

## USE OF PLANTS IN THE EUROPEAN PALAEOLITHIC: A REVIEW OF THE EVIDENCE

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The varied evidence available for the different uses to which plant materials were put during the European Palaeolithic is summarised. Actual remains of plants are more abundant than is generally realised, while the indirect clues provided by tools, human teeth and artistic depictions help to fill out the picture.

### INTRODUCTION

This paper summarises the evidence for the use of wood and other plant materials during the Palaeolithic of western Europe. It is not intended to be an exhaustive catalogue of examples, nor does it overlook the obvious fact that use of plants will have varied enormously through both space and time according to needs and availability. However, we hope to demonstrate that a surprisingly wide range of direct and indirect clues remain which can help to assess the role played by these perishable materials in the Palaeolithic.

### WOOD

The use of wooden posts in the construction of frames for dwellings (tents or houses) is well attested for the Palaeolithic (e.g., see Gábori-Csánk, 1976), and structures which seem to have included wood as a building material have been dated as early as the Lower Palaeolithic (e.g., Terra Amata, see de Lumley, 1969). Perhaps the best preserved example of a post-hole comes from the Mousterian site of Combe Grenal, layer G (Bordes 1961) where a plaster cast of the hole clearly shows that the post must have been a pointed wooden shaft, possibly one in a row of posts used in the construction of the shelter. It seems likely that such a wooden framework would have been covered over, and perhaps roofed, with skins and/or plant material. In those areas where numerous stone tools show the

presence of Man but where there are no signs of shelters, either natural or man-made, it must be assumed that some artificial shelter was constructed, either of vegetation, or of skins, stones or earth.

It is certain that scaffolding or ladders were used in some caves, where art work has been found high up on the walls, far beyond the reach of man: for example, the great polychrome horse of Labastide, in the Pyrenean Magdalenian (Omnès, 1982). Traces of scaffolding have been found at Lascaux, where clay-filled holes and ledges in the cave-walls would have formed suitable supports for beams (Delluc and Delluc, 1979a).

Wood-burning fires, known in Europe and Asia in association with occupation levels from the 'Mindel' glaciation onwards (Terra Amata, Choukoutien) would have provided heat, light, defence and a means of cooking food (Perlès, 1977; Cohen, 1977). Charcoal has been found in numerous Palaeolithic sites (e.g., see Leroi-Gourhan *et al.*, 1979), and anthracological analysis has proved a useful complement to palynology in that it identifies species which were definitely available to, and used by Man in particular periods.

Smoky wood fires may have been used for the preservation of meat and for the oil-tanning of hides (Geist, 1978). Fire may also have been used to control animals when hunting; to burn land deliberately to increase the productivity of plant resources (and thus to attract animals) (Cohen, 1977); and to fell trees or hollow-out treetrunks.

Charcoal was used for pigments, as has been shown by recent analysis of black paintings in the Magdalenian Salon Noir of the cave of Niaux (Brunet, 1981). The frequency of remains recovered from deep caves without signs of fire suggests the use of some form of portable light source, and this is confirmed by finds of stone 'lamps', possibly used to burn vegetable wicks in animal fat (Delluc and Delluc, 1979b; de Beaune-Romera, 1983), and by the fragments of wood, probably torches, found in caves such as Basua (Blanc, 1957) and Niaux (Perlès, 1977). No complete or unburned torches have yet been recovered.

Exposing a wooden tool to fire, to dry out the wood but not to char it, makes the tool harder and thus more efficient. This technique is used frequently by present-day hunter-gatherers (Coon, 1972). However, it is difficult to decide whether Palaeolithic tools were exposed to fire deliberately or by accident. The only Palaeolithic implement which is recorded as showing signs of deliberate fire-hardening is the Lehringen spear, reportedly 'well sharpened with stone knives and then hardened in the fire' (Movius, 1950). Burned wood has been recovered from Torralba, but it is not certain that a fire-hardened implement is present (Biberson, 1964). A broken and charred stick found at Krapina, Moravia, has been identified tentatively as a 'fire stick' used in the production of fire by the friction method, but this too cannot be proved.

Few wooden tools survive from the European Palaeolithic, but comparison with better preserved African sites, such as Kalambo Falls (e.g., see Fagan and van Noten, 1966), and with present-day hunter-gatherers indicates that this is undoubtedly the result of poor preservation rather than lack of use. Two clear examples of wooden spears have been recovered in Europe: the lower Palaeolithic spearhead from Clacton-on-Sea, Essex, and the middle Palaeolithic Lehringen spear. Both are made of yew (Oakley *et al.*, 1977). Biberson (1964) states that there may have been a Palaeolithic spear at Spicheren, Forbach, but in fact this site is now known to be a natural deposit of Villafranchian age (A. Thévenin, *pers. comm.*). Seventy-six substantial wooden fragments and thirty-one casts of wooden

objects have been recovered from Torralba/Ambrona and one of these has been tentatively identified as a spearhead (Biberson, *ibid.*). It was recovered 'between the bones of elephants' (as was the Lehringen spear) and has an asymmetrical pointed end.

There are no surviving palaeolithic bows, although there is a report of the destruction of a wooden bow of late Magdalenian date during excavations at Teyjat, Dordogne (Coles and Higgs, 1969: p. 240). Two wooden fragments recovered from the Ahrensburgian site of Stellmoor (Rozoy, 1978) have been identified as possible bows, and several of the accompanying pieces of wood, with socketed or bifurcated bases, are probably projectiles or arrows. On some of them there is a clear nock, which gives support to the idea that they were arrow-shafts, while one of the long pieces may be a spear. It seems certain, therefore, that the bow was in use in northern Europe by at least the Epipalaeolithic.

Bone spearthrowers have been found in some Palaeolithic sites, and it is highly probable that there were also wooden specimens, which have vanished. Presumably they were used to launch wooden spears. Discoveries of bone hafts, some still containing stone tools (Jelinek, 1975), and of stone and bone tools with bevelled, split or tanged bases suggest that hafting in wood was common in the Upper Palaeolithic (Bordaz, 1971). Unfortunately, no definite wooden hafts have been preserved, although some well preserved wood 'specially shaped and used for hafting stone tools' has been recovered from Königsau, E. Germany (Mania and Toepfer, 1973); in 1894 Worthington Smith reported finding a handaxe at Bedford with 'the butt end when first found wrapped round with herbaceous stems, probably rushes, as if for protection of the hand', which unfortunately disintegrated soon after discovery. Some of the flint bladelets from the late Magdalenian site of Duruthy, France, have shown signs of a gum, presumably used to fit the blades into some form of haft (Arambourou and Thibault, 1975).

Digging sticks have been recovered in fairly large numbers from Palaeolithic sites in Africa (Cohen, 1977; Fagan and van Noten, 1966), and it seems quite likely that they were known and used in Europe, presumably to gather vegetable matter. The only European site to have yielded what may be remains of digging sticks is Torralba, where nine pieces of wood, all showing signs of being worked with a stone tool, have been found in the area around the suspected spear. At least one shows signs of being sawn, and the others show a form of polish (Biberson, 1964). Striations in three Aurignacian post-holes at Cueva Morin, N. Spain, have been interpreted as marks made by a digging stick (Freeman and Gonzalez-Echegaray, 1970).

Some of the enigmatic symbols found in Palaeolithic parietal art have been interpreted as wooden animal traps (Lips, 1949), though this idea is impossible to prove, especially as one has no certainty that the 'traps' are contemporary with the depictions of animals with which they are 'associated'.

There is little evidence for other uses of wood. A spherical imprint in sand at Terra Amata, filled with a whitish substance, has been interpreted as the remains of a wooden bowl (de Lumley, 1969). Wooden beads have been recovered from a few sites, such as Gönnersdorf (Brunnacker, 1978), and, together with finds of bone needles, they could be indicative of the use of some form of thread (of animal or vegetable matter).

## FIBRES AND FLOWERS

Less evidence exists for the use of non-woody plants: for example, the only surviving Palaeolithic rope comes from Lascaux, but it has not been possible to determine the material used in its construction (Delluc and Delluc, 1979a). Oakley (1962) has suggested that a dried fungus would have been used as a tinder, since fragments of *Fomes fomentarius* have been found in the Mousterian site of Salzgitter-Lebenstedt, Germany.

Pollen grains are generally the best preserved part of a plant, but most of those found in archaeological sites are present through natural causes; they may indicate which species were available, but they tell us nothing of the uses to which they were put. Only where there is a substantial mass of pollen present in an area occupied by man is it plausible that its presence is not accidental. Thus there is a certain amount of evidence suggesting that plants were used as a form of bedding at Tautavel (France, Lower Palaeolithic), at Franchthi (Greece, Upper Palaeolithic), and the Mas d'Azil (France, Azilian) (see Hansen and Renfrew, 1978; Boone and Renault-Miskovsky, 1976). Other examples exist, such as the Magdalenian decorated cave of Fontanet (Ariège), where armfuls of gramineae seem to have been carried in by man (Leroi-Gourhan, 1980). The best example, however, is Lascaux, where pollen was discovered in a dense mass, some having the form of the anther still preserved (Leroi-Gourhan and Girard, 1979). Analysis has shown that they were mainly grasses. The heaps of pollen are found in several levels throughout the Magdalenian phase, especially in the passage where the Magdalenians would have needed to sit down when decorating the walls.

Although a digression outside Europe, it is worth remembering that a Neanderthal grave in Shanidar cave, Iraq, contained pollen traces of eight different types of flower, presumably part of a wreath (Solecki, 1971; Leroi-Gourhan, 1968). The flowers were mainly small, brightly-coloured varieties, possibly woven into the branches of a shrub. Solecki has pointed out that most of the flowers are known to have herbal properties, and are used by the people of the region today. This may be a coincidence, but it is highly probable that the people of the Palaeolithic knew something of these uses, and perhaps others of which we have no knowledge. Some idea of the range of uses to which plants can be put is given in Appendix 2; many of them have been well presented in a fictional Palaeolithic context by Auel (1980, 1983).

## ART

To assess the importance of flora from a study of the surviving art is impossible without an understanding of the mind of the artist. The dominant emphasis is upon animals, although there are a few fairly definite representations of plants, while many are open to a variety of interpretations. They may be harpoons, feathers, abstract symbols, or schematised plants. Leroi-Gourhan (1965) has suggested that many of these designs are symbolic of 'maleness', while more recently Marshack (1972) has suggested that some should be regarded as stylised seasonal indicators with a floral basis. Of course, some representations of plants may have gone unrecognised in Palaeolithic iconography. A compilation of the most probable depictions, both parietal and portable, is presented in Appendix 1.

## TOOLS

Microwear analysis is a relatively new technique for examining the polishes, striations, etc., which remain on a stone tool after its use. There are limits on the tools which can be analysed by present methods, but, given suitable pieces to work from, it is possible to distinguish between six broad categories of polish: wood, bone, hide, meat, antler and non-woody plant. The interpretation of the results obtained by this method can be a great help in understanding the function of the implements. For example, Keeley's analysis of implements from Clacton and Hoxne has shown that there was a considerable amount of woodworking at both sites, with evidence for the sawing and cutting of wood (Keeley, 1977). Hoxne also gave evidence for the cutting or slicing of a non-woody plant material. Similar results have been obtained from the analysis of other Palaeolithic tools recovered in Europe (e.g., Pant, 1979).

It is not the function of this paper to discuss microwear analysis in any detail. However, the importance of the results is obvious, and the technique may lead to a complete rethinking about the role of certain stone tools. Comparatively little analysis has been carried out using the scanning electron microscope, although Anderson (1980) has, for example, been able to identify a phytolith attached to an area of sickle gloss on a Mousterian scraper from Combe Grenal.

It is unfortunate that the collecting of plant-food does not really require any specialised equipment. Grinding-stones/pestles and mortars have been recovered from a number of Palaeolithic sites (Kraybill, 1977) but their presence need not indicate the grinding of plant food: there is no reason why they may not have been used for the grinding of meat, bones, cartilage or ochre.

## FRUITS AND NUTS

Quantities of acorns, nuts and perforated fruit-stones were found in Magdalenian/Azilian contexts by a series of excavators in a number of Pyrenean caves (see Bahn, 1979 and *in press* a and b); although they were from apparently undisturbed deposits, under stalagmite. Breuil (in Déchelette, 1908) believed that all such finds were attributable to the activity of rodents. Piette (1896b) and others insisted that the perforations had been made by flints, and that there were no teeth marks. Piette also speculated that the fruit-stones had been opened in order to make drinks with the contents, whereas Briguel (1911) argued that the perforated stones made excellent whistles.

Seeds have been found preserved in a number of sites, including the lower Palaeolithic cave of Tautavel. A special mention should be made of the pioneering Frossards who, in 1870, retrieved carbonised raspberry and strawberry seeds from the Magdalenian sediments of the cave of Aurensan (France) by a crude but effective method of flotation (Frossard and Frossard, 1880).

## CEREALS

Piette (1896a) several times mentioned a find of a small heap of (what seemed to him to

be) wheat grains in the Azilian layer of the Mas d'Azil (see Bahn, 1973 and *in press* a and b), and his faith in a Palaeolithic knowledge of cereals was strengthened by several examples of cereal 'ears' in Magdalenian portable art. Two of the three reported specimens were never published, and are now lost. The example from Lourdes is well known, but open to a number of interpretations (see Appendix 1; and Schiemann, 1940a).

Claims for Palaeolithic cereals continued to occur sporadically: for example, grains in a 'Palaeolithic breccia' in a cave at Engis in Belgium (Doudou, 1904); and Magdalenian grains and grinders mentioned by Baudouin (1932a, b). The best known claims were based on finds of carbonised grains in bird-pellets in a number of Austrian caves, most notably that of Merkenstein (Mühlhofer, 1935, 1940; von Stokar, 1939, 1942; Obermaier, 1939: p. 128) in apparently undisturbed ancient deposits. These claims were vigorously debated, with Schiemann (1940a, b) arguing that the deposits were disturbed and the grains too domesticated to be ancient. At present it is Schiemann's opinion, that the finds represent intrusive materials from the castle above the cave, which prevails (W. Angeli, *pers. comm.*).

It was difficult to take such finds seriously for many years. Now, however, the finds of wild oats and barley in levels dated to 10,000 BC at Franchthi cave, Greece (Hansen and Renfrew, 1978) and that of cultivated wheat and barley in the Egyptian Upper Palaeolithic (Wendorf *et al.*, 1979 — but see *New Scientist* 21/7/83, p. 182) may well invite a more open-minded approach, especially as Couteaux (1977) claims to have found cereal pollen in many French Palaeolithic sites from the Acheulian onwards!

Certainly, in view of the evidence of 'bedding' made of gramineae, it is highly probable that Palaeolithic man made abundant use of whatever wild grasses were available to him: In the late Magdalenian of Duruthy (S. France), for example, a great number of backed bladelets display a kind of 'sickle sheen' which has led the excavators to a hypothesis of intensive gathering of wild gramineae (Arambourou and Thibault 1975).

## HUMAN REMAINS

It is clear from the animal bones at countless sites that meat was a staple diet of Palaeolithic man in Europe (Saffirio, 1975). However, it is likely that, in some periods, plants were also of great importance to man, and indeed may have constituted the bulk of the food consumed, in terms of weight. Lack of preservation prevents a more accurate assessment of the relative contributions to diet of meat and plants, and one must turn to human remains for clues here.

Work on the teeth of Palaeolithic man has revealed features such as scratches and surface wear which may have been caused by plant food in the diet, but which could also have been caused by an occupational use of the teeth (stripping bark, chewing leather, etc.) or by small pieces of bone or grit in the food. Puech has made a study confined to the lingual surfaces of the teeth, as these surfaces are somewhat inaccessible, and hence less likely to bear marks from anything other than food (Puech, 1976). He believes that there was very little plant food in the diet of Neanderthal Man, but that the amount of plant food eaten increased throughout the Palaeolithic. Certainly, in southern France, the teeth of the Magdalenians — even of small children — are very worn (see Bahn, *in press*). However,

additional experiments and comparative studies are needed to accurately determine the relationship between groove morphology and dietary factors, including the cooking of food (Ryan, 1979).

The study of coprolites, which has proved extremely useful in the New World, has been unsatisfactory in the Old owing to the lack of well preserved specimens. Samples obtained from Terra Amata have been examined (Trevor-Deutsch and Bryant, 1978; Bryant and Williams-Dean, 1978) but there is some doubt about their human origin: Hall (quoted by Trevor-Deutsch and Bryant) states:

‘There is absolutely nothing about these specimens that suggests that they are fossilised excrement’. Four samples from Lazaret were found to contain bone, hair and charcoal, but no plant matter (Callen, 1963).

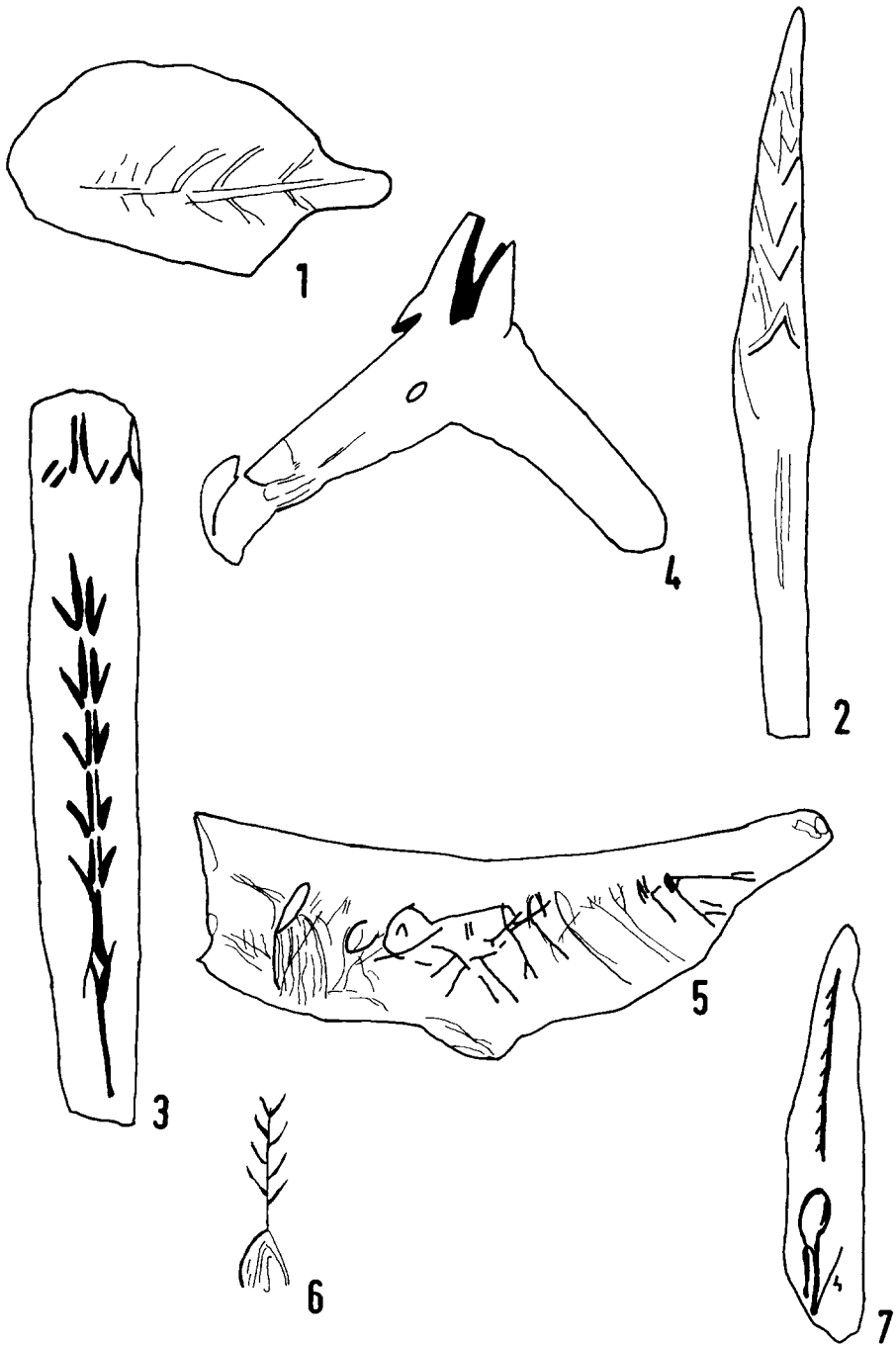
## CONCLUSIONS

It has been shown that there is evidence for the use of wood in the construction of shelters, scaffolding, and in the manufacture of certain tools. Presumably there were many other uses of wood which have left no trace. Differential preservation tends to give the impression that wood was the most commonly-used plant material; but there is a certain amount of evidence for the use of non-woody material for bedding. It is very difficult to determine what was eaten during the Palaeolithic; the amount of plant food in the diet can probably not be estimated with any accuracy. In any case, it will have varied enormously according to environment, season and latitude, as shown by ethnographic studies (Lee and Devore, 1968).

Despite all the problems of preservation, it is clear from the variety of evidence reviewed above that plants of many different types were used throughout the European Palaeolithic for a wide variety of purposes. Ethnography and microwear analysis suggest that many stone tools will have been used in the procurement and working of wood; and in view of the surviving objects in wood, it could be argued that differential preservation has forced us to concentrate on the less important aspects of the period’s technology. In a sense, therefore, the Palaeolithic might more accurately be termed the ‘Palaeoxylic’, or ‘Old Wood Age’.

## ACKNOWLEDGEMENT

The assistance of Dr. J. Taylor of the University of Liverpool is gratefully acknowledged.





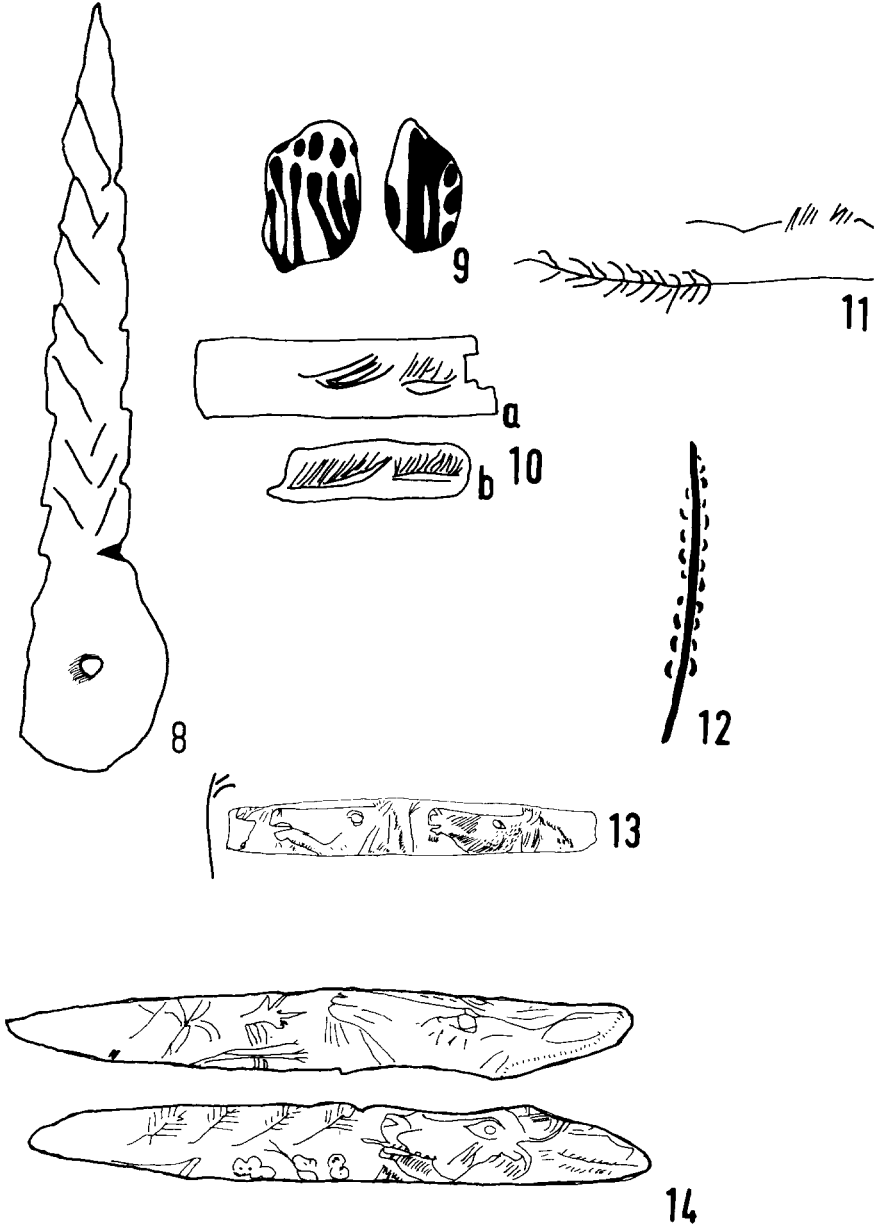
## APPENDIX 1

### A Compilation of Palaeolithic Floral Representations Identified in Published Works

#### FRANCE

##### *Grotte du Mas d'Azil, Ariège*

1. An engraved piece of bone showing a central spine and side 'branches'.  
Delcourt-Vlaeminck, 1975, 83, Fig. 32.
2. An engraved and cut bone with a very flat surface.  
Delcourt-Vlaeminck, 1975, 74, Fig. 6.
3. An engraved reindeer antler.
  - (1) Chollot-Varagnac, 1980, 132, Fig. 47.023.
  - (2) Delcourt-Vlaeminck, 1975, 76, Fig. 9.
4. A carved reindeer antler which shows a head (of a horse?) which appears to have something associated with its mouth. It has been described as a horse 'grazing on foliage' (Marshack) although this is rather difficult to see.  
Marshack, 1972, 73, Fig. 3.
5. This is one of many fragments of engraved shoulder blade. It has been identified as a man in the midst of seven stylised reeds or rushes. There may be an animal to the left of the man but this part has been broken off.
  - (1) Delcourt-Vlaeminck, 1975, 82, Fig. 26.
  - (2) Pales, 1970, 86.
  - (3) Péquart and Péquart, 1960–63, 152, Fig. 117.
6. An engraving on reindeer antler which shows a tree or plant with its roots. Leroi-Gourhan believes that it shows an oval female symbol and a branching male symbol.
  - (1) Chollot-Varagnac, 1980, 122, Fig. 46.609.
  - (2) Delcourt-Vlaeminck, 1975, 85, Fig. 39.
  - (3) Piette, 1896, 410, Fig. 59.
7. Engraved reindeer antler which shows two vertical lines surmounted by a circle and another line/branch. This is a doubtful floral representation as it has also been identified as a fish and a stylised bird.
  - (1) Chollot-Varagnac, 1980, 188, Fig. 47.105.
  - (2) Delcourt-Vlaeminck, 1975, 77, Fig. 12.
  - (3) Piette, 1904, 47, Fig. 73.



8. A piece of reindeer antler with a rounded, flattened base bearing a rough perforation. There are light grooves on the flat surface, deeper incisions on the edges.  
Delcourt-Vlaeminck, 1975, 72, Fig. 1.
9. Two painted pebbles resembling rushes or reeds.  
Piette, 1896, 31, Fig. 63, 64.
10. Piette believes the engraving to show stylised rushes coming out of water.
  - (1) Chollot-Varagnac, 1980, 138, Fig. 47, 742.
  - (2) Delcourt-Vlaeminck, 1975, 83, Fig. 27, 28.
  - (3) Péquart, 1960, 151, Fig. 116.

*Grotte de Niaux, Ariège*

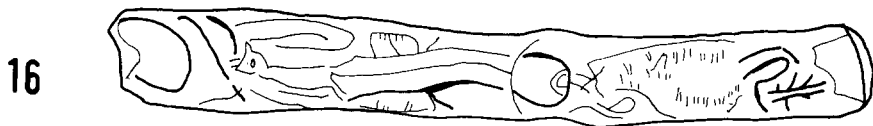
11. A wall painting showing the head of a horse and a long barbed sign parallel to the back. There are four other similar barbed signs in this cave. Marshack believes the signs to be representations of plants, but Leroi-Gourhan (1965) believes them to be 'male symbols' associated with the horses.
  - (1) Delcourt-Vlaeminck, 1975, 90, Fig. 80.
  - (2) Marshack, 1972, 66.

*Tuc d'Audoubert, Ariège*

12. This parietal painted sign was found on a wall associated with a 'vulva'. It shows a central rib with semi-circles which may represent leaves or branches.  
Marshack, 1972, 324, Fig. 188.

*Grotte de la Vache, Ariège*

13. A fragment of engraved rib which appears to show a branch or twig separating two horse heads.  
Marshack, 1972, 225, Fig. 113(a).
14. An engraved bone which may be a fragment of a knife although no signs of use have been found. Marshack has examined both sides using a microscope. On one side he has identified a doe, three wavy lines, (water?), three flowering plants, and the head of an ibex. He believes that this side represents 'spring'. On the reverse he has identified the head of a bison with an open mouth (which he believes shows the mating season), four floral representations (branches of conifers?), one plant and three seeds or nuts. He believes that the two sides represent the opposite seasons of spring and autumn.
  - (1) Delcourt-Vlaeminck, 1975, 72, Fig. 8.
  - (2) Marshack, 1972, 174, Fig. 67.



*Abri du Château, Les Eyzies, Dordogne*

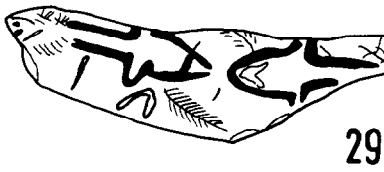
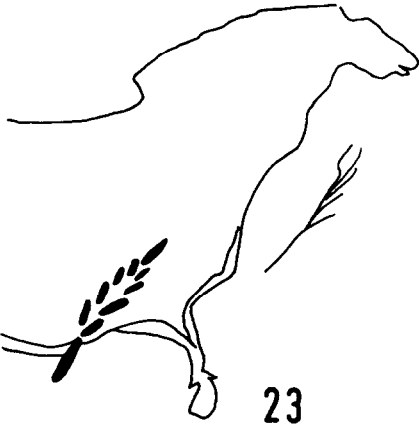
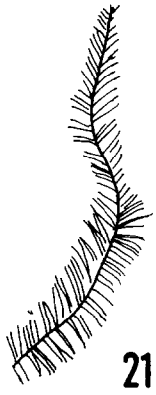
15. An engraved rib which appears to show schematic people carrying branches over their shoulders near two trees. Two more 'trees' are shown above the heads of the people. De Sonneville Bordes (quoted in Delcourt-Vlaeminck) suggests that they may represent either willows or alder.
  - (1) Delcourt-Vlaeminck, 1975, 80, Fig. 20.
  - (2) Marshack, 1972, 203, Fig. 94(b).

*La Madeleine, Dordogne*

16. An engraved bone which shows both the head of an animal and a flower in the form of a phallus. Marshack, 1972, 342, Fig. 201(b).
17. An engraved bone baton originally drawn by Breuil who did not reproduce the 'harpoon' correctly. Marshack has examined the piece using a microscope and has discovered that the harpoon is more like a twig or a branch. Marshack, 1972, 209, Fig. 97.

*Lascaux, Dordogne*

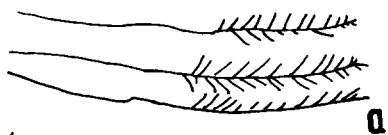
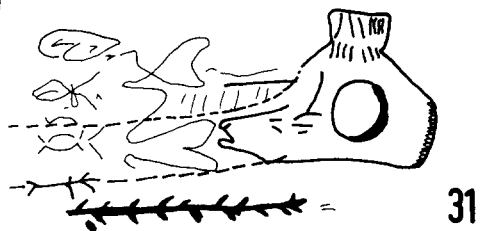
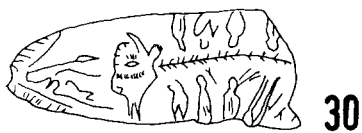
18. Two signs found engraved above the head of a horse in a multitude of engravings. They show a central rib and side 'branches'. Leroi-Gourhan and Allain, 1979, p. 287.
19. A wall painting showing an enigmatic sign close to the head of a bull.
  - (1) Delcourt-Vlaeminck, 1975, 89, Fig. 47.
  - (2) Marshack, 1972, 223.
  - (3) Windels, 1948, 67, Fig. 26.
20. A large wall painting situated near the 'Chinese Horse'. There appear to be simplified branches above an enormous cow. Marshack, 1972, 211, Fig. 106, p. 223.



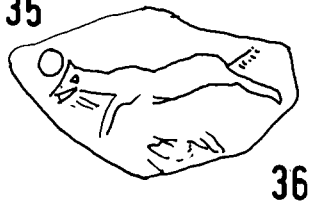
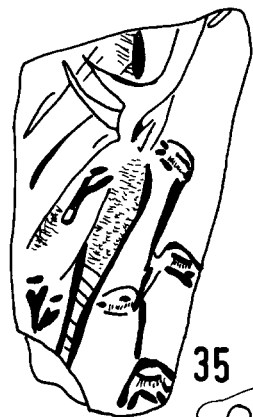
21. An engraving found on the wall of a passage which appears to show a long creeper or feather.  
Windels, 1948, Fig. 5.3.
22. This wall painting has been thought to show a bird-headed man with spear and either a spear thrower or a bird sitting on a stick. However, Marshack has suggested that the 'spear' does not represent any known type of spear or spear thrower. He suggests that this instrument should be interpreted as a branch.  
Marshack, 1972, 281, 283.
23. A yellow horse known as the 'Chinese Horse' associated with shapes that have been identified as harpoons. The shapes may be floral representations as the harpoon does not appear in this cave until Style 4. However, it is possible that these are either very early harpoon representations or that they have been added at a later date.
  - (1) Delcourt-Vlaeminck, 1975, 89, Fig. 48.
  - (2) Marshack, 1972, 220, Fig. 105.
  - (3) Windels, 1948, 67, Figs 42, 43.
24. A mysterious sign which may be interpreted as a flower very close to the feet of a horse. Both are painted on a wall.
  - (1) Delcourt-Vlaeminck, 1975, 88, Fig. 46.
  - (2) Marshack, 1972, 220.
  - (3) Windels, 1948, 80, Fig. 28.

*Laugerie Basse, Les Eyzies, Dordogne*

25. Schematic design of a central rib with side branches, engraved on bone.  
Delcourt-Vlaeminck, 1975, 79, Fig. 19.
26. An engraved bone with parallel incisions on either side of a central rib.  
Delcourt-Vlaeminck, 1975, 79, Fig. 18.
27. This reindeer antler has been described as being decorated to represent bark. If this is true it is very unusual, but it is very difficult to see from the line drawing.  
Delcourt-Vlaeminck, 1975, 85, Fig. 38.
28. An engraved bone which appears to show the head of an animal and a flower in full bloom.
  - (1) Breuil, 1937, 49, Fig. 29, No. 9.
  - (2) Marshack, 1972, 175, Fig. 69.
29. Feathers? or plants? engraved on bone. Stylized fish may also be seen.  
Marshack, 1972, 201, Fig. 93b.



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*Grotte de Raymondien, Chancelade, Dordogne*

30. An engraved bone plaque showing a dead bison with the vertebral column visible. Seven stylized people are shown carrying branches and other lines which may represent twigs or branches appear.
- (1) Delcourt-Vlaeminck, 1975, 81, Fig. 22.
  - (2) Marshack, 1972, 207, Fig. 96b.
31. A bone baton which has engravings of animals and fish and schematic plants (or harpoons?). There is also what appears to be a schematized bud or flower.
- (1) Breuil, 1937, 47, Fig. 28.
  - (2) Marshack, 1972, 213.

*Montgaudier, Charente*

32. An engraved, pierced baton made from reindeer antler. The original drawing of the baton, made by Breuil, failed to identify all the details which have since been discovered by Marshack using a microscope. Three plant-like objects which Breuil had identified as harpoons are identified by Marshack as some form of aquatic plant, as the barbs appear to go the wrong way to be used as a harpoon and their great length would have made them unsuitable. (a) Marshack has also discovered what looks like a flower bud showing sepals, leaves and petals (b) situated above a large fish and a little shoot or root (c) near to a stylized ibex head. These are not visible to the naked eye.
- (1) Delcourt-Vlaeminck, 1975, 77, Fig. 11.
  - (2) Marshack, 1972, 170–173, Figs 60–65.

*Grotte du Placard, Charente, France*

33. A deeply engraved bone which may show schematic flowers.
- Breuil, 1937, 30, Fig. 21, No. 5.
34. An engraved bone which shows three little stars which may be schematic flowers.
- Delcourt-Vlaeminck, 1975, 84, Fig. 33.

*Fontarnaud, Lugasson, Gironde*

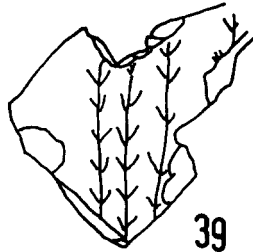
35. Marshack has examined this engraved bone using a microscope and has identified flowers and lines between the antlers of a reindeer which may represent feathers or branches. However, it is difficult to recognise much from the line drawing which has been published.
- Marshack, 1972, 175, Fig. 68b.

*Grotte de Gourdan, Haute-Garonne*

36. An engraving on stone which has been described as a wolf bounding above lines which may represent grass.
- Delcourt-Vlaeminck, 1975, 86, Fig. 43.
37. Engraving showing the head of a doe facing a 'V' shape which has been identified as some form of foliage or vegetation.
- (1) Chollot-Varagnac, 1980, 350, Fig. 47, 349.
  - (2) Delcourt-Vlaeminck, 1975, 84, Fig. 34.



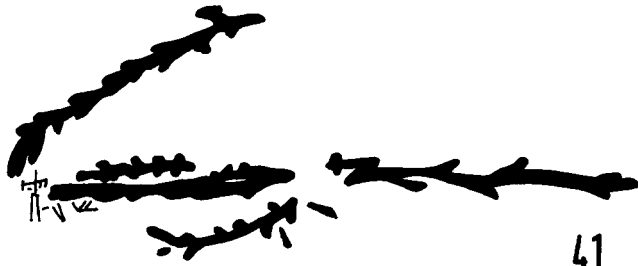
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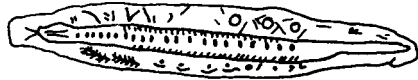
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38. An engraved pebble which shows a stalk and two leaves.  
Delcourt-Vlaeminck, 1975, 86, Fig. 40.
39. An engraving on a pebble showing three or (possibly) four stalks with side 'branches' or leaves.  
(1) Chollot-Varagnac, 1980, 114, Fig. 47, 185.  
(2) Delcourt-Vlaeminck, 1975, 87, Fig. 45.
40. An engraving on a pebble showing a plant with leaves and a flower at the top, possibly a tulip.  
(1) Chollot-Varagnac, 1980.  
(2) Delcourt-Vlaeminck, 1975, 87, Fig. 44.  
(3) Piette, 1896a, 47, Fig. 72.

*Grotte de Marsoulas, Haute-Garonne*

41. A barbed sign found painted on the wall of the cave. There are other such signs in the same cave. They may represent some plant form, perhaps algae?  
(1) Delcourt-Vlaeminck, 1975, 91, Fig. 51.  
(2) Marshack, 1972, 222, Fig. 107a.
42. Bone 'point' with unequal grooves on one surface.  
Delcourt-Vlaeminck, 1975, 72, Fig. 2.
43. An engraving on bone, star shaped, which may represent schematic flowers.  
Delcourt-Vlaeminck, 1975, 84, Fig. 35.

*Grotte de Lortet, Hautes-Pyrénées*

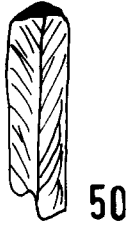
44. The engravings on this antler tine have been identified by Marshack using a microscope. By the head of a serpent there appear to be two plant forms. Marshack also identifies some young birds, portrayed in a schematic way. He believes that this piece represents spring.  
(1) Clot, 1973, 94, Fig. 120.  
(2) Marshack, 1972, 224, Fig. 109b.
45. An engraved bone which shows a number of animals and some small vertical engravings which suggest grass.  
Delcourt-Vlaeminck, 1975, 81, Fig. 24.
46. A very clearly engraved piece of mammoth ivory, showing a central line and side 'branches'.  
(1) Chollot-Varagnac, 1980, 114, Fig. 48, 196.  
(2) Clot, 1973, 95.  
(3) Delcourt-Vlaeminck, 1975, 78, Fig. 13

*Lourdes, Hautes-Pyrénées*

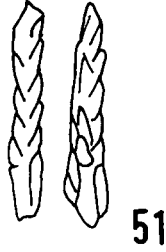
47. An engraved pebble showing little stars which may be schematic flowers.  
(1) Clot, 1973, 94, Fig. 124.  
(2) Delcourt-Vlaeminck, 1975, 86, Fig. 42.  
(3) Omnès *et al.*, 1980, 66.
48. A sculptured piece of reindeer antler with an unusual cross-section.  
Delcourt-Vlaeminck, 1975, 74, Fig. 5.



49



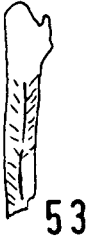
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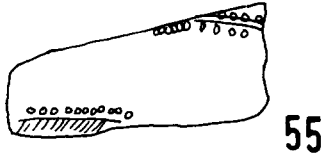
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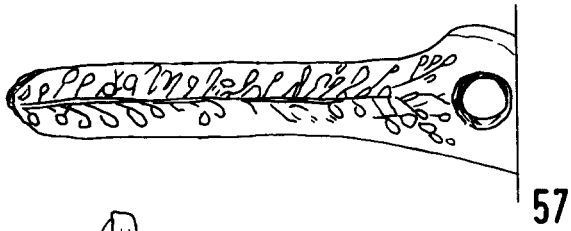
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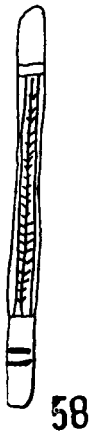
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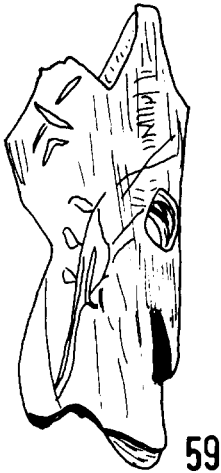
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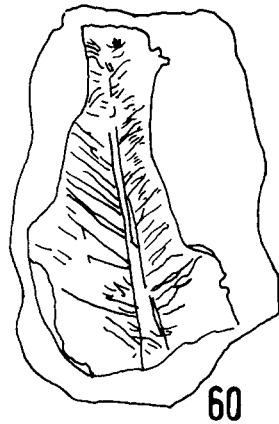
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49. Fragment of engraved reindeer antler showing an engraved central line and side 'branches'. Dr. Hugh McAlister (*Pers. Comm.*, 1981) has suggested that this may represent *Thymus vulgaris*.  
Delcourt-Vlaeminck, 1975, 73, Fig. 31.
50. A central rib and side 'branches' engraved on a piece of bone.  
Omnes *et al.*, 1980, 66.
51. A carved piece of reindeer antler, which has been broken.  
(1) Chollot-Varagnac, 1980, 108, Fig. 55, 349.  
(2) Delcourt-Vlaeminck, 1975, 7, Fig. 4.  
(3) Marshack, 1972, 262, Fig. 137a.
52. An engraving on bone, which appears to show branches and leaves.  
(1) Clot, 1973, 94, Fig. 122, No. 2.  
(2) Delcourt-Vlaeminck, 1975, 78, Fig. 14.  
(3) Omnès *et al.*, 1980, 66.
53. Engraving of central line and side 'branches' on a piece of bird bone.  
Delcourt-Vlaeminck, 1975, 83, Fig. 29.
54. A central rounded rib and parallel side 'branches' engraved on reindeer antler.  
(1) Clot, 1973, 94, Fig. 122, No. 3.  
(2) Delcourt-Vlaeminck, 1975, 84, Fig. 36.  
(3) Omnès *et al.*, 1980, 66.
55. An engraving on bone which appears to show a central rib with side 'branches' along one edge and small circles (fruit?) along the other.  
(1) Delcourt-Vlaeminck, 1975, 88, Fig. 30.  
(2) Omnès *et al.*, 1980, 66.
56. A pebble with a deep engraving of a leaf.  
(1) Clot, 1973, 94, Fig. 122, No. 5.  
(2) Delcourt-Vlaeminck, 1975, 85, Fig. 41.

*La Grotte du Veyrier, Haute-Savoie*

57. A reindeer antler engraved with a stalk bearing juxtaposed leaves. The stalk narrows towards the perforation.  
(1) Breuil, 1937, 68, Fig. 41.  
(2) Breuil and St-Périer, 1927, 103, Fig. 46.  
(3) Delcourt-Vlaeminck, 1975, 75, Fig. 7.

*Grotte de Saint-Marcel, Indre*

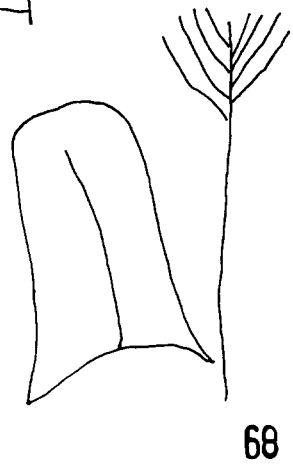
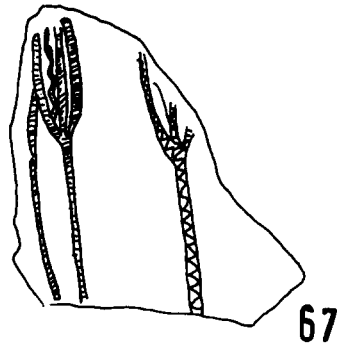
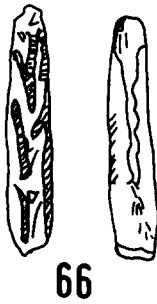
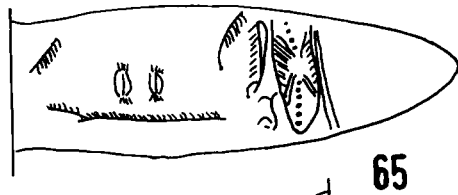
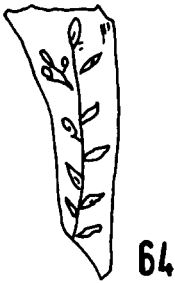
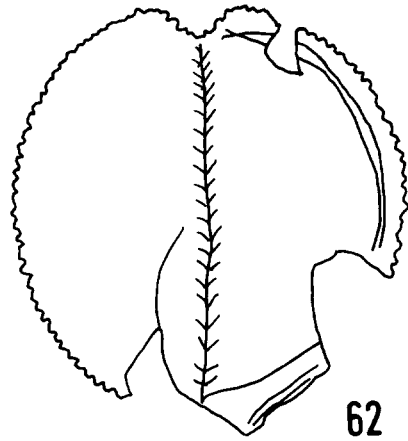
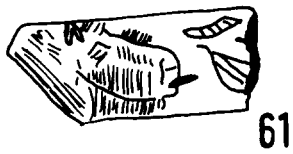
58. A bone engraving showing a central rib with juxtaposed 'branches'.  
Delcourt-Vlaeminck, 1975, 81, Fig. 23.

*Duruthy, Landes*

59. A plant-like engraving.  
Arambourou (*Pers. Comm.*), 1981.

*L'Abri Durif à Enval, Vic-le-Comte, Puy-de-Dôme*

60. Engraving upon a pebble.  
Pales, 1979, 133, Fig. 32.



*Arudy, Pyrénées-Atlantiques*

61. An engraving on bone showing the head of an animal and an oval shaped leaf.  
Delcourt-Vlaeminck, 1975, 78, Fig. 16.

*Roc de Courbet, Bruniquel, Tarn-et-Garonne*

62. A round piece of bone with denticulated edges, divided in two by a schematic plant? A similar piece has been recovered from Mas d'Azil, and a fragment of another from Gourdan.  
(1) Chollot-Varagnac, 1980, 114, Fig. 8.  
(2) Delcourt-Vlaeminck, 1975, 80, Fig. 21.
63. These engravings on bone are not easy to see with the naked eye and Marshack used a microscope to examine them. Graziosi (quoted in Marshack) believes that the 'trees' are stylized human forms.  
Marshack, 1972, 201, Fig. 93b.

*Grotte du Trilobite, Yonne*

64. An engraved reindeer bone which shows a stalk with leaves and a small side branch.  
Delcourt-Vlaeminck, 1975, 79, Fig. 17.

## CZECHOSLOVAKIA

*Pekarna, Moravia*

65. A bone ceremonial/symbolic knife which has been in contact with ochre; one small fish, vegetable forms and perhaps insects or nymphs have been identified. The reverse shows a horse.  
Marshack, 1972, 263, Fig. 136.
66. One side of this bone fragment shows a serpent-like form.  
Marshack, 1972, Fig. 262.

## ITALY

*Polesini*

67. Fragment of bone, engraved on two faces. Examined by microscope.  
Marshack, 1969, 262, Fig. 32.

## SPAIN

*El Castillo Cave, Santander*

68. A black sign painted on a wall near to three red 'vulvae'.  
(1) Delcourt-Vlaeminck, 1975, 90, Fig. 49.  
(2) Marshack, 1972, 326–327, Fig. 187.

## APPENDIX 2

### A Compendium of Possible uses of Plant Material During The Palaeolithic Excluding Food and Drink, Obtained from the Ethnographic Record

#### (1) WOOD

It is fairly difficult to make planks of wood without the use of metal tools — although it is not impossible, planks can be formed by using wedges to split the wood, but the plank produced is rarely even and may need considerable work with an adze-like instrument. Carving, drilling, weaving, plaiting and bending may have proved easier to achieve in the Palaeolithic.

##### *General Uses*

- \* Constructions e.g. dwellings,  
fences and hurdles,  
scaffolding,  
thatching etc.
- \* Fire making by the friction method.
- \* Hafting — ethnography suggests the use of timbers such as elm which do not cleave easily.
- \* Implements e.g. weapons (bows, clubs, spears etc.)  
utensils (bowls, digging sticks etc.)
- Ladders
- \* Torches — especially *Juniperus* sp. which burns with a bright light but little smoke.
- Transport e.g. sledges — not necessarily snow sledges,  
boats — canoes, coracles etc.  
shoes etc.

##### *Uses of Bark*

Bark is used widely for its waterproof properties.  
Clothing — as used by Lapps.  
Roofing.  
Tanning — especially *Quercus* sp.  
Containers — especially *Betula* sp.

##### *Uses of Branches and Twigs*

Brushes — for use in parietal art and for personal use.  
\* Rope manufacture — especially *Betula*, *Pinus* and *Salix* sp.  
Weaving — baskets, mats etc. — especially *Salix* sp.

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\* Indicates a use mentioned in the text.



*Uses of Leaves*

- Containers — especially for food, when they are often cooked to become edible containers.
- Dyes — also used for tattooing by California Indians.
- \* Tinder, when dried.

*Uses of Resin/Sap*

- Binding medium for pigments — as used by Anadaman Islanders.
- Glue — may also be used to trap birds, similar to bird lime.
- Mastic for hafting — or to form the haft.

**(2) NON WOODY PLANTS**

Unfortunately, the use of non-woody plant material tends to leave little trace in the archaeological record.

*General Uses*

- \* Aesthetics — such as the Shanidar ‘wreath’ of flowers.
- \* Bedding and seating.
- Clothing.
- Fodder to attract animals.
- \* Fuel.
- \* Threads and ropes e.g. bridges.
- nets and traps.
- Scent — *Juniperus* and *Pinus* are still widely used for this purpose.
- Thatching and roofing.
- Weaving and basketry.
- \* Wicks.

**(3) LICHENS AND MOSSES**

- Absorbent pads for use in painting, babies’ nappies etc.
- Dye.
- \* Tinder — especially *Fomes fomentarius* as recovered from Palaeolithic sites.
- \* Wicks

**(4) POSSIBLE USES OF FIRE**

- \* Animal management — used to both lure and dazzle animals.
- \* Cooking.
- Cremations.
- \* Fire hardening of wooden implements.
- Flint working.
- \* Heat.
- \* Land clearance — to improve both hunting and plant growth.
- \* Light — torches, lamps, etc.
- \* Meat smoking and preserving — especially *Juniperus* sp. (It is likely that the smoke would also keep insects away.)
- \* Tree felling.
- \* Woodworking.

## (5) MEDICINES

Many plants have different medicinal uses (e.g. elder will act as a purgative, an ointment for bruises, an eye lotion, fly repellent etc.). Therefore only a few common uses (of common plants) are given below. For further examples consult Mabey, 1977.

- Antibiotic e.g. common mould.
- Antiseptic e.g. conifer resin, iris root, hollyhock, ash.
- Appetiser and laxative e.g. dandelion.
- Hallucinogen e.g. datura (chewed by Chukchi), agaric.
- Insecticide e.g. horsetail, fern, alder.
- Painkiller e.g. willow bark.
- Poison — for both men and animals — e.g. yew.
- Abortives and contraceptives e.g. mistletoe, ergot, golden thread.

## (6) FOOD AND DRINK

The possible uses of plants as food and drink are too numerous to list in detail. It should be remembered that berries, fruits, nuts, tubers, roots, bulbs, seeds, vegetables and greens would all have been available for human consumption. The production of different flavoured drinks, such as herb teas or fruit juices would also have been possible.

It must be assumed that there were some uses of plants that we know nothing about.

## REFERENCES

- Anderson, P. (1980). A testimony of prehistoric tasks; diagnostic residues on stone tool working edges. *World Archaeology*, **12**, 181–194.
- Arambourou, R. and Thibault, C. (1975). Les recherches de préhistoire dans les Landes en 1974. *Bulletin de la Société Borda*, **99**, 135–143.
- Auel, J.M. (1980). *The Clan of the Cave Bear*. London.
- Auel, J.M. (1983). *The Valley of Horses*. London.
- Bahn, P.G. (1979). *The French Pyrenees: An Economic Prehistory*. Unpublished Ph.D. Dissertation, University of Cambridge.
- Bahn, P.G. (in press a). Utilisation de ressources végétales dans le Paléolithique et le Mésolithique des Pyrénées françaises. in *Ier Colloque Int. sur l'alimentation de l'homme préhistorique et dans les sociétés primitives*. Les Eyzies, August 1981.
- Bahn, P.G. (in press b). *Pyrenean Prehistory: A Palaeoeconomic Survey of the French Sites*. Aris & Phillips, Warminster.
- Baudouin, M. (1932a). Existence de la culture du blé à l'époque Magdalénienne. *Bulletin de la Société Préhistorique Française*, **29**, p. 320.
- Baudouin, M. (1932b). Les meules à blé de l'époque girienne. *Bulletin de la Société Préhistorique Française*, 549–550.
- de Beaune-Romera, S. (1983). *Les Lampes du Paléolithique Supérieur: Définition, Typologie et Fonctionnement*. Thèse de 3e cycle, Sorbonne (Paris I). See also *Bulletin de la Société Préhistorique Française*, **80**, 66–68.
- Biberson, P. (1964). Torralba et Ambrona. Notes sur deux stations acheuléennes de chasseurs d'éléphants de la vieille Castille, in *Miscelanea en homenaje al Abate H. Breuil*, tomo 1, pp. 201–231. Barcelona.
- Blanc, A.C. (1957). A new palaeolithic cultural element, probably of ideological significance, the clay pellets of the cave of Basua (Savona). *Quaternaria*, **4**, 111–119.
- Boone, Y. and Renault-Miskovsky, J. (1976). La Cueillette. In: de Lumley, H. (ed.) *La Préhistoire Française*, vol. I (i). pp. 684–687.
- Bordaz, J. (1971). *Tools of the Old and New Stone Age*. London.

- Bordes, F. (1961). Mousterian cultures in France. *Science*, **134**, 803–810.
- Breuil, H. (1937). *Les Subdivisions du Paléolithique Supérieur et leur Signification*. 2nd Edition.
- Breuil, H. and de Saint-Périer, R. (1927). Les poissons, les batraciens et les reptiles dans l'art quaternaire. *Archives de l'Institut de Paléontologie Humaine*, Mémoire 2, Paris.
- Briguel, P. (1911). Les noyaux perforés du Mas d'Azil. *L'Anthropologie*, **22**, 371–373.
- Brunet, J. (1981). Niaux: Du charbon de bois dans les peintures. *Archéologia*, **156**, July, p. 72. See also *Archéologia*, **162**, Jan. p. 74.
- Brunnacker, K. (ed.) (1978). *Geowissenschaftliche Untersuchungen in Gönnersdorf*. (Der Magdalenien Fundplatz Gönnersdorf, Band 4). Wiesbaden, 258 pp.
- Bryant, V. and Williams-Dean, G. (1978). The coprolites of man. *Scientific American*, **238**, 100–109.
- Callen, E. (1963). Diet as revealed by coprolites. In: Brothwell, D. and Higgs, E.S. (eds) *Science in Archaeology*. pp. 235–243. London.
- Chollot-Varagnac, M. (1980). *Les Origines du Graphisme Symbolique*. Paris.
- Clot, A. (1973). *L'Art Graphique Préhistorique des Hautes-Pyrénées*. Zaragoza.
- Cohen, M.N. (1977). *The Food Crisis in Prehistory*. Yale.
- Coles, J.M. and Higgs, E.S. (1969). *The Archaeology of Early Man*. London.
- Coon, C.S. (1972). *The Hunting Peoples*.
- Couteaux, M. (1977). A propos de l'interprétation des analyses polliniques. In: Laville, H. and Renault-Miskovsky, J. (eds) *Approche Ecologique de l'Homme Fossile*. pp. 259–276.
- Déchelette, J. (1908). *Manuel d'Archéologie Préhistorique, Celtique et Gallo-Romaine*. Vol. I. *Archéologie Préhistorique*. 747 pp. Paris.
- Delcourt-Vlaeminck, M. (1975). Les représentations végétales dans l'art du Paléolithique supérieur. *Bulletin de la Société Tournaisienne de Géologie, Préhistoire et Archéologie*, **31**, 70–96.
- Delluc, B. and Delluc, G. (1979a) L'accès aux parois. In: Leroi-Gourhan, A. and Allain, J. (eds) *Lascaux Inconnu*. pp. 175–184. Paris.
- Delluc, B. and Delluc, G. (1979b). L'éclairage. In: Leroi-Gourhan, A. and Allain, J. (eds) *Lascaux Inconnu*. pp. 121–139. Paris.
- Doudou, E. (1904). Note sur des graines de végétaux trouvées dans la brèche préhistorique de la seconde grotte d'Engis (Belgique). *Revue de l'École d'Anthropologie*, **14**, 21–32.
- Fagan, B. and van Noten, F. (1966). Wooden implements from late stone age sites at Gwisho Hot Springs, Lochnivar. *Proceedings of the Prehistoric Society*, **32**, 246–261.
- Freeman, L.G. and Gonzalez Echegaray, J. (1970). Aurignacian structural features and burials at Cueva Morin (Santander, Spain). *Nature*, **224**, 722–726.
- Frossard, E. and Frossard, C. (1880). *Etudes sur une grotte renfermant des restes humains de l'époque paléolithique, découverte à Bagnères-de-Bigorre*. 2nd edition.
- Gábori-Csánk, V. (1976). Le mode de vie et l'habitat au Paléolithique moyen en Europe Centrale. In: Freeman, L. (ed) *Les Structures d'Habitat au Paléolithique Moyen* Colloque XI, 9th Congress UISPP, Nice, pp. 78–104.
- Geist, V. (1978). *Life Strategies, Human Evolution, Environmental Design*. New York.
- Hansen, J. and Renfrew, J. (1978). Palaeolithic–Neolithic seed remains at Franchthi cave, Greece. *Nature*, **271**, 349–352.
- Jelinek, J. (1975). *The Pictorial Encyclopedia of the Evolution of Early Man*. London.
- Keeley, L.H. (1977). The functions of palaeolithic flint tools. *Scientific American*, **237**, 108–126.
- Kraybill, N. (1977). Pre-agricultural tools for the preparation of foods in the Old World. In: Reed, C. (ed.) *Origins of Agriculture*. pp. 487–517.
- Lee, R. and Devore, I. (1968). *Man the Hunter*. Chicago.
- Leroi-Gourhan, A. (1965). *Préhistoire de l'Art Occidental*. Paris.
- Leroi-Gourhan, A. (1968). Le Néanderthalien IV de Shanidar. *Bulletin de la Société Préhistorique Française*, **65**, 79–83.
- Leroi-Gourhan, A. (1980). Pollens et grottes ornées. In: *Altamira Symposium*. pp. 295–7.
- Leroi-Gourhan, A. and Girard, M. (1979). Analyses polliniques de la grotte de Lascaux. In: Leroi-Gourhan, A. and Allain, J. (eds) *Lascaux Inconnu*. pp. 75–81. Paris.
- Leroi-Gourhan, A. et al. (1979). Les Bois. In: Leroi-Gourhan, A. and Allain, J. (eds) *Lascaux Inconnu*. pp. 185–191.
- Lips, J. (1949). *The Origin of Things*. London.
- de Lumley, H. (1969). A palaeolithic camp site at Nice. In: Lamberg-Karlovsky, C. (ed.) *Hunters*,

- Farmers and Civilizations. Old World Archaeology. Readings from Scientific American.* (1976).
- Mabey, R. (1972). *Food for Free*. London.
- Mabey, R. (1977). *Plants with a Purpose*. London.
- Mania, D. and Toepfer, V. (1973). *Königsau: Gliederung, Ökologie und Mittelpaläolithische Funde der letzten Eiszeit*. Berlin.
- Marshack, A. (1969). Polesini, a reexamination of the engraved Upper Palaeolithic mobiliary materials of Italy by a new methodology. *Rivista di Scienze Preistoriche*, **24**, 219–281.
- Marshack, A. (1972). *Les Racines de la Civilisation*. Paris.
- Movius, H. (1950). A wooden spear of third interglacial age from lower Saxony. *Southwestern Journal of Anthropology*, **6**, 139–142.
- Mühlhofer, F. (1935). Beobachtungen an Gastrolithen diluvialer und rezenter Waldhühner; der Mensch der letzten Eiszeit als Anbauer von Gramineen. *Verhandlungen der zoologisch-botanische Gesellschaft in Wien*, **85**, 141–144.
- Mühlhofer, F. (1940). Kritisches zur Datierung alter Getreidefunde: eine Erwiderung. *Prähistorische Zeitschrift*, **30**(1), 348–353.
- Oakley, K. (1962). On man's use of fire, with comments on tool making and hunting. In: Washburn, S. (ed.) *The Social Life of Early Man*. pp. 176–193.
- Oakley, K. et al. (1977). A reappraisal of the Clacton spear point. *Proceedings of the Prehistoric Society*, **43**, 13–30.
- Obermaier, H. (1939). Streiflichter in das Leben der späteiszeitlichen Rentierjäger der Urschweiz. *Jahrbuch der Schweizerischen Gesellschaft für Urgeschichte*, **31**, 123–132.
- Omnès, J. (1982). *la grotte ornée de Labastide (Hautes-Pyrénées)*. Lourdes.
- Omnès, J. et al. (1980). *Le Gisement Préhistorique des Espélugues à Lourdes (Hautes-Pyrénées)*. Centre Aturien des Recherches sous terre, Mém. I.
- Pales, L. (1970). Le "Coco des roseaux" ou la fin d'une erreur. *Bulletin de la Société Préhistorique Française*, **67**, 85–88.
- Pant, R.K. (1979). Etude des traces d'utilisation des outils lithiques. In: *L'Homme de Tautavel, Dossiers de l'Arch.* **36**, 86–89.
- Péquart, M. and Péquart, S.-J. (1960–3). Grotte du Mas d'Azil (Ariège): Une nouvelle galerie Magdalénienne. *Annales de Paléontologie*, collected papers.
- Perlès, C. (1977). *Préhistoire du Feu*. Paris.
- Piette, E. (1896a). Les galets coloriés du Mas d'Azil. *L'Anthropologie*, **7**, 385–427.
- Piette, E. (1896b). Les plantes cultivées de la période de transition au Mas d'Azil. *L'Anthropologie*, **7**, 17 pp.
- Piette, E. (1904). Classification des sédiments formés dans les cavernes pendant l'Age du Renne. *L'Anthropologie*, **15**, 129–176.
- Puech, P. (1976). Recherche sur le mode d'alimentation des hommes du Paléolithique par l'étude microscopique des couronnes dentaires. In: de Lumley, H. (ed.) *La Préhistoire Française* vol. I (i), pp. 708–709.
- Rozoy, J.G. (1978). *Les Derniers Chasseurs*. Bull.Soc. Arch. Champenoise, 3 vols.
- Ryan, A. (1979). A preliminary scanning electron microscope examination of wear striation direction on primate teeth. *Journal of Dental Research*, **58**, 525–530.
- Saffirio, L. (1975). Monophagy in the European Upper Palaeolithic. In: Arnott, M.L. (ed.) *Gastronomy, the Anthropology of Food and Food Habits*. pp. 79–88.
- Schiemann, E. (1940a). Kritisches zur Datierung alter Getreidefunde. *Prähistorische Zeitschrift*, **30**(1), 3–34.
- Schiemann, E. (1940b). Nochmals: Kritisches zur Datierung alter Getreidefunde. *Prähistorische Zeitschrift*, **30**(1), 371–378.
- Smith, W.G. (1894). *Man the Primeval Savage: His Haunts and Relics from the Hilltops of Bedfordshire to Blackwall*. London.
- Solecki, R. (1971). *Shanidar, the Humanity of Neanderthal Man*. London.
- von Stokar, W. (1939). Die Getreidefrage im Paläolithikum. *Quartär*, **2**, 101–108.
- von Stokar, W. (1942). Phylogenie und Vorgeschichtsforschung. *Prähistorische Zeitschrift*, **32**(3), 3–16.
- Trevor-Deutsch, B. and Bryant, V. (1978). Analysis of suspected human coprolites from Terra Amata, Nice, France. *Journal of Archaeological Science*, **5**, 387–390.

- Tyldesley, J.A. (1981). *The Possible Exploitation of Flora in Western Europe by Later Palaeolithic Man*. B.A. Honours dissertation, Univ. of Liverpool.
- Ucko, P.J. (ed.) (1977). *Form in Indigenous Art*. London.
- Wendorf, F. *et al.* (1979). Use of barley in the Egyptian late Palaeolithic. *Science*, **205**, 1341-1347.
- Windels, F. (1948). *The Lascaux Cave Paintings*. London.