette of a fourth.

The clay was brought from a neighbouring chamber; some 'sausages' on the ground have traditionally been interpreted as phalluses, or

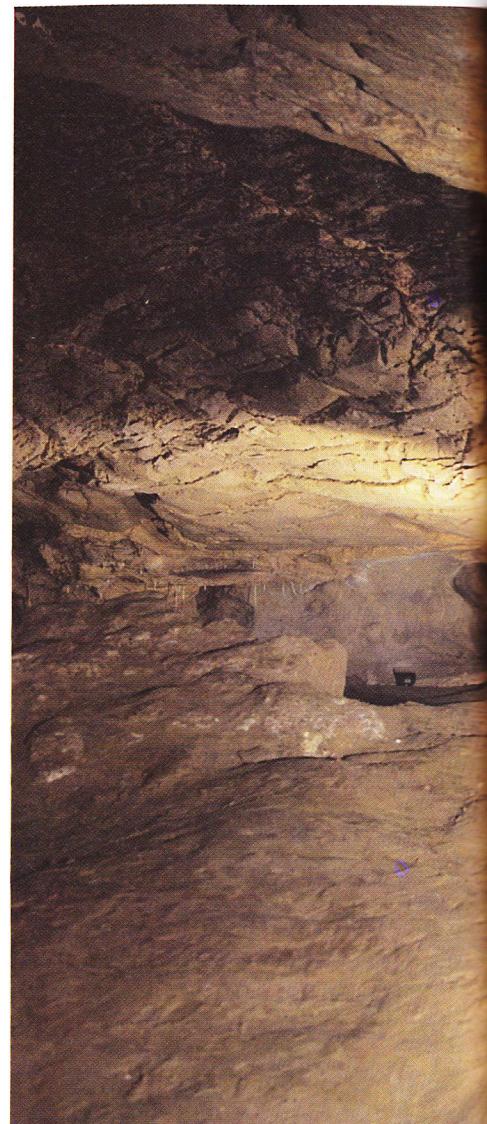
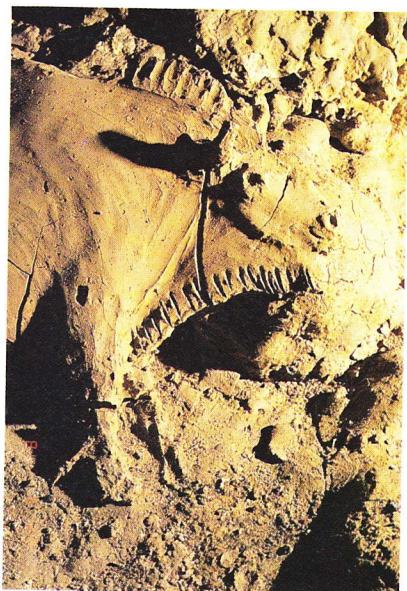


Fig. 61 *The two clay bison of the Tuc d'Audoubert (Ariège) in their context, as the focal point of a small, low-ceilinged chamber. Probably Magdalenian. The bison are 63 and 61 cm long respectively. (Wide-angled photo by JV, collection Bégouën). [See also Figs. 120-22]*

Fig. 60 *Clay bank in the cave of Bédeilhac (Ariège), showing modelled vulva on the left, and a bas-relief bison about 30 cm in length. Probably Magdalenian. (JV)*

Fig. 62 *Detail of one of the Tuc d'Audoubert bison, showing how the clay was worked with fingers and implements. (JV, collection Bégouën)*



occasionally as horns, but a recent study by a sculptor¹²⁸ suggests, far more plausibly, that they are simply the result of testing the clay's plasticity, and the position of palm- and finger-prints on them supports this. Similarly, marks on the haut-relief bison show that they were modelled with fingers and further shaped with some sort of spatula (Fig. 62); a pointed object was used to insert the eyes, nostrils, mouths, mane, etc. It is likely that the cracks in the figures occurred within a few days of their execution, as they dried out. Most of the artist's detritus around the figures seems to have been carefully cleared away.

Finally, one fully three-dimensional large clay figure is known: the famous bear at Montespan. However, although a fully rounded form, in a Sphinx-like posture, it cannot really be classed as a statue – it is simply a bear-shaped headless dummy, 1.1 m long and 60 cm high, over which the hide (perhaps with head still attached) of a real bear was probably draped.¹²⁹ This would account for the polish on the clay. Nevertheless, a great deal of work went into shaping this considerable mass of clay (c 700 kg), and its haunches and stomach area are particularly fine (Figs.63-64); its claws were also incised into the clay paws.

Bas- and haut-relief in stone

Just as work in clay is restricted to the Pyrenees, so parietal sculpture is limited to other parts of France such as the Périgord, where the limestone could be shaped in this way. One difference between the two techniques is that clay figures are found (or have only survived) inside the dark depths of caves; sculptures are always in rock-shelters or the front, illuminated parts of caves. The reason for this discrepancy remains obscure, since the artists were clearly capable of working for long periods far inside caves and, as we shall see, had light-sources adequate to the task.

Among the earliest examples of parietal stone-carving are the bas-reliefs of Laussel (Dordogne), including the well-known woman holding a 'horn' in her right hand; this particular specimen was originally carved on a large block of four cubic metres in front of the rock-shelter, which was not, therefore, a 'movable wall';¹³⁰ the figure includes a number of techniques—her left side is merely deeply engraved, like the Aurignacian blocks mentioned earlier, while her right is in '*champlévé*', since material has been removed next to it which brings her body into relief. The figure seems to have been regularised and perhaps even polished; finally, fine engraving was used for her fingers and for the marks on the horn (Fig.67).¹³¹

The carvings of Fourneau du Diable (Dordogne), on the other hand, are on a block of only half a cubic metre, weighing less than a tonne, and had therefore been placed precisely where the artist wanted them,¹³² while the blocks of Roc de Sers (Charente) had originally been arranged in a semi-circle at the back of the rock-shelter, but subsequently some had rolled down the talus slope.

One of the best examples of haut-relief is the frieze at Cap Blanc (Dordogne) (Fig.69), where figures reach a depth of 30 cm in places. By and large, we do not know precisely what implements were used for work of this kind, although it is a safe assumption that they were quite robust percussion tools (hammers, chisels, saws and abrasives), judging from the traces of impact still visible on and around many sculptured figures. Few of the sites have yielded plausible tools in their fill, but at Laussel some Aurignacian 'picks' have battered ends; the picks of Angles-sur-l'Anglin were mentioned earlier (see above, p.58), and worn flint tools including burins and scrapers were recovered from the Magdalenian of Cap Blanc.¹³³

The engraving on the Laussel female has echoes in incised lines on the sculptured blocks at Roc de Sers; far more common, however, are traces of pigment on these carved figures, similar to those on portable carvings of various types. The Laussel woman has red ochre on her whole body, especially visible on the breasts and abdomen, as well as in the groove around her, and some of the other Laussel figures have traces too. In the magnificent sculptured frieze of Angles-sur-l'Anglin (Vienne) many figures (including the male portrait) have traces of paint, and vestiges of red ochre have also been found on the fish in the abri du Poisson, and on the friezes of La Chaire à Calvin (Charente) and Cap Blanc—indeed, at the latter the ochre seems to cover large areas, both on the figures and around them, but can now be seen only under very intense light or when the wall is humid.¹³⁴

Pigment was also used in combination with engraving, as at Pair-non-Pair, where there are many traces of ochre inside the incisions as well as on the areas in relief; but in many sites it is difficult to decide whether the

engravings were ‘rédone’ with colour or whether they were originally done on painted surfaces, thus trapping some pigment in the grooves.

Pigments

Identification and preparation

As soon as Palaeolithic parietal art began to be accepted, at the end of the last century, analyses were undertaken to identify the pigments used: Rivière, the pioneer of La Mouthe, was the first to take samples, in 1898, and had them analysed by Adolphe Carnot, who found that they were iron oxide, with no trace of lead or mercury, and had been applied in the form of a watercolour which had penetrated the rock; later, samples from Gargas and Marsoulas, submitted by Regnault to C. Fabre, were also identified as an iron-oxide paint.¹³⁵ H. Moissan did analyses for Font de Gaume in 1902, with similar results.

Since that time, the red pigment on cave-walls has consistently proved to be iron oxide (haematite, or red ochre), not only in western Europe but also in remote caves like Kapova and Cuculat.¹³⁶ Black, on the other hand, is usually manganese dioxide, although recent analysis of pigment in the Salon Noir, Niaux, has revealed that charcoal was used for figures here: the plant cells are visible under the microscope, while the scanning electron microscope has shown that it was a resinous wood similar to the juniper; charcoal may also have been used instead of manganese at Las Monedas.¹³⁷ Charcoal marks are known elsewhere, such as at Altamira, and the Grotte Bayol (Gard), but these may simply be torch-marks rather than deliberate drawing.

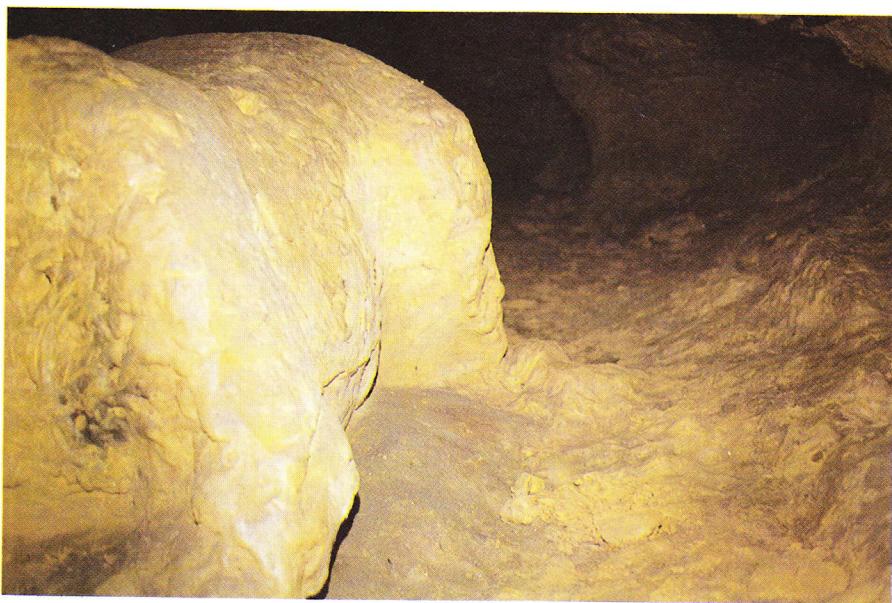
White was used far more rarely; kaolinite was brought into the abri Pataud (a non-painted site, as far as we know) and may have been used as a white pigment or as an ‘extending pigment’ mixed with other colours;¹³⁸ at Altamira, some white paste found in a shell proved to be a mix of mica and illite,¹³⁹ and one nodule from Lascaux is also thought to be kaolin.

It has often been assumed that the Palaeolithic artists also used blues and greens extracted from plants, and that these have not survived on the walls – however, it requires complex chemical treatments developed in modern times to extract these colours, and the plants concerned grow in warm or tropical areas; so, apart from the charcoal mentioned above and the possibility of a little woad, plants were probably not used for pigment.¹⁴⁰ Similarly, copper and lapis-lazuli were unknown as sources. Consequently, Palaeolithic artists had only five basic colours to work with: red, yellow, brown, black and white, but the latter is so rare that the choice was really of four.

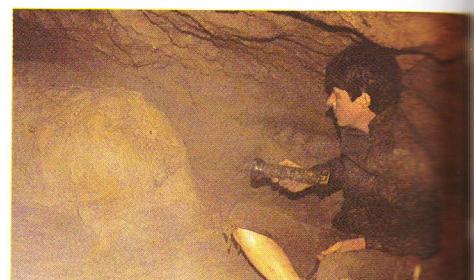
The main mineral colouring materials were usually readily available, either casually collected as nodules or exploited from known sources (or even occasionally mined, as we have seen in Africa and Hungary); lumps of them have been found in abundance in some sites, and tens of kilos of them, bearing traces of how they were used, lie unstudied in museums.

At Tito Bustillo, in front of the great Magdalenian painted frieze, there were colouring materials, some of them still in the barnacle shells in which they were mixed. In the far earlier cave-site of Arcy-sur-Cure (Yonne), dating to the very beginning of the Upper Palaeolithic, there was a limestone plate which had clearly been used for carrying ochre.

However, the greatest assemblage of evidence of this kind, and the best studied so far, is that from Lascaux, where 158 mineral fragments were



Figs. 63/64 *The front and right flank of the clay bear of Montespan (Haute-Garonne), about 1.1 m in length. Probably Magdalenian. (PGB).* The view of the 'dark side' (near the cave-wall) of the bear shows the left forepaw and shoulder, and the finely modelled belly and haunch. Note the traces of red pigment nearby. (PGB)



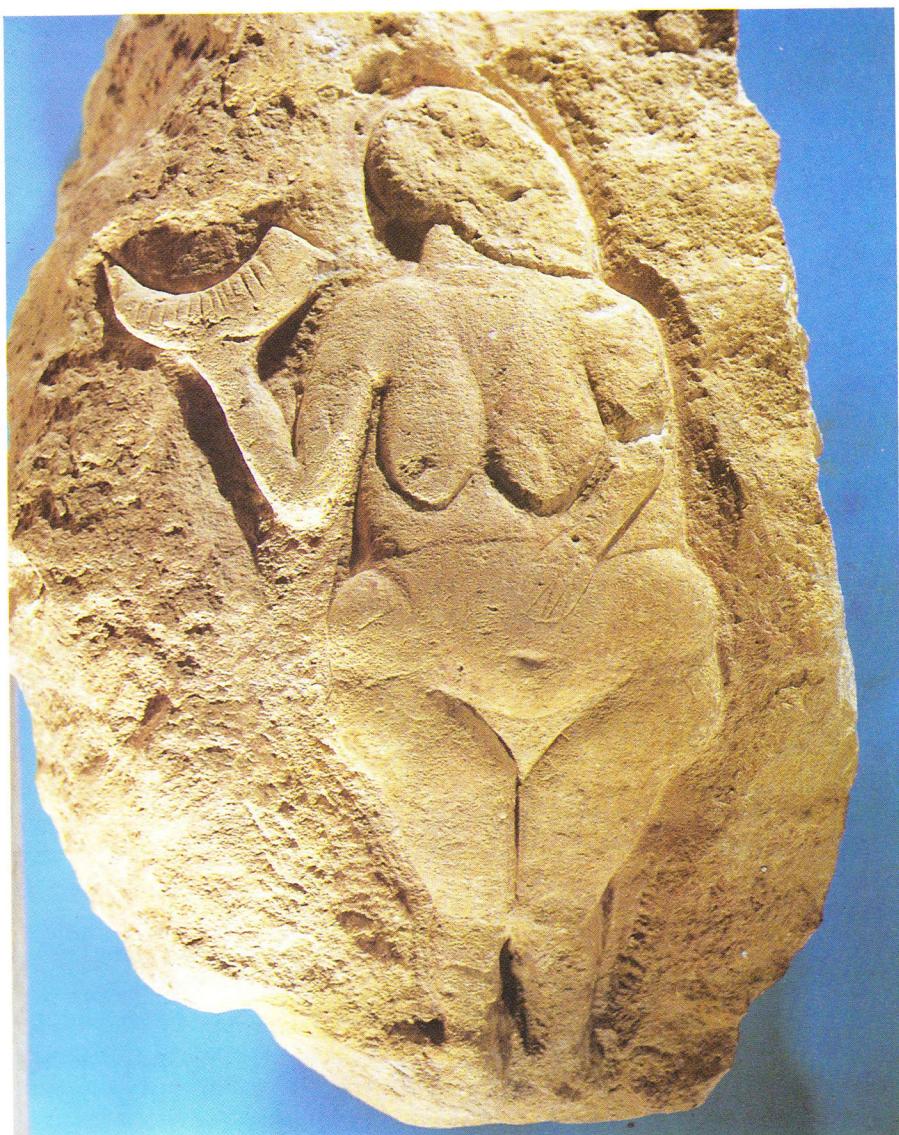
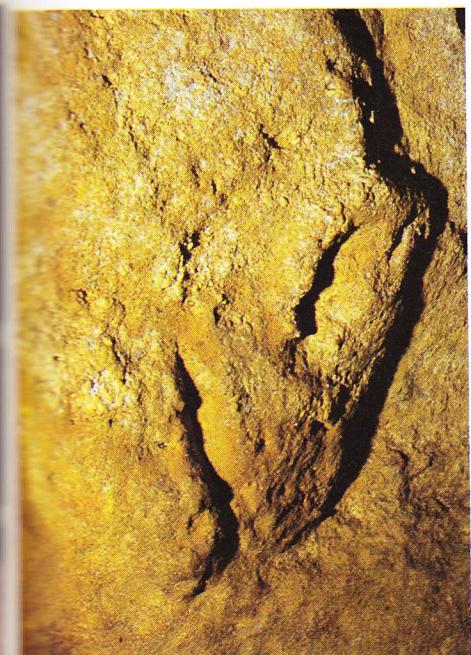


Fig. 67 'Venus with horn' from Laussel (Dordogne). Probably Gravettian. Height: 44 cm. Although now detached, it should be classed as parietal art since originally it was carved on a block of 4 cubic metres. (JV)



Figs. 65/66 The sculptured bas-relief horsehead of Comarque (Dordogne), 70 cm long. Probably Magdalenian. (JV). Detail of the horse's muzzle. (PGB)



Fig. 68 Red pigment in the cave of Cougnac (Lot). (JV)

found in various parts of the cave, together with crude 'mortars' and 'pestles', stained with pigment, and naturally hollowed stones still containing small amounts of powdered pigment.¹⁴¹ There are scratches and traces of use-wear on 31 of the mineral lumps. Black dominates (105), followed by yellows (26), reds (24) and white (3). It was found that there were sources of ochre and of manganese dioxide within 500 m and 5 km of the cave respectively.

The shades vary considerably: the colour of ochre is modified by heat, and Palaeolithic people clearly knew this, since even in the Châtelperronian of Arcy there were fragments at different stages of oxidation still in the hearths. Yellow ochre, when heated beyond 250°C, passes through different shades of red as it oxidises into haematite.¹⁴²

A further stage in pigment preparation, in Lascaux at least, involved the mixing of different powdered minerals, since unmixed pigments are rare here. Chemical analysis of ten samples produced some surprising results: for instance, one pigment contained calcium phosphate, a substance obtained by heating animal bone to 400°C. It was then mixed with calcite, and heated again to 1000°, thus transforming the mix into tetracalcite phosphate.¹⁴³ A white pigment was found to comprise porcelain clay (10%), powdered quartz (20%) and powdered calcite (70%); while a black pigment found in a mortar was charcoal (65%) mixed with iron-rich clay (25%) and a few other minerals, including powdered quartz. Clearly, therefore, the Palaeolithic artists were experimenting and combining their raw materials in various ways. Analysis is now proceeding further, and the scanning electron microscope is being used on tiny chips of some Lascaux paintings in order to study the microstructure of the pigments and compare them with natural samples, in an effort to assess the nature and extent of the prehistoric processing.¹⁴⁴

A different problem is the binding medium used. In the past it was often assumed that some form of fatty animal product was used for the purpose; however, a series of 205 experiments in two caves has been carried out by Claude Couraud, involving a variety of pigments and binding substances (including fish glue, arabic gum, gelatin, egg white, bovine blood, and urine), and a range of wall-types and degrees of humidity. Observation of the results and deteriorations over three years led him to the conclusion that fatty and organic substances were totally unsuitable binding agents, and fail to adhere well to humid walls. In fact, the only substance which seemed to be good at fixing and preserving the pigments on the rock-face was water – especially cave-water, which is rich in calcium carbonate and which was probably used at Lascaux.¹⁴⁵ It was also found that pigments adhered better if they had been finely ground.

Application

The simplest way to apply pigment to walls was with fingers, and this was certainly done in some caves: for example, the animal figures of La Baume-Latrone (Gard) were clearly painted with fingers, as were the '*serpentiformes*' of La Pileta (Málaga), versions in red clay or black pigment of the simple finger-markings or '*macaronis*' which also abound in these caves.¹⁴⁶ La Pileta and other caves such as Cougnac also have series of double finger-marks in pigment on or around animal figures.¹⁴⁷

Experiments suggest that painting by finger tends to produce poor results. Nevertheless, when Lascaux II was being made, it became

apparent to the modern artists that some painted lines had been done with the finger in the original figures.

Normally, however, paint was applied with some sort of tool; again, since none has survived, it is experimentation which suggests what was used, although one must always remember that the original artists had years of experience and familiarity with their materials, and acquired 'knacks' which cannot be revealed by modern short-term exercises. Some lumps of pigment are in the form of 'crayons' (there are 19 with use-wear at Lascaux alone), and these may have been used to sketch outlines; however, they do not mark the rock well, and really work only on humid walls. Moreover, they wear down very fast – in tests, 1 cm of length produced a mark of only 15 cm!¹⁴⁸ Consequently, lumps of pigment must have been used mostly as sources of powder, which explains the traces of scraping on many of them – and flints with ochre on their edge have been found at Lascaux, Tito Bustillo and other sites, close to the minerals.

As mentioned earlier, mortars and other 'vessels' have been found at Lascaux containing crushed pigment, and similar objects with traces of colour inside are known from Altamira (including some vertebrae), Villars (concave fragments of calcite), Tito Bustillo (barnacle shells) and elsewhere. What we do not always know is whether the powder was made into a paste or a liquid – no doubt it depended on the circumstances and the desired effect, whether a dot, an outline or a flat-wash. In some cases, the paint was probably in liquid form, since it is diffuse, or it has run – for example on some figures of the Frise Noire at Pech Merle – although trickling may also have been caused by wet walls at times.

Whether in paste or liquid form, how was the paint applied? Experiments with a variety of materials produced their best results – ie solid, precise and regular marks – with animal-hair brushes (especially badger); brushes of crushed or chewed vegetable fibre were next best. On the other hand, brushes of human hair were too supple and fragile, while pads of bison fur transferred colour to the rock efficiently, but quickly became flaccid and unusable.¹⁴⁹

Nevertheless, there are cases where some sort of pad must have been used because other methods were unsuitable. Some surfaces at Lascaux have a cauliflower-like covering (the crystalline calcite coating of the Hall of the Bulls made it unsuitable for engravings), and once figures had been outlined on them – presumably by crayon or brush – the infill was done with hundreds of circular, diffuse spots that join up and give the impression of an even wash. They appear to have been done with a pad and dampened powder: for example, a red cow in the 'Diverticule Axial' has been filled by about 200 such patches. Yet these figures have sharp edges, which suggest that a hide or some such object was placed along the desired line.¹⁵⁰ This pad-and-paste method would certainly have been easier to use on ceilings and inclined walls than brushes and liquid paint. In some lines of big dots in various parts of Lascaux, one can see a change after two or three similar ones, which suggests that the pad or brush held enough pigment for only a few at a time.

In some cases, such as the Covalanas and Arenaza deer (outline figures made of dots) or the famous bison of Marsoulas, composed almost entirely of red dots, each 2–3 cm in diameter,¹⁵¹ it is hard to decide whether fingers, thumbs, pads or brushes were responsible. As mentioned earlier (p.48), use of infra-red film has revealed that some apparently unbroken lines, such as in a tectiform at Bernifal, were originally made with dots whose





Fig. 69 Photomontage of the sculptured frieze at Cap Blanc (Dordogne), showing the series of horses, some facing left and others right. Magdalenian. Total length: c 8 m. The central horse is 2.15 m long. (JV)

Fig. 70 Three hinds drawn with dots at Covalanas (Santander). Total length: c 2.5 m. The central hind is 60 cm long. (JV)

Fig. 71 Some of the incomplete hand stencils of Gargas (Hautes Pyrénées). (JV)



pigment ran together, because the earthy red pigment was soluble in humid conditions and spread (unlike manganese dioxide, which is insoluble and thus does not run and fade). At Combel (Pech Merle), infrared analysis showed that a group of red dots had been made with a pad dipped in ochre, whereas an adjacent set had been applied by spraying.¹⁵²

Hand stencils

A technique of spraying paint was also clearly employed for the hand stencils which are so numerous in certain caves (occasionally with forearm included, as at Maltravieso and Fuente del Salín, Fig. 72);¹⁵³ the comparatively rare positive hand-prints (for example at Altamira, Santián, La Pasiega and Fuente del Salín) were made simply by applying a paint-covered palm to the wall. Very occasionally, hand stencils seem to have been made with a pad, as in the case of two black specimens at Gargas which have a regular area of paint around them; a white specimen in the same cave apparently had white material crushed around the fingers; but most have a 'diffused halo' which results from spraying. There are two possible methods: through a tube, or directly from the mouth; and was the pigment in dry or liquid form?

Once again, observation and experiments have helped to clarify the situation. When dry, the powder can have been applied only through a tube; the site of Les Cottés (Vienne) contained a bone tube with powdered red pigment inside it, which seems to indicate that this technique was indeed used at times. If dry powder was projected, then a humid wall was required or there would have been no adhesion; in any case, dry pigment leaves 'fallout' beneath the hand, and this does not exist on the Palaeolithic stencils. By contrast, if liquid paint is used, blowing it through a tube concentrates it too much; experiments show that spraying liquid paint from the mouth, about 7–10 cm from the wall, is not only the easiest method but also the one which produces results which best resemble the original stencils;¹⁵⁴ pursing the lips slightly projects a spray of fine droplets which form the required halo with diffuse edges. On average, it takes about 3 g of pigment and between 30 and 45 minutes to do each hand in this way, whereas the 'dry method' can sometimes be quicker, but uses 9–10 g. However, filling one's mouth with paint is hardly pleasant, and it is possible that a combination of the two techniques was used: ie placing a hollow tube upright in a paint-holder, then blowing across its top through a second tube forces the paint up and out in a fine mist; or perhaps blowing into a bent reed so that a spray emerges from a split at its base.¹⁵⁵

We have already seen that most engravings were probably done by right-handed artists; and it has traditionally been assumed that because most stencils are of left hands (at Gargas, 136 left hands have been identified, and only 22 right), this too denotes predominantly right-handed people. Although this is likely to be correct, the hands are poor evidence, partly because the painting may have been done by mouth, not by the dominant hand, and partly because some hands may have been stencilled palm-upward! However, one should also note that in the very rare Ice Age depictions of people holding objects (particularly those of Laussel, such as the 'Venus with horn') it is usually the right hand which is doing the holding.

Unfortunately, the stencil experiments have not settled the old debate about the apparently mutilated or deformed hands, most abundant at Gargas but also known in other caves such as Tibiran, Fuente del Trucho



Fig. 72 Hand and forearm stencils from Fuente del Salín (Santander). (After Bohigas et al)

(interestingly, located just across the Pyrenees from Gargas!), Maltravieso, possibly Erberua and Fuente del Salin, etc. There are three basic explanations for the missing phalanges (finger bones) on these hands: either the fingers were bent (probably palm-upward) when the stencils were done, or the phalanges were actually missing, through ritual mutilation or through pathological conditions.

Many prehistorians have thought the fingers were deliberately bent, for one reason or another, perhaps as a kind of language of gestures or signals,¹⁵⁶ and some experimenters claim to have duplicated all the 'mutilations' at Gargas by bending their fingers, and point out that there are stencils with clearly bent thumbs at Gargas and Pech Merle.¹⁵⁷ Another experimenter, however, consistently found that placing his hand palm-upward and bending the fingers caused pigment to infiltrate behind it,¹⁵⁸ which, as we have seen, was not the case in the originals. He therefore supports the view that the phalanges were actually missing.

If they were, then ritual mutilation may have been responsible, as at Maltravieso, where primarily the little finger was affected; but at Gargas the cause is more likely to be pathological. Investigation by Ali Sahly showed that the stencils here comprised adults, women and/or youths, and children including infants; of the 124 best preserved, only 10 are free of abnormality; the various combinations of missing phalanges are on only the fingers, not the thumb. Almost 30% had the last two phalanges of all four fingers gone. He claimed that repetitions of the same hands were detectable, so that less than 20 people produced 231 prints between them.

His conclusion that conditions such as frostbite, gangrene and Reynaud's disease (which attacks only the fingers and very rarely the thumb) were responsible found support in his discoveries of actual hand-imprints in clay, not only at Gargas but also at Lascaux, which seemed to have phalanges missing; and of finger-holes in clay at Gargas, casts of which seemed to end in stumps rather than finger-tips.¹⁵⁹

Some painting techniques

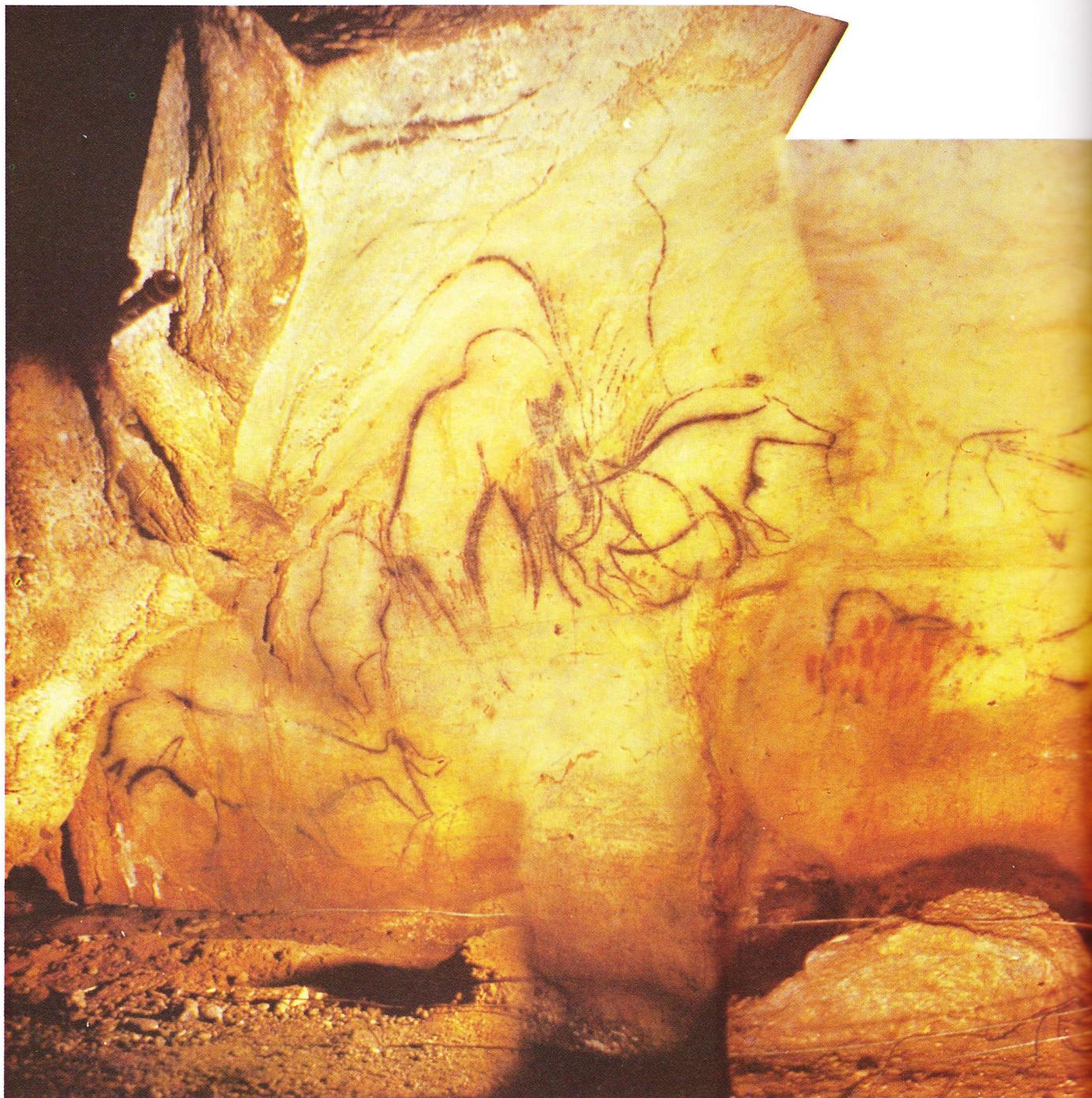
Strictly speaking, figures made by finger or in simple outline should simply be seen as coloured drawings; the term 'painting' might better be limited to those cases with infill of various kinds, and, as we have seen, painted infill dates back to the Aurignacian block from abri Blanchard, and perhaps beyond, as does the practice of colouring wide areas of rock-wall. The sophisticated bichrome and polychrome figures of the Magdalenian arrive relatively late, and are rare in Palaeolithic iconography in comparison with engravings and outline drawings.

The latter were undoubtedly quick and easy things to do for an artist of experience and talent. In an already famous experiment, Michel Lorblanchet memorised every mark in the 'Frise Noire' of Pech Merle (there are 25 animals on this panel measuring 7 m by 2.5 m)(Fig. 73), and then reproduced the whole thing on an equally smooth panel of similar dimensions in another cave, lit by a lamp in his left hand. Each figure took an average of 1–4 minutes (compare this with the times for hand stencils, above), so that the whole frieze required about an hour, including initial sketching with a stick.¹⁶⁰

Similarly, Claude Couraud has reproduced a Lascaux horse and a Niaux bison, both full-size on paper and at reduced scale in a cave: the horse required 30 minutes of preparation and another 30 to do on paper, but took only 30 minutes in the cave; the bison took 20 minutes on paper, and only

10 in the cave.¹⁶¹ Therefore, it seems that even quite detailed figures needed little time for their execution.

Experiments have also been done to investigate problems of superimposition of different paints. At Lascaux, it was long uncertain whether the red cows were on top of the black bulls, or vice versa, because the two pigments had mixed; some scholars thought the cows were done first, but infra-red pictures suggested the opposite. Using samples of similar pigment, it was found that red on top of black did not mix, but black on top of red did so – and so the bulls were clearly painted after the cows.¹⁶² As mentioned earlier (p.48), infra-red with special cut-off filters



has also been used by Alexander Marshack, Jean Vertut and others to determine the use of different ochres and mixes of ochre within a single composition or panel, where everything looks the same to the naked eye. Similarly, ultraviolet light helps one to separate out overpainting and overengraving more clearly. However, it must be stressed that these techniques cannot be applied universally or at random, but need to be developed for each particular problem or cave.¹⁶³

Combinations of painting and engraving are quite common and varied in parietal art; at Trois Frères, clearly visible traces show that a panel was scraped extensively before a large red 'claviform' was painted on it (Fig. 24);¹⁶⁴ similarly, several panels at Altxerri were scraped extensively to produce a light background for painted figures;¹⁶⁵ in some cases, an engraved figure is filled in with ochre; elsewhere, as in the spotted bison of Marsoulas, a few incisions delimit certain parts of a painted figure, such as the head and leg; while at Tito Bustillo, some of the bichrome horses on the

Fig. 73 Photomontage of the 'black frieze' in the cave of Pech Merle (Lot), showing mammoths, bison, aurochs, horse and red dots. Solutrean. Total size: c 7 m by 2.5 m. The mammoth at top left is 1.4 m long. (J.V.)



main panel are silhouetted by wide areas of engraving which make them stand out from the darker background and from earlier figures.¹⁶⁶ There are even painted animals which are redone or ‘highlighted’ with engraving, as at Trois Frères, Lascaux, Le Portel, or Santimamiñe, for example.

As mentioned earlier, just as perfectly proportioned figures could be engraved around a cylinder of antler, so the ‘falling horse’ of Lascaux is painted around a rock: the artist could never see the whole animal, yet its proportions remain sound. It is possible that an even more sophisticated technique was occasionally used in the caves, namely anamorphosis, or deliberate distortion. Claims have been made that four red cows at Lascaux and a black horse at Tito Bustillo were purposely deformed in this way so as to look normal from ground level or from the side;¹⁶⁷ given the other accomplishments of Palaeolithic artists, there is no reason to suppose that touches of this sort were beyond their capabilities.

Just as with portable art, there are clear regional differences in artistic technique (quite apart from style and content): for instance, in the Pyrenees there are roughly equal numbers of engraved and painted figures in the Mas d’Azil, but engraving dominates in the decorated caves to the west and painting in those to the east, although there are inevitably exceptions (Tibiran has more painting than engraving, while Fontanet and Massat are the reverse).¹⁶⁸ The regional difference in distribution between clay and sculpture has already been mentioned; perhaps linked to this is the fact that art on cave-floors is largely restricted to the Pyrenees but, unlike Cantabria and the Périgord, this region has no decorated ceilings – there are occasional engraved or painted figures on ceilings (engravings at Montespan, for example), but there is nothing remotely like the Lascaux passage, or the great painted ceiling of Altamira which Déchelette baptised the ‘Sistine Chapel of Rock Art’.¹⁶⁹

The Altamira ceiling was within easy reach – indeed, it was so low that the artists could not have seen its whole surface at once; but how did they manage to paint on high ceilings? Occasionally, as with a sign in Lascaux, it might have been accomplished with a brush on the end of a long pole. At La Griega (Segovia), it is thought that an engraving on a ceiling 3 m up could have been done by a person straddling the passage with one foot on a ledge on either side.¹⁷⁰ Elsewhere, as at Roucadour (Lot) where the engravings are 6 m above ground-level, or at Baume-Latrone, where there are broad sweeps of painting on a ceiling over 3 m high,¹⁷¹ it is probable that the floor has sunk down since Palaeolithic times. But for truly monumental work, such as the great Labastide horse on a rock 4 m high, the two black mammoths painted 5 m up on the vault of Bernifal, or much of Lascaux’s decoration, it is clear that ladders (perhaps tree-trunks with branch-stumps as rungs) or scaffolding must have been used. Abundant wood residues found in Lascaux may come from these constructions (some are from big oaks) as well as from torches and so forth, but the clearest evidence is the series of about 20 sockets cut into the rock on both sides of the ‘Diverticule Axial’, about 2 m above the floor; these were packed with clay. Holes about 10 cm deep in this clay suggest that branches long enough to span the passage were fitted into the sockets and cemented into place with the clay. This series of solid joists could then support a platform, providing easy access to the upper walls and ceiling.¹⁷²

Shedding light on the subject

Portable art may all have been done in daylight, like the art on blocks and the decoration of rock-shelters. But the work inside caves required a reliable source of light. In a few cases, a hearth at the foot of the decorated panel may have sufficed: at La Tête-du-Lion (Ardèche) a concentration of pine charcoal only 1.2 m from the decorated wall may be a '*foyer d'éclairage*' of this type, though it could simply be the remains of torches.¹⁷³ Certainly, portable light was necessary in most caves. What did they have at their disposal?

Despite Rivière's discovery at La Mouthe, the very existence of Palaeolithic lamps was not fully accepted until 1902, the same year that cave-art was finally validated. This was no coincidence: once the pictures deep inside caves, often hundreds of metres from daylight, were seen to be authentic, it was obvious that the artists must have had some means of illumination.

As often happens, the establishment of a previously rejected notion led scholars to the opposite extreme, so that all hollow objects, and lots of flat ones, were identified indiscriminately as lamps! A recent critical study of the hundreds of objects claimed to be lamps has resulted in only 302 being considered as possibilities, of which a mere 85 are definite and 31 others probable. This is a very poor total when seen against the 25,000 years of Upper Palaeolithic life and the hundreds of decorated caves, especially when it is noted that 70% of them come from open-air sites, rock-shelters or shallow caves.¹⁷⁴ It is certain that a different method was usually employed in deep caves – probably burning torches, which have left little or no trace other than a few fragments of charcoal or black marks on walls.

There are a few beautifully carved lamps; and some, such as those from La Mouthe or Lascaux, even have engravings on them. Many of them are of a red sandstone from the Corrèze region of France, which thus seems to have been a centre of production.

Combustion residues in some specimens have been subjected to analysis which indicated that they were fatty acids of animal origin; while remains of resinous wood or of non-woody material clearly come from the wicks (residues in the carved Lascaux specimen proved to be juniper). Experiments have been carried out with replica lamps of different types, different fuels (cow lard, horse grease, deer marrow, seal fat), and a variety of wicks (lichen, moss, birch bark, juniper wood, pine needles, dried mushrooms, and kindling). The results led to a number of interesting insights, which were confirmed by study of the lamps used by Eskimos.¹⁷⁵

Firstly, a good fuel needs to be fluid, and easy to light. The initial melting of the fat needs to absorb the wick material which, by burning, continues to melt the fuel. This cycle can continue for hours, providing both wick and fuel are replenished from time to time: one estimate is that 500 g of fat will keep a lamp going for 24 hours.¹⁷⁶ As mentioned earlier (p.23), animal-fat fuel produces no soot.

There are two basic types of lamp: the open-circuit model, in which the fuel is evacuated as it melts; and the closed-circuit, where the fuel is kept in a cavity. The open type seems very rare in the Ice Age, although many simple slabs of stone may have been used like this (about 130 limestone slabs at Lascaux were interpreted in this way, although many are now lost, and only about 36 seem likely lamps); most recognisable Palaeolithic

lamps are of closed-circuit type. In Eskimo communities, the open types are for occasional use, while the closed types – in which far more work has been invested – are used daily.

But how bright are these lamps? The answer, surprisingly, is that they are pretty dim, even by comparison with a modern candle. The power of the light given off depends on the quality and quantity of fuel; the flame is usually unstable and trembling. Experiments with a stone lamp using horse fat produced a flame of one-sixth the power of a candle, according to measurements with a photometer.¹⁷⁷ With such limited radiance, it would have been necessary for Ice Age people to use several at once, or to resort to burning torches. In some deep caves, such as Labastide, there are also the remains of hearths of various kinds, which would certainly have provided strong light at times.

We, of course, are spoiled by artificial light, and are no longer accustomed to dimmer sources. But in fact it is surprising how much can be seen by the light of a single candle, and a large cave-chamber could be adequately lit with two or three. It has been found that with only one lamp one can move around a cave, read, and even sew if one is close enough to the light – the eye cannot really tell that the flame is weaker than a candle.

One important factor is that flickering flames of this type have the effect – no doubt observed and perhaps exploited in the Palaeolithic – of making the depicted animals seem to move, an eerie experience. For the really big figures, over 2 m in length, more than one lamp would have been needed to see the whole thing at once. The lamps would also have affected colour perception – they give off a warm yellowish light which makes yellow look orangey, and makes red pale or brown. The eye adapts well to red in this light, and this may explain the frequent use of red dots and signs at various points in the caves – by lamplight they were readily visible signals.

We still have much to learn about how Ice Age people – including many children (p. 13) – managed to make their occasional forays into the remote depths of some caves. Even armed with bundles of torches, or lamps with a plentiful supply of fat and wicks, it seems a very risky thing to do. However, if archaeology has taught us anything, it is that we should never underestimate the capabilities of our ancestors. We must not lose sight of the fact that caves and darkness formed part of their environment, and they clearly knew how to cope with them very successfully.

Open-air art

Equally, however, we should not let the terms ‘cave-art’ and ‘cavemen’ blind us to the fact that they very rarely lived far inside caves but, rather, occupied rock-shelters, cave-mouths, and a variety of open-air habitations, from the tents of western Europe to the mammoth-bone huts of central and eastern Europe.

Since they spent almost their whole lives in the great outdoors, it has always been assumed that they must also have produced art outside the caves, but that it has not survived the millennia of weathering and erosion. As mentioned earlier, there have been occasional claims that open-air figures were of Palaeolithic age – most notably at Chichkino, Siberia, where hundreds of animal depictions over a distance of about 3 km include a horse and a wild bovid considered characteristic of the end of the Ice Age – but few scholars have been prepared to take them seriously. In recent

years, however, a series of important finds in western Europe has finally brought the proof that Palaeolithic people did produce art in the open air, that it can survive, and that the Soviet claims may therefore be valid after all.

The first such finds occurred at a number of rock-shelters and caves (including Murciélagos) in the Nalón Valley, Asturias, which have some eroded lines and animal figures deeply engraved in their exterior areas;¹⁷⁸ nevertheless, these engravings were still in or near shelters and cave-mouths, rather like the sculptured friezes and carved blocks of France. The next discoveries, however, were at truly open-air sites.

At Domingo García, Segovia, the figure of a horse, almost a metre in length, was found engraved (or, rather, hammered out) on a rocky outcrop.¹⁷⁹ In style it resembles the engraved horses in the cave of La Grieja, in the same region; moreover, a schematic engraving of a different style and period is superimposed on its outline (Fig. 75).

At around the same time, three animal figures, including a fine horse, 62 cm long and 37.5 cm high (Fig. 74), were discovered on a rock-face above the River Douro, at Mazouco in north-east Portugal;¹⁸⁰ they had survived thanks to a position which protected them from the elements.

Fig. 74 Open-air engraved horse at Mazouco, Portugal. Length: 62 cm, height: 37.5 cm (Photo D. Sacchi)





Fig. 75 *The open-air engraved horse of Domingo García (Segovia).*
(Photo and tracing A. Moure Romanillo)

This horse, too, resembles those of La Griega, and the three sites thus seem to form a regional group.

Finally, a series of fine incisions has been found at Fornols-Haut, Campôme, in the eastern French Pyrenees, on a huge block of schist located at an altitude of 750 m on a mountainside (Fig. 76).¹⁸¹ The rock has been greatly weathered by wind; but, because the eastern face is sheltered, its engravings, although eroded, are clearly visible. This face is covered in engravings, drawn in all directions and comprising about ten small animals – none complete – as well as signs and zigzags. The finest figures include the head of an isard, 7.5 cm high, and that of an ibex (Fig. 77).

As we have seen in the preceding chapter, all parietal art is notoriously difficult to date, open-air examples especially so since they have no context whatsoever. However, there is nothing remotely similar to these figures in the Middle Stone Age and later art of eastern Spain, or in the schematic art of more recent periods; moreover, had any of these figures been found in a cave they would automatically have been accepted as fine specimens of Palaeolithic art. These sites have therefore proved the existence and survival of Ice Age open-air engraving (painting was doubtless also done outside, but is far less likely to have survived weathering in this way); and they have profound implications for our interpretation of the functions of Palaeolithic art as a whole. Palaeolithic parietal art is by no means limited to caves – they are merely the places where it has been best preserved.

Conclusion: portable versus parietal

In the past, portable art was sometimes seen merely as a ‘sketchbook’, a repetition or rehearsal in miniature for parietal work. Today, however, we see them as parallel and equally important art-forms, clearly part of the same world, but perhaps entirely different in function.

As we have seen, one basic difference between the two is that portable objects have been moved around, whereas parietal figures are precisely where the artist wanted them, whether on the floor, the walls or the ceiling of the cave. Another difference is that portable art, by definition, is composed of small, light objects, and the figures and motifs drawn on

Fig. 76 *The engraved rock on the mountainside at Fornols-Haut (Pyrénées-Orientales), altitude 750 m. The rock is 2.3 m high and 3.9 m wide at the base. (Photo D. Sacchi)*





them are of a corresponding scale; as we have seen, the size and shape of the stones, bones and antlers either determined the form of the design (lines of figures are common) or were chosen according to requirements.

The same applies to parietal art (especially where rock-shape was incorporated into a figure), but the height and width of the available surfaces meant freedom from many of these constraints; hence, parietal figures could be arranged in a variety of ways (individuals, clusters, panels), and simple lines of animals are rare. Moreover, there was no restriction on size: figures range from the tiny (such as those of Campôme) to the enormous (such as the great Labastide horse, almost 2 m long, for which scaffolding was required¹⁸²). The Hall of the Bulls at Lascaux has relatively small deer and horses, together with the huge bulls, over 5 m in length; but of course not all the figures on a panel of this type are necessarily of the same date, meaning or composition, and this is the fundamental problem to which we must now turn our attention.

Fig. 77 *Ibex head engraved on the rock at Fornols-Haut. Length: c 7.5 cm. (Photo D. Sacchi)*