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In Search of the 'Broad Spectrum Revolution': Human – Animal Relationships at the Pleistocene-Holocene Transition in Southern Europe.

Thesis submitted to the University of Durham for the qualification of PhD.

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No material in this thesis has previously been submitted for a degree in this or any other university. The research and opinions of others have been cited. All else is my own work.

In Search of the 'Broad Spectrum Revolution': Human – Animal Relationships at the Pleistocene-Holocene Transition in Southern Europe.

Sally Newton

Abstract.

Can evidence of the so-called 'Broad Spectrum Revolution' be found across southern Europe at the end of the Pleistocene and the early Postglacial? If so, what is its significance? Archaeozoological material from four cave and rock shelter sites on the Mediterranean peninsulae was examined to test the evidence for change or continuity of diet over this important period. The sites are Theopetra, in Greece, Mondeval de Sora and Riparo Tagliente, in Italy, and Gruta do Caldeirão, in Portugal, all of which have evidence for late Upper Palaeolithic and/or early Mesolithic occupations by human groups. In addition to these case studies, the sites were put into context using the literature for other important sites in these regions. The conclusion is that there is considerable inter-site variability and indeed intra-site continuity of diet over the transitionary period, and that 'revolution' is a far too loaded term for what actually appears to have occurred.

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None.

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1: Introduction.

1.1. The 'Problem'.

"In general, intensive use of wild resources and some degree of sedentary life begin before genetic changes in plants can be identified. . . . There is evidence for the intensive gathering and collecting of plants in the Near East from at least the tenth millennium bc" (Hodder, 1990, p32)

The paradigm of the Broad Spectrum Revolution is so pervasive, even the post-processualists accept it. The phrase appears to have first been coined by Flannery (1969) in his paper about early signs of domestication in Iran, but it draws upon a long archaeological tradition of wide use of small resources being seen as one of the defining features of the Mesolithic. Lewis Binford, the year before Flannery's paper was published, also emphasised the importance of fish, molluscs and migratory fowl to the post-Pleistocene sedentary communities (Binford, 1968). As with most aspects of the Mesolithic, the Broad Spectrum Revolution (BSR) is acclaimed not only as a phenomenon in its own right, but as a scene setting feature for the Neolithic that follows – another tradition which is reflected in the quote from Hodder. In the early part of the last century Darwin's theories (1859) on the gradual evolution of animal species had come to be applied also to human societies. The theories of Marx also contributed to a prevailing paradigm of inevitable succession. One can understand how these theories may have appealed, as – unlike the Biblical and Classical origin myths – human society was perceived to have progressed, not fallen. Such a standpoint does tend to degrade the previous periods, however. For example Clark (1980) has criticised Gordon Childe's (1935) view of the Mesolithic peoples:

"The impression his [Childe's] readers were likely to form was that of survivors from the Ice Age living on at a miserably low level of culture against the time of enlightenment issuing from revolutionary change in south-west Asia." (Clark, 1980, p7).

The title of his work suggests that even Clark himself, however, regards the Mesolithic as a 'prelude' – a necessary background to the more central Neolithic. To study the so-called Broad Spectrum Revolution, therefore, is to do more than investigate the diet of post-glacial peoples, it is to take part in an ongoing part of archaeological history.

More recently, in addition to pseudo-Darwinism, another methodology borrowed from biological studies has been incorporated into archaeological studies of human diet: Optimal Foraging modelling. Optimal Foraging strategies will be looked at in more detail in Chapter 2 but for the moment let it merely be said that these models do not complement the progressivist ideal. Optimal Foraging implies that an individual of a species behaves in such a way to maximise their own reproductive success, for example by ranking resources by energy returns. The foraging strategies are therefore potentially very localised to ecosystems rather than to time periods, and do not necessarily have any contribution to the supposed progress of human civilization. Broad Spectrum diets, therefore, could be interpreted from an Optimal Foraging perspective as the only feasible option in a survival situation rather than a step towards incipient agriculture. They could be said to be more realistic of actual behaviour. Nevertheless, optimal foraging models are replete with their own problems (see Chapter 2, section 2.3).

It would be ludicrous to deny that there are sites in the late Pleistocene and early Holocene where a broad spectrum of resources *are* utilized, and I have no desire to do so, but it is nevertheless necessary to critically examine the wider application of this paradigm rather than having blind faith in it. During the course of the research the following questions were asked:

1. How widely relevant *is* the BSR? Does a similar pattern occur outside the Near East?
2. Is utilization of a broad suite of resources really anything new?
3. Does Broad Spectrum Foraging have an inevitable link to incipient agriculture?

1.2: Aims and Objectives.

The aim of the thesis project was therefore to test the applicability of the BSR / Tardiglacial Paradigm to the southern European region using archaeozoological samples from four sites on the Mediterranean peninsulae: Theopetra, in Greece; Riparo Tagliente and Mondeval de Sora in Italy and Gruta do Caldairão in Portugal. Given such a wide geographical area there was no assumption that the inhabitants would have actually met each other. However, the intention was to compare their means of food procurement to see what subsistence choices they may have had in common, notwithstanding spatial distance. The sites are also distributed temporally, as Theopetra and Gruta do Caldairão have evidence for both late Pleistocene and Early Holocene occupation by human groups, while Tagliente is a purely Pleistocene site and Mondeval de Sora would have been inaccessible until the glacial retreat of the Holocene. Therefore it was hoped that there would be a contrast of dietary choices over time within each site as well as more general inter-site trends. Continuity of diet choice would also, naturally, be of interest.

As the samples were all based on animal bone it was necessary to gain as much information as was possible from them within the normal constraints, and therefore observation and documentation of taphonomic factors was imperative. An examination of the complex filters that affect bone deposits in caves and rock shelters follows. To put the animal bone data in context, however, I also considered the evidence for contemporary sites in the region and other aspects of life such as technology and burial practices from sources in the literature.

1.3: Taphonomy: The Problems and Implications of Faunal Deposits in Caves.

Taphonomy has become one of the most important issues we face when attempting to reconstruct ancient environments and human behaviours. It is imperative to understand how much of an assemblage has been preserved, how much lost, by what means, and what this may imply as regards our interpretations of life in the prehistoric periods. That taphonomy was not always a burning issue, and methods of taphonomic analysis have only been developed comparatively recently in the history of archaeology, has been a contributive factor in the fanciful and sometimes plainly offensive interpretations of prehistory earlier this century. Binford (1981) was one of the first to try to extract definite conclusions from bone assemblages themselves rather than adapting our interpretations to suit the current paradigms. More recently Frison (1991) has pointed out the ridiculous assumptions that are made when animal behaviour is ignored. It is fortunate that the taphonomy of bone deposits has been studied intensively for two decades, but untangling the myriad of different factors that have filtered an assemblage is still a daunting task. Despite the other advantages of cave deposits, their taphonomy is still problematic. Given that all four of assemblages on which the practical work for this thesis is based come from caves and rock shelters it is imperative to understand the filters the samples may have gone though. The intention is to develop a research plan so that the optimum amount of information may be gleaned from what may appear to be an unpromising data set.

1.31: Inanimate taphonomic filters.

Even in the micro-environments of caves it is important to consider the various environmental agencies that may help to destroy, preserve, disperse, accumulate or otherwise modify bone samples. It is easy to become wrapped up in the analysis of one potential filter whilst down-playing others. For example, Speth suggests that as kill and butchery sites are often situated near rivers, untangling the contribution of fluvial action and human action is often a problem (Speth, 1991). The tendency may be to attribute the whole assemblage to one agency or the other. The potential for fluvial transport of bone fragments in or out of caves naturally depends upon the presence of a river in the area at the time of strata deposition, information which may be provided by the geography and stratigraphy itself, but it is worth looking at bone fragment size and surface texture for clues. Fluvial sorting may lead to ribs, vertebrae, sacra and phalanges being swept further than other elements from animals of the same size (Brain, 1981). Other water sources may also affect the chance of bone preservation. For example there are (or were) karstic aquifers at the back of Theopetra cave, resulting in different diagenetic conditions in the sediments above and below these water sources (Karkanas *et al*, forthcoming).

Temperature changes may also modify bone assemblages, though this is an aspect of taphonomy that remains in a state of investigation. The suggestion is that apatite is more soluble at freezing point than at warmer temperatures, e.g. 25 °C (Viellard and Tardy, 1984, cited in Karkanas *et al*, forthcoming), meaning that bone is more likely to dissolve under cold conditions. This could be incredibly important to understanding the preservation history of faunal remains in glacial and interglacial cave sites, particularly those that have a sequence of both climatic regimes. Further research of this phenomenon at other sites will, it is hoped, expand upon this intriguing possibility (Karkanas *et al*, forthcoming.)

The character of the matrix itself is, of course, very important to the preservation of bone. Calcium rich layers, e.g. those derived from calcitic or dolomitic rocks, calcitic ashes or snail shells, will generally preserve bone well, whereas soils containing phosphatic minerals with other chemical components usually will not (Karkanas *et al*, forthcoming). The texture and softness of the substrate in a cave is an important factor in whether small mammal bones are destroyed by the trampling of other animals or merely pressed into the surface (Andrews, 1990). Diagenesis, the alterations of bone within the soil itself, can be problematic in that there may be lateral as well as vertical differences in the diagenetic conditions even within the one cave (Karkanas *et al*, forthcoming). Geological data may also provide suggestions as to how the assemblage was accumulated. Whole nests of small mammals, for example, may be buried in landslides (Andrews, 1990), one suspects even if the event was, geologically, a relatively minor one. On a larger scale, the young of wolves - and other cave dwelling creatures - may be killed and buried if sections of a cave roof collapse (Binford, 1981). It is useful to scan samples for potential whole skeletons and groups of skeletons to attribute such disasters correctly. Partial burial of a bone within the soil can lead to differential preservation, with one area of the specimen looking markedly different from the rest (Brain, 1981).

Root etching can damage the surfaces of bones extensively and -though unlikely in a cave situation - it is worthwhile taking note of such marks in order to infer secondary deposition. Another good reason to be aware of the patterns made upon bones by roots is their potential resemblance to abstract engraved art (Binford, 1981). Such a misinterpretation of these patterns would give a very different history to the fragments concerned, and perhaps also to those associated with them.

1.32: The effects of animal activity.

Unsurprisingly the actions of animals can have a variety of effects on faunal remains, and extrapolating potential sequences of events from the damage visible on bones is a useful, informative activity. The variety of different animal species in any one habitat and their divergent influences on bone assemblages is a difficult problem to untangle. As Binford (1981) pointed out, the number of different potentially cave-using species in Pleistocene Europe is extensive. This list is not restricted to mammals, as barn owls, the European eagle owl and some eagles will all sometimes nest in caves and contribute significantly to the smaller species found in the sample (Andrews, 1990). Bats can also lead to the accumulation of large samples of microfaunal remains, depending upon species (Morris, 1974 cited in Andrews, 1990).

The deaths of the individuals represented by the faunal remains themselves may be part of a complicated taphonomic process that it is useful to understand. By recording and analysing the age distribution of samples of the same species it may be possible to construct 'mortality profiles' (Lyman, 1994). These can be useful in assessing whether a group of animals died through gradual attritional means, or via some sort of catastrophe. A similar technique was used to examine the deaths of roe deer at Star Carr, in which it was found that the juvenile 'coffee bar' males were those most likely to be killed (Legge and Rowley-Conwy, 1988). The age of bear skeletons may give us a clue as to whether they died in hibernation, which is a much more likely situation than the traditional bear-hunting scenario (discussed in Frison, 1991). Also, baby hyenas often die near the cave mouth, of malnutrition, as their mother may wander off for long periods (Binford, 1981). This seems just as likely a situation in the harsh conditions of glacial Europe as it is in today's Africa. Even after death bones move, due to post-mortem modification of soft-tissues, and this movement is variable depending upon the medium in which the body decomposed, either air or water (Weigelt, 1927/1989 cited in Lyman, 1994). It would be interesting to know how the damp, shady conditions inside a cave influence this process. The density of the bones themselves varies from species to species. This is not merely due to the size of the animal, but is also related to the means of locomotion and fighting tactic during mating competitions (examined in Kreutzer, 1992). This is important to know, as the likelihood of a bone's survival, before and after burial, is dependent to a degree on its original density. It is also fruitful to be aware of how a bone naturally breaks, in order to attribute the causative factors correctly.

As with human hunting, animal predation is not a haphazard process and can have interesting consequences on a faunal assemblage. Interpreting palaeoenvironments via predator assemblages is difficult, however, due to the biases which affect the final accumulation; predators will only hunt certain species, typically, and then the assemblage which is accumulated will be subject to other taphonomic filters

(Andrews, 1990). The hunting tactic of the predator concerned will also influence the nature of the faunal sample. For example animal species that wear down their prey in a long chase, such as wolves, are more likely to kill the young, ill and elderly than predators who engage in a more random straight ambush - though the young may be more susceptible to fatal mistakes of judgement (Lyman, 1994). This is an interesting possibility, but the capacity for the victims to struggle and defend themselves must be taken into account.

The scavenging activities of cave dwelling animals can also have an effect on faunal assemblages. Hyenas, possibly the most intensive scavengers, have a marked effect upon the bones of the animals they consume. Cruz-Uribe (1991) found that a hyena assemblage will have lots of cylinder shaped bone fragments and few epiphyses, and small compact bones will have been swallowed and completely destroyed (cited in Lyman, 1994). Gnawing generally, of scavenged and predated bones, can cause a great deal of damage. Canid damage to bones can include punctures, pits, scoring, furrows, and 'crenulated' edges (Binford, 1981). These features were often mistaken for the work of other agencies, as Binford emphasised, and even now I believe it would be difficult to distinguish between a 'crenulated' scapula, for example, and one that had broken by other means. Binford has been criticised for outlining the ways in which carnivores gnaw bones but not examining the *degree* of damage done (Lyman, 1985). Pitting, scoring and punctures are slightly less problematic. It is useful to take note not only of the presence of gnawing, but its form. Binford suggests that pitting is associated with wolf dens and 'dog-yards' (also, presumably, any place where dogs have been resident) as it is produced by direct gnawing on the bones, when the meat has already been stripped. The gnawing damage done by mammals, canids in particular, is generally more extensive than that of other animals (Andrews, 1990). Birds of prey, for example, tear at the prey with sharp beaks and talons but cannot chew (Andrews, 1990). In contrast, the consumption of small mammal, bird and fish bones by dogs leads to their near or total destruction (Payne and Munson, 1985.)

Whilst much work has been done on the destructive influence of canids and other large carnivores it should not be forgotten that rodents can also modify bone samples. Rodent gnawing is fairly easy to spot (good photographs can be found in Lyman, 1994), but has not always been recognised for what it is. The burrowing of rodents -

or indeed any other burrowing creature - within the cave environment can lead to secondary deposition.

1.33: The effect of prehistoric humans upon taphonomy.

Human hunting has been a slippery subject in archaeological research for decades, attracting numerous theories and suggestions that span the spectrum of archaeological biases. Taphonomy can help to prove and disprove theories, though naturally it is replete with its own problems. The mortality profiles mentioned above may be a useful indicator as to whether prey were hunted by carnivores or humans, as carnivores are said to prey more heavily upon the old and young whereas humans favour prime adults (Lyman, 1994, uses the example of rabbits). This observation is not without difficulties when applied to other environments and prehistoric peoples, however. One would imagine that the strength, speed and technological capacity of the human hunting group would play an important part in whether they killed the animal(s) they preferred. Plus of course there may be variations in their preferences according to season, taboo, rituals, the intended use of the animal products derived and so on. For example Binford, 1981, recounts how the Nunamiut preferentially hunt juvenile caribou in autumn so that their skins can be used to make the winter parkas.

The butchery and processing of animals was (arguably) studied systematically by Binford, during his early observations of Nunamiut subsistence (Binford, 1978). There have since been criticisms of this work in the light of more detailed data. When other taphonomic pressures are taken into account, such as bone density, the relationships between food value and assemblage formation become more complex (Klein, 1989). Even today, however, if applied with common sense Binford's work (1978 and 1981) can give us clues as to the intentions that lay behind the modifications we observe. There is a similar problem to that outlined above, inherent in archaeozoological studies, in that an obsession with meat weights, calorific yields and so on may overwhelm interesting variations in the prevailing patterns. For example a study of the bone assemblages of Ngamuriak, a living African pastoralist site, led to the conclusion that the extraction of marrow and grease ("within-bone nutrients") was the primary factor influencing the unusual taphonomic pattern (Marshall and Pilgrim, 1991, p161). No suggestion was made as to why the pastoralists were going to such lengths to extract these resources when they were in an "unstressed" situation (p150) - was there something about their collective tastes or social structure that made marrow and grease desirable or necessary? Whilst modern hunter-gatherers are undoubtedly fascinating - and, in a search for analogies, we are hardly spoiled for choice - it is wise to be wary of spatial and temporal generalisation. For example, it is doubtful how feasible grease extraction was before the invention of water-proof cooking pots and other cooking technology (Speth, 1991). Another worrying feature in the recent literature is the incitement towards a more generalised taphonomic methodology as outlined in Jones and Metcalfe, 1988 and Metcalfe and Jones, 1988. The danger is that a significant portion of our understanding of human societies will be missing if we seek general rules - taphonomy should highlight details, not camouflage them.

Though humans do sometimes eat bones (Binford, 1981; Brain, 1981), the more common results of food preparation are butchery marks, and burning. The degree of damage done to a bone, as reflected in its colour, may suggest the temperature to which it was subjected (David, 1990; Shipman, 1988). Though it is worthwhile considering the possibility that a bone was burned accidentally, burning may give us clues as to the cooking techniques of the people under study.

1.34: The effect of modern humans upon taphonomy.

The discussion above points out the losses incurred when our methodology and, to a certain extent, our ideology, is unequal to the task of interpreting assemblages with justice. Ways in which samples can be accumulated, partially destroyed and modified by ancient natural processes have also been discussed. In addition, however, an important variable to keep in mind are the losses and modifications that may result during and after the excavation. Just a simple thing such as on-site sieving may augment a small mammal assemblage extensively (e.g. Klein, 1989, described the increase in micromammals discovered at Klasies River Mouth when fine mesh screening was implemented). Sieving from a wide range of contexts on a site could give us useful clues as to the taphonomy of a sample - for example the very small splinters around a site which may indicate a canid den (Binford, 1981) could easily be missed if a high resolution sampling strategy was not observed. Even sieving can be problematic, however. Small mammal bones may be broken *in situ* but remain associated and probably identifiable - extraction through a sieve inevitably leads to the dispersal of the pieces, which are often unidentifiable in isolation (Andrews, 1990).

Undoubtedly quite a lot of bones are accidentally destroyed or thrown on the spoil heap even in contemporary systematic excavation. Similarly, when the bones reach the lab, some will prove unidentifiable, breaks may occur in transport, fine surface features may be missed by tired eyes on a Friday afternoon. Fortunately, it has been discovered that surface features are rarely overlooked or misidentified even by analysts with low-tech equipment and little training (Blumenschine *et al*, 1996) but the authors also argued that gnawing may be played down in relation to the more attractive evidence of hominid activity. It would be easy to dismiss such biases, but it is best to remain alert to the potential effects of our subconscious preferences. Limits of time and money can also have an attritional effect on taphonomic analysis. For example, spotting digestive corrosion on the bones of microvertebrates requires a Scanning Electron Microscope (Fernandez-Jalvo and Andrews, 1992). Few studies could stretch to this. Even the manuals we find ourselves relying upon may have faults. For example, Lyman alleges that the bone density measures of Binford were inaccurate, sometimes by a large margin (Lyman, 1985). In the past there was, finally, the annoying habit of editors to get rid of detailed taphonomic analysis even when it was included in a site report (Maltby, 1985). One trusts that this no longer happens!

1.4: Methodology.

The wealth of information that can be gleaned from a bone assemblage is evident, particularly those from prehistoric caves, which are likely to have been more sheltered than their contemporaries, but it is prudent to be aware of the inadequacies and pitfalls of our taphonomic analysis. Bearing these considerations in mind, it may now be helpful to outline the research plan used in the analysis of the samples from this project.

At the outset of the study it was decided to:

1. Look at the behaviour of the species found.

2. Study splinters and unidentifiable fragments, as well as the fragments that could be identified to taxon.
3. Note breakage patterns where applicable (i.e. complete, cylinder, epithesis only, spiral fracture, straight sided fracture etc.).
4. Note the age of the specimens by examining fusion, surface texture and dental eruption and wear.
5. Note the presence of gnawing damage, and its form.
6. Draw butchery marks.
7. Note colour and extent of burning.

Specimens were identified using the comparative collection in the Archaeology Department, Durham when the practical work was done in Britain, and the *Atlas of Animal Bones* (Schmid, 1972). The mammal collection at the Natural History Museum (London) proved invaluable in increasing my familiarity with marmot, ibex and chamois bones, as did the chamois skeleton kindly lent by Clive Gamble.

The specific methodology varied slightly from site to site as the assemblages differed (for example I was concerned only with the rabbit component of the Caldairão assemblage as the other animals had already been studied) but in general the information sought from each bone was the same: context, element, species, proximal fusion data and distal fusion data (where relevant), side of body, fragmentation, gnawing evidence, burning evidence, and human modification. This information was noted in the form of a numeric code as a sort of shorthand to save time and space, and then transferred from notebooks into specially adapted SPSS programs to compile results. The essential code for transferral to SPSS is based upon that devised by Paul Halstead (University of Sheffield) but it is easily adapted to suit the needs of the research in hand. For example I desired more detailed information on the patterns of burning so I added a separate column for burning evidence. Here is an example of a line of information about a single bone:

ELEM	SPEC	PROX	DIST	SIDE	FRAG	GNAW	BURN	CUT
7	15	0	1	2	3	0	1	0

This means that the bone was a rabbit tibia from the right side of the body, the proximal end is missing but the distal end is fused, only the epithysis is present, it is neither gnawed nor shows any human modification but it has a burnt patch (black). Thus a great deal of information could be built up fairly rapidly, which was necessary when assessing the larger samples. Pathologies, cut marks and anything unusual were also noted and drawn, separate to the code. The master key to the code can be found in Appendix One.

The structure of the thesis is as follows: first, the physical and cultural importance of food in hunter-gather societies will be examined (Chapter 2). Then the late Pleistocene/early Holocene transition in the Near East will be summarized (Chapter 3) to provide a means of comparison with the European material to follow. We will move westwards, starting from Greece and the Balkans, continuing to Italy and finally Iberia, looking at the picture of life over the transition that is presented in the existing literature, with the associated practical case study to follow each contextual chapter.

Chapter 2. Food and Foraging in Hunter-Gatherer Societies, Physical and Cultural Perspectives.

2.1: Introduction.

Food consumption is, of course, important for all societies both as a physical necessity and an important daily cultural act, but the relationship between most 21st century Westerners and their food supply is both heavily intellectualised and curiously detached. In order to better understand the food habits of distant prehistory it is necessary to consider nutritional issues that affect hunter-gatherers past and present. In this chapter, using the work of archaeologists and anthropologists, the particular food and foraging aspects of hunter-gatherer groups will be reviewed and assessed, including the specific nutritional needs of a foraging group, the impact of Optimal Foraging Theory, and the reasons behind dietary change. The division made between physical and cultural is largely a means of logically structuring the text, rather than reflecting real circumstance, but it is a dichotomy that frequently occurs in the literature generally.

Another problem inherent in this subject is the heavy reliance upon ethnographic analogies. We are left with little choice but to employ ethnographic analogy, but comparisons have to be thoughtfully and logically made. Dubious ethnographic generalisations have a long history in archaeology, for example Sollas, in 1911, equated the Australian and Tasmanian indigenous peoples with Lower and Middle Palaeolithic hominids, while Eskimos and the Bushmen were paralleled with the Upper Palaeolithic groups (Sollas, cited in Gamble, 1986). The importance of the African Bushmen as ethnographic analogy *par excellence* continued for decades, and many misconceptions about them abound to this day (Survival, 1998). For example, the fact that the Kalahari Bushmen/San consume, sometimes, 420g of protein per person per day, was once seen as a sign of affluence (e.g. Lee, 1968; Sahlins, 1968) but is now seen as an indicator of stress (Yellen, 1977; Speth, 1991).[1] Other indigenous groups are also regarded as cultures frozen in time: Frayer (1981) states "little climatic or technological change has occurred between the late Pleistocene and modern human cultures of Australia" (p67), despite the fact that they now hunt using rifles and land-rovers, and – for 200 years or so – have been pressed into more marginal environments. More generally, foraging studies have been known to reinforce other social stereotypes such as gender relations (see, for example, Washburn and Lancaster, 1968, especially pages 299 and 301). Much of this is probably unintentional, but it hardly furthers the reputation of the discipline.

Food and food procurement, therefore, are complicated and contentious issues, whether one studies our own diet or that of a so-called 'simple forager'.

2.2: Nutritional needs of small foraging groups, and their effects.

Naturally small groups of foragers share most nutritional requirements and many food preparation processes with the rest of the human population, but there are some defining features of the hunter-gatherer lifestyle. We must avoid some preconceptions, for example it would be wrong to think of foragers as predominately isolated – absolute self-sufficiency in an egalitarian group is almost unknown (Spielmann, 1986). Also, hunter-gatherers *do* store foods, sometimes to a great extent, but the vagaries of seasonal change in flora and fauna can cause a pattern of glut and shortage. For example in the low times of late spring most of the fat in the bodies of large land herbivores will be concentrated around the brain, kidneys and other internal organs, and in the marrow of the distal limbs and mandible (Speth, 1989). Groups have found ways around potential problems, such as targeting particular sexes of prey when their fat yield is likely to be greatest in the above case (Speth, 1991). It has been suggested that the great gluts of seasonal food resources such as salmon or herbivorous herds made the great aggregations at Upper Palaeolithic Franco-Cantabrian sites possible, promoting greater social contact (Bender, 1995). Movement around the landscape helps to balance forager subsistence through the year. It is believed that high levels of mobility can have an unexpected impact upon the human body – for instance exercise is a possible factor in reducing female fertility (Bentley, 1985), though of course there are many other potential causes. Interestingly, although factors such as age, body size and special physiological needs affect human protein

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[1] See also the debate between Hawkes and O'Connell, 1981, and Sih and Milton, 1985, discussed in section 2.3.

requirements, physical activity has a limited impact (Wing and Brown, 1979). Perhaps the same would be true of other non-energy nutrients.

2.21: Health.

How healthy is the hunter-gatherer diet? Naturally the answer to this is likely to differ between particular groups, individuals and environments, but it is a legitimate question to ask at a general level. The continuing, if subconscious, paradigm of the Noble Savage which developed with humanists such as Montaigne and Rousseau (originally 1578-80 and 1750-62 respectively)[2], tends to make us assume that subsistence on wild foods is inherently more nutritious and fulfilling than the fruits of production. Current despair over farming methods underlines this. There is a history of agriculture being perceived as destructive, and irreversibly negative (Hunter-Anderson, 1998; Rainbird, in press). The reality, however, is that many contemporary indigenous peoples suffer malnutrition, have an infant mortality rate 1.5 to 3 times higher than the national average and have a life expectancy 10 to 20 years lower than the population around them (Brundtland, 1999). It is likely that some of this unfortunate situation is the result of modern circumstance. For example when the World Health Organization produced a report on health in hunter-gatherer societies in 1964, it was found that malnutrition was rare, but starvation relatively frequent (cited in Dunn, 1968). Presumably if the whole ecosystem is under stress then the hunter-gatherers – however broadly foraging they are – are likely to suffer with it. It is thought, however, that wild foods may be more stable under extreme conditions such as drought and flood than are domesticates (Cassidy, 1980). Shortages of particular nutrients and foodstuffs are potentially life threatening but foragers do find alternatives. For instance, the low frequency of plant foods in the diet of foragers in arctic environments can be supplemented by eating the stomach contents of herbivorous prey (Speth, 1991). Heavy reliance upon a single low-nutrient staple – a common cause of malnutrition today – was impossible before domestication and unlikely to affect agriculturalists or hunter-gatherers before the dominance of world markets and colonial economics (Segraves, 1977). Protein 'over-dose', however, is

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[2] Rousseau does not mention the Noble Savage as such, but does talk extensively about 'man in his natural state', and the happiness of this life (1973, see 'A Discourse on the Origin of Inequality' esp.

possible in winter, but can be avoided by utilising fat sources such as oil rich seeds, shellfish and other small prey[3] and by extracting fat and grease from bones (Speth, 1991). It is worth keeping in mind that the parameters of calorie requirements in relation to health are surprisingly broad: the average calorie intake per day in the United States is 3500 Kcals, while the Masai of East Africa consume under 1000 Kcals per day, but nutritionally related pathologies are largely absent in both societies (Segraves, 1977).

The process of hunting itself can have dangers such as the risk of bites, kicks, goring and so on. Hunter-gatherers can also catch diseases, through food or open wounds, from the animals they hunt, but agriculturalists suffer the same sort of problems *and* crowd diseases (Cassidy, 1980). On the whole, the life-style of a hunter-gatherer in a rich environment, prior to introduced negative influences such as alcoholism and habitat destruction for cash-crops, is likely to have been relatively healthy, though short of idyllic.

2.22: Intra-group differentiation.

Thus far we have looked at foraging groups as a whole, but in any society intra-group needs differ, often along age and sex lines. We know that hunter-gatherers have systems for distributing food amongst themselves (see Wiessner, 1996 and references cited therein), but do all members of society receive appropriate nutrition? This question does not refer to *equality* – the rigidly equal portions given in institutional settings to large, small, male, female, slothful and active alike are neither nutritionally sound nor perceived as fair – but to what is most conducive to an individual's well-being. A general guide to energy requirements appears below, showing that this particular nutrient is required at different rates:

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pp52-80). Similarly, Montaigne talks in glowing terms of 'cannibals' and 'savages'. Both are essentially critiquing their own societies.

[3] Many smaller animals such as fish, birds, insect larva, beavers (especially their tails) and some molluscs retain their fat better during low seasons than the large mammals (Speth, 1991).

Comparison of Kilocalorie intake requirements by age and sex.

	Males	**Females**
12 yrs	**2500**	**2500**
15 yrs	**3100**	**2600**
19 yrs	**3600**	**2300**
22 yrs +	**2800**	**2000**

(The peak age for Kilocalorie requirements is underlined).

Data taken from Robson, 1972, Fig. 3.1.

Social differentiation rather than inequality *per se* is believed to be common in hunter-gatherer societies – for example elders are considered repositories of knowledge and therefore have some control over juniors, but juniors will become elders and therefore the inequality is not permanent (Bender, 1995). Social differentiation is also linked to gender, which is not strictly permanent either but is certainly more difficult to change than age (Bender, 1995). An interesting archaeological case study outlining changing prestige through life is the Mesolithic cemetery site of Oleneostrovski Mogilnik. According to the wealth index based on pierced pendants, mature adults in their prime seem to be wealthiest, with the young and old of both sexes generally poorer, though the situation is less dramatic for females (O'Shea and Zvelebil, 1984). The authors interpret this as meaning that male prestige was based on physical health and food procuring abilities, while female wealth may have been dependent on male relatives, as it does not drastically diminish with age. It would be surprising if such social divisions were not reflected in diet, generally, since eating is a daily all-inclusive social act, and we do indeed find evidence of nutritional differentiation in the anthropological record. At first glance, men in most societies – hunter-gatherer, agricultural and industrial – seem to get preferential treatment in food provisioning. For example the Chukchee women of Siberia skin, butcher and cook the reindeer but their husbands receive the first helpings of the meat, leaving the bones for their wives (Simoons, 1967). While older men are often the beneficiaries of differential provisioning, sometimes the old are treated in the same way as the women. Among some sub-arctic Native Americans, for instance, the prime-aged men had first access to the food and the old and women ate last (Josephy, 1968). This might seem vaguely logical if the 'weak' did virtually nothing, but Josephy says that it was the women's work to pull toboggans, split firewood and build shelters (ibid. 69). It is noted among foragers generally that, while women often *could* have the best of the gathered foods, social or supernatural restrictions may prevent them from doing so (Rosenberg, 1980). What a gatherer does when unobserved, however, may depend upon the strength of her beliefs and the success of society in reinforcing them. Similarly, the hunters of most forager societies (usually men) are prevented from bragging about their successful expeditions or stock-piling resources by a variety of social measures, so that a rough equality is ensured (Wiessner, 1996).

Women are also often the subjects of food purity taboos when at their most nutritionally vulnerable – i.e. during pregnancy or lactation (Rosenberg, 1980). It is ironic, however, that some food taboos, whilst appearing cruel, may have a neutral or even beneficial effect on the health of the women and children, perhaps reflecting the original intentions. For example, among the Kikuyu in East Africa, who subsist via agriculture, seemingly harsh restrictions on food actually mean that the women, girls and young children have a healthier diet than the boys and men (Orr and Gilks, 1931). It is probably no accident, also, that food restrictions on women often involve protein-rich foods such as meat and fish. Pregnant women must consume enough protein to constitute at least 5-6% of daily calories or the foetus will be unhealthy, or perhaps even die, but an excess of 20% protein would also be dangerous (Speth, 1991). Misplaced kindness is also known, such as when a pregnant woman is starved so that the foetus will be smaller and childbirth easier (Mace and Mace, 1959).

Nutritional deprivations on women tend to have knock-on effect upon infants and children, but some aspects of the hunter-gatherer lifestyle protect children, to a certain extent. The long breast-feeding of mobile foragers' infants not only acts as a natural contraceptive, safeguarding the health and mobility potential of the mother (Speth, 1991), but is also healthier for the child. Weaning is a dangerous time, when infants are most likely to suffer severe diarrhoea and subsequent malnutrition (Wing and

Brown, 1979). 'Marasmus' is a deficiency disease occurring in children who have been withdrawn from breast milk suddenly and too early, and given a replacement which is less hygienic (Thomsen and Pollitt, 1977). The good evidence of early infant weaning at Wadi Kubbaniya (Hillman, 1989) is perplexing. The community must have had good reasons for adopting this path. Older children, though subject to dietary restrictions along with the women, as outlined above, may be able to supplement their own diet. In arid environments, at least, the nuts, roots and small prey that children procure, or that are given to them by female relations, provide the most consistent sources of protein and fat (Hawkes, *et al.* 1997, cited in Stiner, *et al.* 2000).

It is interesting that several contemporary hunter-gatherer groups (seven in Wiessner's study of 27 communities) say that the carcase belongs to the owner of the hunting implement, rather than the hunter *per se* (Wiessner, 1996). Naturally this is often the same person, but it does allow elderly or disabled people to have a hand in food distribution by lending their hunting weapons to fitter members of the community. Thus, on the whole, hunter-gatherers usually achieve nutritional levels that are reasonable for the whole group.

2.23: Ecology.

Do forager societies usually achieve an ecological balance? Again, the Noble Savage paradigm and more recent 'Green' discourse would tend to shout 'yes', but it is not an unequivocal case. Clearly hunter-gatherers do not exist within the landscape without making an impact at all, but the degree of damage done is sometimes difficult to assess. Flannery (1969) believes that the social behaviour of foragers keeps the population numbers below a level where the food supply is depleted. This vies somewhat with the theory that megamammal extinctions in the New World were the fault of human hunter-gatherers (Martin and Klein, 1984; Haynes, in press). Haynes argues that mammoths and mastodonts were so high-ranking within the food preferences of the 'Paleoindian' peoples that the foragers continued hunting them even when it became increasingly difficult to do so, and seriously changed the whole habitat forever by removing such important species (ibid. and references cited therein). On the other hand, some known hunter-gatherer actions may actually have a positive effect on the local ecology. For example the controlled burning of patches of woodland attracts game and makes them more visible to the human hunter (Butzer, 1982) but also gives the forest necessary revitalisation. By the Contact Period, at least, Native American peoples were managing woodlands by controlled burning, timed when it would be most beneficial but least harmful – e.g. in the moist early spring (Dods, in press). Dods also argues that indigenous hunters use their traditional ecological knowledge to 'trick' prey into producing more offspring than the environment can actually sustain. The 'surplus' animals are then harvested in the autumn before the habitat can be depleted (ibid.). The entire subject of 'indigenous conservation' is highly controversial, bound up with arguments about native land rights, and the evidence for deliberate conservation practices by hunter-gatherers is patchier than popular culture would have us believe (Smith and Wishnie, 2000). The authors rightly assert that land rights should not be assessed on whether an indigenous community is or is not the harmless custodian of the habitat – property developers are certainly not judged on this criterion (ibid.), but they also admit that it is easier to recognize depletion in the archaeological record than it is conservation. It will be worthwhile, in the review of Late Palaeolithic and early Mesolithic evidence from the research sites, considering this issue and contributing to the debate.

2.3: The Impact of Optimality Theory.

2.31: What is it?

Optimal foraging theory is essentially a tool for researching animal behaviour in relation to resource exploitation. It can be seen as an extension of Darwin's evolutionary theory (Pyke, 1984). It was not primarily designed for archaeologists, nor indeed anthropologists, but for species other than humans and then applied to our own species later. Optimality theory should not be taken too literally – it does not assume that an optimal organism exists and that various species should conform to a particular template (Foley, 1985). Rather, it seeks to provide a benchmark against which real species can be compared. This commonly uses criteria as follows:

- Optimal diet breadth.
- Optimal foraging space.
- Optimal foraging period.

- Optimal foraging group size.

(Schoener, 1971, cited in Winterhalder, 1981, p22).

Like the principle of Natural Selection, optimal foraging theory was expected to be generally applicable to many different species, and appears to have been initially embraced by the biological sciences. It has been shown, however, that published papers including 'optimal foraging' in the title or tests of OFT in the text increased steadily until 1981 but decreased in 1982 and 1983 (Pyke, 1984, fig 1, p525). An OCLC 'First search' of general science abstracts, however, revealed 280 inclusions of 'optimal foraging' in articles between 1984 and the year 2000, 9 (3%) of which were explicitly concerned with humans, so it has certainly not gone away.

Energy is used as the 'currency' of optimality assessments because it is convenient and cross-cultural and because it is perceived as the "most important" nutritional element (Winterhalder, 1981, p21). This is clearly subjective - energy alone would not get an organism very far. Energy is also usually abundant in ecosystems and thus unlikely to be a serious selective constraint (Foley, 1985). Foods are 'ranked' according to the calories they provide in relation to searching and processing costs. For example, Hawkes and O'Connell (1981) studied the mongongo nuts eaten by Bushmen in the Kalahari, and concluded that the nuts should be a low-ranking food. It has been pointed out that adults in this society spend a great deal of their time gathering and processing mongongos, and this 'superabundant' resource makes up to half their annual diet (Lee, 1979, p182 cited in Sih and Milton, 1985), therefore it appears the people themselves do not see the nuts as 'low-ranking'. Sih and Milton also argued that protein, moisture content and other variables may be more important in some habitats than energy, and it is the *mixture* of food that matters, in any case, rather than any individual element (ibid.). In reply to the article, Hawkes and O'Connell included this statement:

> ". . . foraging models are not suited to describe the interaction of all, or even a large number of the variables that might affect subsistence related behaviour. They are intended to simplify the complexity of the real world for purposes of analysis." (reply to Sih and Milton, 1985, p401).

This is undoubtedly true, but it does not necessarily follow that we should nevertheless use them in all cases – the real world *is* complicated, after all.

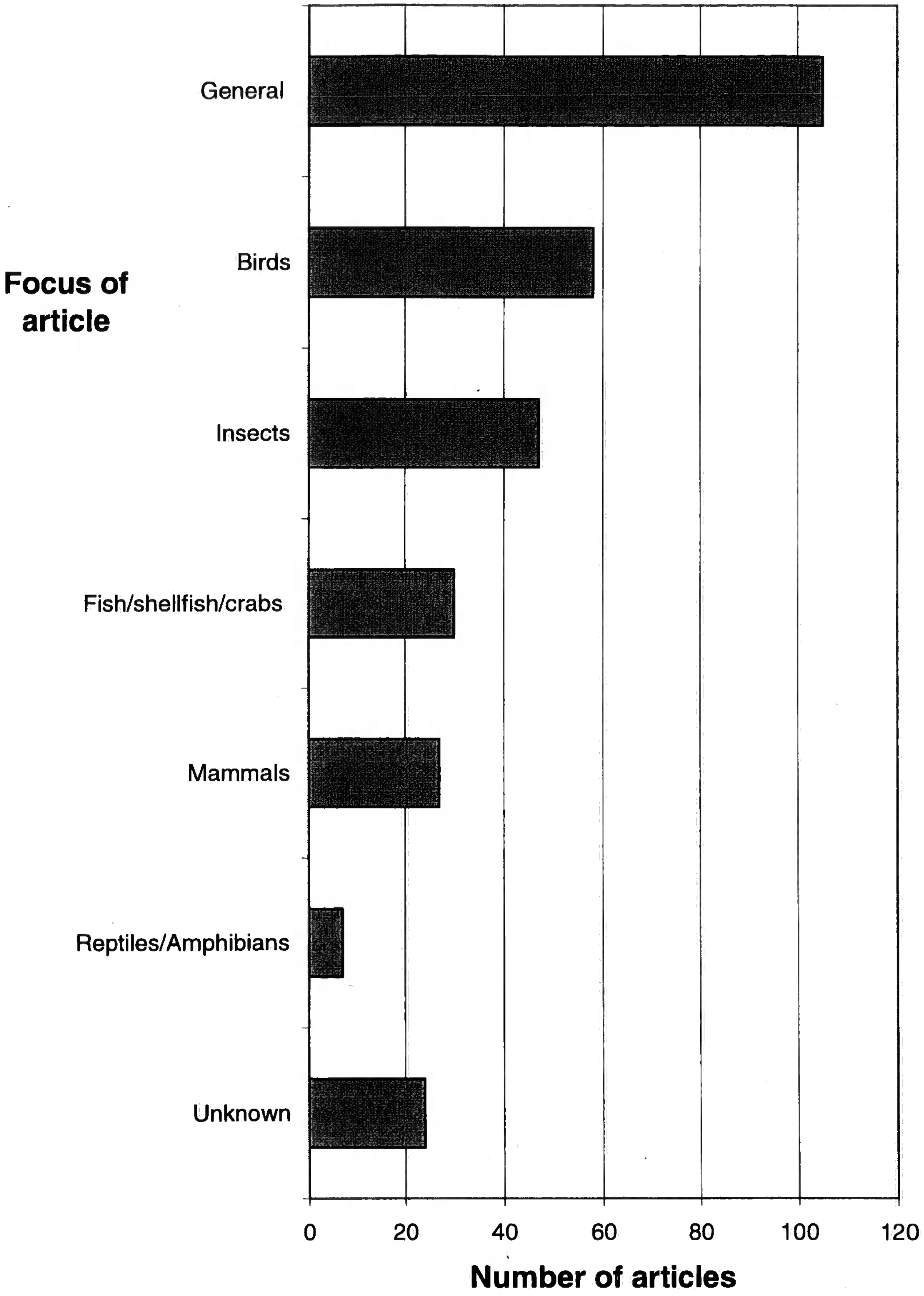
2.32: Can it be used over broad geographical areas and time scales?

It has been argued that Optimality Theory is at its most useful when it is applied to broad geographical areas and time periods. This is logical, since it is a tool of evolutionary biology. For example, Foley stresses that all hominids should be assessed rather than just modern humans (Foley, 1985), but this gives us a time span of over three million years, and would seem to make optimality theory completely irrelevant to the work of most archaeologists. Within the same article, however, it is said that optimality theory can only account for static periods, and not times of change (ibid.). Winterhalder states that the environments in which optimality is assessed may not be similar to those in which behaviours evolved (1981) – a very likely scenario with ever shifting human populations and environments in a constant state of flux. Why this should be a problem is questionable, however, in that if a behaviour continues without change, maybe it *still is* optimal in some way, or at least it is not harmful.

2.33: Is Optimal Foraging Theory relevant to humans?

In general answers to the question above are likely to fall into two camps – yes and no – with little interaction between. Optimality Theory has been critiqued in that it is inappropriate to apply principles developed for "passerine birds and arthropod predators" to humans (Foley, 1985, p222). This reaction seems strange, at first sight, since most contemporary people raise no objection to the principle of Natural Selection being applied to *Homo sapiens* as well as finches, tortoises and so on, but then Optimality does seem to have been used mainly in studies of birds – at least three of the references Winterhalder cites are about optimality in bird populations (namely Krebs and Cowie, 1976; Horn, 1968; and Orians, 1971). A survey of the references cited in Pyke's review of the literature (1984) also reveals a bias towards the use of OFT in bird and insect studies, at least at that date (see Fig 2a). Pierce and Ollason (1987) reject optimal foraging theory utterly on eight detailed counts, even from a biological sciences perspective. Like Natural Selection, the focus of OFT is upon the ways in which behaviours promote reproductive success, in this case foraging behaviour in particular. This may not be appropriate for any animal (Pierce and

Fig 2a: Survey of Optimal Foraging Literature.



A count was made of the articles (n=298) in the references section of Pyke (1984). Naturally Pyke's own reading preferences and the proportion of species in nature affect the totals, but birds *do* appear to dominate.

Ollason, 1987) and is certainly dubious for human populations. Even proponents of the use of OFT in anthropology acknowledge that humans may optimise for individual success during their own life, rather than reproductive output (Foley, 1985). It may be extremely difficult even to recognize the degree of optimality achieved or aimed for, however. Environments can change quicker than genetic evolution can take place in many animals, particularly humans, and the rapid way in which humans can innovate culturally and technologically makes us more flexible than most (Winterhalder, 1981). This seems particularly relevant to the end of the last glaciation, which we now know to have been sudden. Humans can have a vast repertoire of rapid responses to the variables typically assessed under OFT. For instance, in a hot environment animals might maximise feeding time while minimising the chance of over-heating (Sih and Milton, 1985). There are several ways for a human to do this – wear protective clothing, take water along when gathering, forage at dawn and dusk, take turns gathering and share the food later, build some form of tool to gather more efficiently . . . . All of these options are a result of our general intelligence and resourcefulness rather than the separate discrete adaptations that another animal may rely on. Humans also share information (as do other animals to a lesser extent) at central gathering places to reduce individual sampling needs (Sih and Milton, 1985).

A criticism that is more philosophical than methodological is the biased way in which OFT has been applied to humanity. The theory is, almost without exception, used in the study of hunter-gatherers (Keegan, 1986, uses optimal foraging theory in an analysis of Machiguenga horticulture in Peru[4]). Simple circular reasoning may appear to justify this – foraging theory = foragers – but if it really is essentially about the endless cycle of feeding and breeding, then it is no more exclusively applicable to hunter-gatherers than is Natural Selection. Winterhalder insists that hunter-gatherers were not chosen as the focus of optimal foraging strategy because they are a "manageable set of examples" (1981, p16) but goes on to say that they are useful because they do not use money and are 'restricted' (his verb) to subsistence. The

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[4] Even this community supplements their cultivated maize and manioc with hunting, fishing and gathering, and they are regarded by the author as transitional:

existing literature would seem to imply that hunter-gatherers have more in common with leaf-cutter ants than they do with lawyers and stockbrokers, which is perverse. The oft-quoted archaeological adage "Neolithic farmers have social relations with each other, Mesolithic hunter-gatherers have ecological relations with hazelnuts" (Richard Bradley, 1984, p11) is particularly relevant here.

Thus there are so many provisos, criticisms and limitations that can be levelled at Optimality Theory that its potential impact would appear limited, but we should not be unnecessarily pessimistic. There is nothing inherently wrong in trying to assess how ancient and contemporary peoples managed their diet, and optimal foraging theory was clearly attractive as a possible way of doing this complicated task. It should always be kept in mind that the theory is a benchmark of comparison, as said above – significant drifts *away* from the optimal are interesting, not errors to be ironed out (Halstead, pers. comm.). The best legacy of such studies is that we now see human beings as ecological animals, a part of the whole, and this is positive if we also acknowledge the holistic nature of human society. Thus, in the chapters that follow, you will find food and environments discussed but also technology, art, settlements and burial, for the contexts they give.

2.4: How quickly does diet change?

It has been said:

> "Dietary customs, such as food preferences and taboos, are vigorously adhered to and generally slow to change." (Wing and Brown, 1979, p12).

Can this be true under all circumstances, however extreme? If so, what is the psychology behind such rigid conservatism? While hunger is a physiological state, appetite - and the food choices we make - are psychological factors that differ between people (Mennell, 1991). Mennell describes humans as having an 'appestat' which, like a thermostat, can be on too high (bulimia) or too low (anorexia) a setting, and the factors determining the appestat are physical and social – for example the perception of an acceptable body image (ibid.). Clearly there are individual decisions involved, but also cross-communal or intra-communal trends. We can see cultural

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"The focus of this paper is horticultural economies. Their significance rests in their evolutionary modification of diet clearly in our own society and throughout documented history (see, for example, Fiddes, 1991, and Goody, 1982) and, whilst recognizing it in distant prehistory is possible, establishing reasons for dietary change can be problematic. In this section the elusive signs of dietary modification and the reasoning behind it shall be assessed and discussed.

2.41: Does diet change rapidly under resource stress?

The 'ranking' of foods has already been mentioned during section 2.3, in relation to Optimal Foraging Theory, and it would appear that many societies have so-called 'famine foods' that are only called upon during times of extreme stress. This is interesting, but it does not suggest a permanent dietary change. Temporary starvation does not necessarily lead to permanent dietary change, less still permanent cultural change, but it seems possible that sustained shortages will affect a way of life insidiously. To illustrate, Goody (1982) mentions how he and colleagues ate cat in the situation of a POW camp (pp 83-85). It does not imply that they went on to consider cats a viable meat resource when they returned to civilian life. Even if they had, the prevailing morality of society would have prevented the use of cats in this way, and even the other prisoners were disgusted (see Fiddes, 1991, pp136-137 for a discussion of the household pets and Oriental restaurants Urban Myth). In an example of shortage in a particular resource, potato crops were decimated during what is usually known as the Irish Potato Famine of 1846-1850, hitting the labouring classes hardest (see the *Clannada na Gadelica* website) but potatoes remained popular in Irish cuisine afterwards. It has been suggested archaeologically that a whole way of life can change due to the failure of a key resource. For example in Mesolithic Denmark the decline of oysters due to an increase in salinity is proposed to have, perhaps over a course of years, been the cause of disaster (Rowley-Conwy, 1984). Oysters were a reliable staple during the already lean seasons, their failure may have caused a famine and provoked the adoption of agriculture, which had already been known about for a thousand years (ibid.). Clearly it is tempting to see a connection between the decline of the resource and the contemporaneous adoption of a lifestyle the people had been wilfully ignoring for centuries, but can a single foodstuff really have such far-

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position between hunter-gatherers and agricultural subsistence systems." (Keegan, 1986, p92).

reaching effects? It seems unlikely, but there is little doubt that the disappearance of an important food is potentially distressing, even if it does not result in starvation or hardship. Seremetakis (1994) believes that all material culture is intimately bound to memory and our ability to create histories, but the first – and most poignant – example she gives is of a foodstuff (pp1-4). It is the *rodhakino* fruit, or 'Aphrodite's Peach', which gradually but irretrievably disappeared from the Greek markets due to crossing with another peach variety and, ultimately, interference from the EEC. Seremetakis describes how upsetting it was to find that this valued food, with its mythological connotations and ability to trigger memories of childhood, has gone forever. In the quotations of Appendix 1 (taken from Kulchyski *et al*, 1999) many of the interviewees talk about resources that have disappeared, are disappearing, or are simply out of bounds to them in the current state of society. It is apparent that seemingly trivial aspects of life, once vanished, are actually very important to our cultures and world views.

2.42: What happens to the diet when a group is displaced geographically?

We have said that hunter-gatherers do move around the landscape, within their own territories and – occasionally – further afield, but what consequences does this have on their foodways? Buffering, for example, would normally involve members of the stressed group going into a neighbouring territory and gathering resources themselves (Spielman, 1986). Thus, this does not necessarily involve a drastic shift in distance, so resources available may be similar, and they are able to gather the foods *they* desire, rather than hand-outs from the host group.

Long distance displacement may be unhealthy. Hunter-gatherers are, of course, susceptible to diseases within their ecosystem but on the whole they are well adapted to *that* ecosystem – displacement of groups to other lands, and contact with outsiders, promotes 'new' disorders (Dunn, 1968). For example Eskimos are physiologically adapted to a diet higher in meat than most diets around the world, and find a low-meat diet difficult to tolerate (Wing and Brown, 1979). Unfortunately the authors do not make clear whether this problem affects adults and children alike – how quickly can the body learn to compensate? A situation particularly relevant to this thesis research is the behaviour of hunter-gatherer groups when moving in to a 'virgin landscape'.

Naturally, there may be many similarities between the new area and that from which they moved, especially in the post-Glacial scenario of expansion from refugia, but some situations may be completely novel.

2.43: The influence of outsiders and social critique.

In our own society the influence of external foodstuffs is twofold. Some 'foreign' foods are seen as negative, particularly American products such as sugary drinks and 'fast foods', probably as much for reasons of cultural protection as safeguarding health. It does not stop us from consuming them in huge quantities. This ambiguous relationship has a history – for example in George Cheyne's 18th century work 'The English Malady' exotic, luxury imports were blamed for provoking cultural malaise (discussed in Turner, 1991). Other imports and influences are portrayed as health giving and culturally admirable – e.g. olive oil, the 'Olivio' commercials ("Club 18 to 130"), and the support for Mediterranean culture generally. Wing and Brown (1979) argue, citing the example of pre- and post-invasion Mexico, that change of local diet is actually very gradual, even under the influence of introduced foodstuffs. Apparently, although humans adapt easily to food sources in a new area, a diet is rarely thrown out wholesale (ibid.). Adjustments are made, however, often to reflect changes in social circumstance, or as social critique. Vegetarianism is a current case – there can be many reasons for adopting a vegetarian diet, including health issues and taste, but aversion to animal cruelty and industrialised production methods are also cited (Fiddes, 1991). Within contemporary hunter-gatherer societies a mixture of foods are eaten, both traditional resources and those that have clearly been drawn into the cuisine from external influences. For example, on his fieldwork with Inuit peoples Alexander noted so-called 'land foods' such as caribou meat, seal, walrus and Arctic char remain the staples, despite the imported alternatives that fill the supermarkets (Alexander and Alexander, 1996). Some non-indigenous foods have been accepted enthusiastically, however, such as tea, coffee, ship's biscuits and packet macaroni cheese (ibid. and examples in Appendix 1). Who, in society, is the main driver for resource introductions? The following observation may be telling:

"We ate seal meat most days, and I noticed how Niaqutsiaq's children would smother it with tomato ketchup whenever they could. Joshua, a young Inuk from

Arctic Bay, obviously was not keen on it either. 'You can live on this land food OK', he told me, 'but it tastes like shit!'." (ibid. p147).

Parental critique and a mild desire for rebellion is hardly restricted to the Inuit, or hunter-gatherers generally, and it is worth bearing in mind that some individuals within a society, or whole sections, may be more willing to change their diet than others. For the perspective of older people in Inuit society and other groups to introduced foods, see Appendix 1.

As well as the actual substances eaten, the *way* of eating is an important social marker. A single food can be considered pure in its uncooked state but polluting when cooked (Douglas, 1966), and presumably vice-versa. Even at the start of life there are food issues. As Synnott says: "Everyone may eat in public, except babies." (1993, p.163), but fashions change, in part due to the realisation that this taboo does not always apply to infants in non-Western cultures.

2.5. Conclusion.

Consideration of external influence and dietary change is very relevant to the Mesolithic–Neolithic transition in Europe, when we have both examples of 'new' foodstuffs (e.g. sheep, wheat, many others) and new ways of eating (ceramic technology), and the possibility that these innovations may have been accompanied by human population movements. It is also relevant in the earlier period, however, after the end of the last Glaciation, when populations in Europe are also believed to have been expanding, and contact was potentially easier. They also faced a climate and environment that was erratic, if not necessarily drastically different. Are there significant differences in foodways that can be observed in the archaeological record of this period?

Chapter 3: The 'Broad Spectrum Revolution' in the Near East.

3.1: Introduction.

The late Pleistocene/early Holocene of the Near East has been subject to a long history of research, no doubt partially because of the Biblical heritage in the region. More importantly, it is the main centre for the origins of agriculture in the Old World, and probably the most intensely studied early farming area anywhere. This has led to some problems. The period has been split into labelled 'cultural groups' on the basis of technology and subsistence strategy such as Natufians, Mushabians, Harifians and Kebarans – some of which were contemporary – as if the communities were already distinct tribes. There is also a slight bias in that most of the evidence, until recently, came from the Levant rather than southwest Asia generally (Rosenberg *et al*, 1998). Even pollen cores have been taken in an unevenly distributed manner, partly due to the paucity of useful sediments in the region (Baruch and Bottema, 1991). Understandably, political and military unrest have not helped, from the Ottoman Empire up to the present. Also, the emphasis upon the origins of farming and the sedentary way of life mean that the Mesolithic period here, even more than in the other regions of Eurasia, is definitely a 'prelude' (after Clark, 1980). For example, Flannery (1969) argues that the Broad Spectrum wild resource utilisation in the Near East during the Upper Palaeolithic "set the stage" for the domestication of plants (p 74). Others (Bar-Yosef and Kislev, 1989) talk of hunter-gatherers being "forced" into broad spectrum foraging, and how sedentary life ensured that "the ensuing socio-economic developments were unavoidable" (p633). In this chapter the subsistence activities of the people living in South West Asia during the Epipalaeolithic will be reviewed. A specific aim is to question whether the impact of any subsistence changes is truly worthy of the epithet 'revolution' as Flannery (1969), Henry (1989)[5] and others believe. Looking ahead to further chapters, it is also important to assess to what

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[5] The opening statement of Henry, 1989: "In the history of human development it is hard to overemphasise the importance of the economic transition from foraging to food production." p3. He then recounts, briefly, all the positive or at least neutral effects of food production.

extent the subsistence adaptations in this region, momentous or not, were important for other regions, particularly southern Europe.

3.2: Subsistence regimes in existence during the Near Eastern Upper Palaeolithic.

Arguably, during most of the Upper Palaeolithic the hunter-gatherers of the Near East are practising a similar subsistence strategy to their contemporaries elsewhere. From the Mousterian to the Natufian eras there appears to be a shift from the hunting of larger ungulates, through to more medium sized and smaller animals (Davis, 1991). However, subsidiary resources utilized in the Mousterian are actually more varied than those exploited in the greater part of the Late Upper Palaeolithic (Edwards, 1989).

The Kebaran foragers who inhabited the Levant from about 19000 bp until 14500 bp, hunted medium sized mammals such as gazelle and fallow deer, lived a mobile life in small groups, and probably also utilized wild cereals, pulses and fruits (Bar-Yosef and Kislev, 1989). There is isotopic evidence for C3 plants in the Kebaran diet, but no evidence for C4 (tropical) plants or marine foods (Sillen and Lee-Thorp, 1991). Unfortunately, owing to problems in extracting bone collagen from skeletons of this age, these interesting isotopic results come from only one individual and cannot, therefore, be taken as typical. The fact that Kebarans suffered tooth pulp exposure, abscesses and adult tooth loss just as much as the Natufian peoples (Smith, 1991) suggests their diet was not too dissimilar.[6] Slow-moving small prey, such as tortoises and 'legless lizards' were caught regularly by human groups in the Mousterian and Kebaran periods but the more agile small animals were either ignored or left uncaught from a lack of suitable technology (Bar-El and Tchernov, 2000). The taxonomic diversity of the fauna from the Kebaran sites, when contrasted directly with the later Natufian sites, is definitely lower (Edward, 1989). Edwards suspects this is partially due to taphonomic factors, since the increasingly sedentary hunter-gatherers of the Natufian left more compact and discrete middens, contributing to an increased likelihood of species diversity in the remains. The relationship between site area and

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[6] Dental attrition is more severe in the Kebarans and the Natufians compared with both the earlier foragers and later agriculturalists, but dental caries – whilst known in Natufian and Kebaran skeletons

number of taxa (ibid, fig 2a, p232) bears this out. We know contemporary foragers at Wadi Kubbaniya in North Africa were already using plant foods extensively and practising 'broad spectrum subsistence' generally (Hillman, 1989, p222). This diet included thirteen different edible plants, and also fish, mammals and birds (Hillman, 1989), probably reflecting the general richness of the site's Nile Valley location. Again, a more sedentary lifestyle has almost certainly contributed to better preservation of a wide range of ecofacts. Poor preservation – or lack of preservation at all – has resulted in a dearth of plant remains from the Epipalaeolithic Near East. Colledge (1991) had to identify the plant remains of Wadi Hammeh 27 from their internal as well as external structures as they were so badly broken, and has concerns that other excavators may have simply given up. It has also been noted that the contemporary inhabitants of the area today, the Bedouin, regularly use wild plant foods without cooking, or simply boiling them, thus effectively extracting these foodstuffs from the archaeological record (Colledge, 1991). Undoubtedly many of these wild plant foods require no complex equipment for harvesting or processing, either, unlike the sickles and grinding stones of regular cereal exploitation.

The extent of bird exploitation in the Kebaran is difficult to ascertain. The fact that birds were only listed as 'other' in several of the Upper Palaeolithic reports, while bird bones at Natufian and Mousterian sites have been meticulously recorded down to the small passeriforms which are not necessarily human prey, does not help the general picture of species diversity in this period (Edwards, 1989).

To summarize, the late Upper Palaeolithic hunter-gatherers of the Near East, or 'Kebarans', do not appear to be following a broad spectrum foraging strategy, but the evidence available is by no means conclusive. What could have encouraged them, and their contemporaries, to increase the breadth of their foraging base?

3.3: Environmental and habitat change at the Pleistocene/Holocene transition.

It is easy to blame the ravaged landscape of the Near East upon the long history of agriculture and herd husbandry in the area, but it must be remembered that later

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definitely become more frequent in later times (Smith, 1991). This may reflect a move towards cereals metallurgy, ceramic technology and even the use of lime plaster from the Neolithic onwards all required large amounts of fuel and exacerbated the depletion of the natural forests (Brett Hill, 2000). Even before the beginnings of agriculture the Near East was affected by the same global climatic changes as elsewhere, characterized by repeated cyclic changes and the abrupt end of the Pleistocene (Johnsen *et al*, 1972), but there are some aspects that are specific to the region. Quite subtle changes in climate can have dramatic repercussions on the environment of the Near East because the moisture levels and temperatures of this region are highly sensitive (Henry, 1989). Of course this may differ on a local scale, for example between highlands and lowlands, or coastal and inland. Certainly, the forest, steppe and desert zones are all relatively close together in the Levant and susceptible to change (Henry, 1989), while the glacial refugia of Europe may have been more stable.

The 'Kebaran' people appear to have been restricted to the lands close to the coast until 14500 bp, as the habitat further inland would have been too cold and dry to exploit intensively (Bar-Yosef and Kislev, 1989). The period between 14500 bp and 12500 bp is marked by an increase in rainfall, which probably widened the foraging zone since the number of archaeological sites increases (Bar-Yosef and Kislev, 1989). Then, from around 12,500 BP, worldwide temperature elevates and the moisture bearing storms steadily move northward from the east Mediterranean, and at about 11000 BP the Levant starts to dry out, the woodlands shrink and retreat into the uplands (Henry, 1989). At least, this is the traditional Levantine picture. The pollen core from Ghab, in north western Syria, indicates that the forests and, by extension, humidity levels were at their peak at about 11500 BP and that the Younger Dryas period was generally marked by a rise in humidity in this area (Baruch and Bottema, 1991). This appears to make sense, especially if the 'moisture bearing storms' did not move *drastically* northwards. According to Fig 3.2 in Henry, 1989, p65, Ghab would still fall within a moist area. There is some disagreement as to how close the site of Tell Abu Hureyra, also in Syria, was to the oak-forest zone. The pollen record would suggest that the oak forest was no closer than 150km away (van Zeist and Bottema, 1982), but there are plants such as hackberry and Rosaceae – which are characteristic of the oak forest – among the plant macrofossils (Hillman *et al*, 1989). Of course the

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cooked as gruel/porridge, but also possibly bread or beer.

pollen has been brought to the site by largely non-human agencies while the plant macrofossils are almost certainly the result of human gathering for foodstuffs and other uses, but it seems unlikely the forest fruits were gathered from such a long distance, or even exchanged along the line.

Similarly at the site of Saflulim in the central Negev highlands, which was occupied around 11,000 BP, the presence of *Pinus* and *Paliurus* among the charcoal assemblage suggests that humidity and general conditions in the area were decidedly more favourable than they are today (Goring-Morris, 1999). However the Hula pollen evidence, from northern Israel, is not synchronous with the Ghab diagram and seems to fit more easily with the traditional framework. The Hula area is drying out in the Younger Dryas when the Ghab is humid, whilst at the beginning of the Holocene Hula is also gaining increased humidity and conditions in the two areas are becoming more similar (Baruch and Bottema, 1991). Further afield, wood charcoal analysis from Hallan Cemi in Turkey revealed the presence of *Fraxinus*, *Quercus*, *Prunus*, *Pistacia* and *Salix* or *Populus*. These last two species, and perhaps the abundant ash, suggest that riverine forest was present when the site was occupied, as well as the extensive (but sparse, to the English eye) oak forests that still surround the site today (Rosenberg *et al*, 1998).

In summary, it would be wrong to think that the habitats of the Near East were constantly and uniformly harsh and inhospitable, with the hunter-gatherers being pushed relentlessly back by encroaching desert. Good habitats did exist, and it would perhaps be more of a mystery if the communities had *not* foraged broadly.

3.4: Other potential reasons for subsistence change.

Given the ways in which small hunter-gatherer groups control their resources (see chapter 2, above) the question of *why* the subsistence regimes would have changed radically must be addressed. Circular arguments abound, with the same factors cropping up, but sometimes as cause and sometimes as effect. The different strands of argument are neatly summarised in Henry, 1989, fig 1.2, p13, reproduced here:

Modes of adaptation

Simple foraging Complex foraging Food producing
1st transition 2nd transition
12,500 BP 10,000 BP

1.Broad spectrum >>>>>>>>>>>Population growth>>>>>>>>>>>>>>>>>>>>Emergence of
subsistence & expansion agriculture

2. Population growth>>>>>>>Resource>>>>Broad Spectrum>>>>>>>>>>>>>Emergence of
& expansion stress subsistence agriculture

3. Resource>>>>>>>>>>>>>Broad spectrum>>>>Population>>>>>>>>>>>>>Emergence of
stress subsistence growth agriculture

4. Expansion of>>>>sedentism>>>>specialized subsistence>>>>>Resource>>>>EoA
cereals & population growth stress <u>or</u> return to
simple foraging

As can be seen, stress - of one sort or another - is almost always cited as the 'push' towards broad foraging and eventually food production. For example the BSR in the early Natufian can be seen as a reaction to an exhausted habitat, with increased reliance upon domesticates a later adaptation to the same problem (Tchernov, 1991). The necessary knowledge may have predated the actual start of plant cultivation by some time. For example Hillman suggests that foragers who regularly harvested the same area of wild nut grass would definitely notice the better quality of these stands and thus 'incidentally' propagate them but unless some stress beset them there would be no reason to *rely* upon food production (Hillman, 1989). As has been discussed above, environmental change in the area was certainly patchy, and it would seem some areas became favourable areas for human exploitation when others declined. If the Epipalaeolithic Natufians had continued to forage the landscape widely, in small groups, and exercise other ways of buffering shortages, they probably could have coped with even a severe environmental change (Henry, 1989). Population and demographic 'disequilibrium' (Binford, 1968; Flannery, 1969) tends to be the favoured stress factor, but this is also problematic for similar reasons as those outlined above. Hunter-gatherers can and do control their populations numbers, usually more successfully than agriculturalists. Binford suggests that an expanding population will encroach upon the territories of stable populations, eventually forcing both groups to readapt as they move beyond their favoured habitat (for more detailed discussion see

Binford, 1968). However this theory infers what might happen when a population is already increasing rather than why they initially lose control over their group size. Besides, though population numbers do appear to increase, this happens *during* Natufian times rather than before (Henry, 1989).

3.5: The Natufian subsistence strategy and its contemporaries.

As we have seen, the earlier hunter-gatherers are by no means living on a restricted diet, but the *proportion* of small animal resources does allegedly increase dramatically, from approximately equal numbers in earlier times to small resources becoming three to eight times as common as large animal species utilised in the Natufian era (Henry, 1989). Even then, it is apparent that a gazelle carcase, for example, carries at least eight times as much nutritional value, in terms of fat and protein, as the average fish, so it is necessary to keep these quantities in perspective. Flannery (1969) states that ungulates continued to make up to 90% of the meat supply in the Upper Palaeolithic, but the *range* of smaller wild resources, including fish, crabs, molluscs (marine and terrestrial), turtles, partridges and migratory water fowl, increased. As Edwards has argued, this broadening may be more apparent than real, but even Edwards' critique tends to deal with species presence/absence rather than the real quantities involved (e.g. fig. 1 in Edwards, 1989, p 227).

Neither is broadening, *per* se, necessarily very significant. More species of birds, for example, are exploited in the Natufian but the overall contribution to the diet of bird meat generally remains static (Edwards, 1989). The capture of *Lepus capensis* (cape hare) does appear to intensify in the Natufian period. Table 3 in Bar-El and Tchernov (2000) shows that the density of lagomorph remains is significantly higher at the Natufian sites (Hayonim Cave layer B and Hayonim Terrace) than in the Mousterian, Aurignacian and Kebaran periods and the pre-pottery Neolithic, but they are present in small quantities throughout. Flannery (1969) did not believe that small mammals are a reliable resource anywhere in the Near East, but fish, fowl, molluscs and plants were more secure. However, southwest Asia has little coastline compared with its land mass (Edwards, 1989), so the foragers could not rely upon marine resources to the same extent as the *escargotières* of Portugal or North Africa (Lubell and Gautier, 1979).

Strontium/Calcium ratios and bone apatite isotopes from the Natufian sites of Hayonim, El Wad and Ein Mallaha offer evidence of a C3 plant diet with "negligible" use of C4 and marine foods (Sillen and Lee-Thorp, 1991, p405). The authors point out, however, that sites where Natufian groups may have made regular use of marine resources are probably now under water (ibid.). The evidence for plant resources being an important dietary staple in the terminal Palaeolithic is more concrete, but as outlined above it is difficult to prove that they were not always important. There is also a bias in that many of the Near Eastern plants utilised for food are herbaceous and grow together in stands, producing seeds at about the same time, and therefore when gathered *en masse* – e.g. with a sickle – the species diversity is inevitably higher than that of a strategy based upon the gathering of tree fruits or roots (Hillman, 1989). Model 4 in Henry's 'Modes of Adaptation' (above) relies upon the presence and expansion of wild cereals in the Near East to explain sedentism, population growth, ecological breakdown and the eventual invention of agriculture. The Tell Abu Hureyra evidence seems to fit this model, though root foods and animals such as gazelles were also very important (Hillman *et al*, 1989, and Legge and Rowley-Conwy, 1987). At Hallan Cemi in Turkey, however, the community appears to have lived at the site all year round, utilising a broad spectrum of resources, but wild cereals were *not* important (Rosenberg *et al*, 1998). At this site lentils, bitter vetch, almonds, pistachios, sheep/goats, red deer and, particularly, pigs supported a sedentary lifestyle. There were also some turtles, birds, fish, lizards and freshwater clams (ibid.). Interestingly, there is evidence that both the ovi-caprids and the pigs may have been managed to a degree. Nineteen out of the twenty-eight sexable ovi-caprid bones were male, providing tenuous evidence that the flock was selectively culled. More conclusively, there is an 11:4 bias in favour of males among the pig assemblage, and 43% of the pigs consumed were less than a year old. Also, body part data suggests pigs were slaughtered closer to the site than other animals (Rosenberg *et al*, 1998). Clearly, none of this is conclusive proof of pig husbandry, and undoubtedly if the same assemblage occurred twenty thousand years earlier in northern Europe different conclusions would have been reached, but it does make a good case for an independent innovation centre of the pre-farming 'mind-set'.

There is a good argument that gazelle were being manipulated by the Levantine Natufians too, however, without leading to the husbandry of that particular species. Gazelles were the main animal resource in the Natufian, and indeed it might be argued that their subsistence strategy was not truly broad, but rather a gazelle-hunting specialization with a wide range of subsidiary resources. The hunting strategies adopted for gazelle exploitation are certainly more than just opportunistic. At Tell Abu Hureyra gazelle appear to have been killed *en masse*, perhaps in a structural trap similar to the 'desert kite' of recent times (Legge and Rowley-Conwy, 1987). Such a mass drive and slaughter would seem to imply a catastrophic age and sex profile, but there is also archaeozoological evidence that the wild herds were selectively culled. At the Hayonim site the male to female ratio in the Aurignacian and Kebaran faunal assemblages is approximately 1:1, but the Natufian deposits from Hayonim Cave Layer B, Hayonim Terrace and Ain Mallaha have respectively 80%, 76% and 71% males (Cope, 1991). This trend then reverses in the Late Natufian until the ratio is more or less equal again, implying that this heavy bias against the male of the species was unsustainable in the long term (ibid.). Biometrics and age profiling provide further evidence. Relentless hunting pressure does seem to have dwarfed the animals over time (Tchernov, 1991). Davis's work on gazelle tooth crown heights shows that the proportion of juveniles killed increases, again probably due to sustained human predation (Davis, 1991). This case is interesting as it is cited, understandably, as the beginnings of human manipulation of the environment (e.g. in Cope, 1991) but is also a clear case of human excess causing ecological disaster. Management of animals, in the current sense, would mean more that simply taking off the 'cream' of the herd without predicting the consequences, though of course modern groups are not always free to do as they wish [7]. It is perhaps telling that the equal sex ratio is re-established towards the end of the gazelle hunting period – did the hunters perhaps realise what they were doing? Also, given the drives and traps probably used to kill the gazelle that both Cope (1991) and Legge and Rowley-Conwy (1987) mention, is it possible that individuals were randomly killed but mainly the male carcasses were utilized? This would be an even more wasteful strategy than that proposed. The description of male

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[7] For example, since the 1960s reindeer exploitation by the Saami in Norway has become more intense, but this is largely because the government 'Reindeer Herders Administration' encouraged them to make reindeer herding an economic rather than strictly subsistence way of life. The overcrowded reindeer sickened and gradually reduced in weight, becoming noticeably smaller than the Siberian reindeer, even in this short time (Alexander and Alexander, 1996).

and female gazelle morphology in Cope, 1991, seems to indicate that males and females could be told apart when they are alive, but how easy this is in the scrum of a desert kite is doubtful. It is also feasible that some cultural preference existed for the hunting of males, such as those we know in later periods, but it is difficult to see how this could be sustainable on a day-to-day basis. Given that the Natufian people were not alone in the landscape, but sharing it – for up to a thousand years – with 'simple' mobile foragers known as Mushabians (Henry, 1989) the issue is raised as to how the intensive Natufian gazelle exploitation would have impacted upon the subsistence of this other group. Approximately 77% of the animal prey at Mushabian sites consists of roughly equal quantities of gazelle and wild goat, with some equids, wild cattle, hare, tortoise and partridge (Henry, 1989). Clearly this diet has some similarity with that of the Natufians, though hunting the agile goats in the uplands may have been their own specialism (ibid.) and thus potentially eased the presuure from any gazelle depletion. Interestingly, at Mushabi XIV the people appear to have been smoking meat using large quantities of juniper wood, which is just as good evidence for food storage as the silos, baskets and granaries, albeit of a different foodstuff. The Harifians, at the end of the Natufian period, were still hunting dorcas gazelle, but also wild sheep, ibex, onager and aurochs (Butler *et al*, 1977), but their smaller population may have had less of an ecological impact.

It is debatable as to whether the Natufian regime in general was a reliable means of subsistence, or an inherently unstable strategy that necessitated further change of some sort, as the 'modes of adaptation' models above all imply. Simple foraging may seem inefficient, but it is stable in the long term precisely because enough food sources are left behind to regenerate (Henry, 1989). In this case the 'revolution' tag seems very doubtful, as the terminal Pleistocene hunter-gatherers and their farming descendents are not making drastic and intentional improvements in their lifestyle but rather reeling from one disaster to another. They are, essentially, 'victims of their own success'. An increasing incidence of enamel hypoplasia has been recorded in Natufian teeth over time, suggesting childhood malnutrition, and also a diminution in stature – though this may be caused by other factors (Smith *et al*, 1985). However, high as the incidence of Natufian hypoplasia may seem, it is trivial compared with that of succeeding agricultural populations, which could indicate that the Natufian diet was nutritionally quite sound, *or* that malnourished Natufian children were less likely to recover (Smith, 1991).

The subsistence strategies themselves may point towards fear of famine. Early animal domestication may have been a way of 'banking' surpluses (Flannery, 1969, p74) in a way that the mass slaughter of gazelles was not. The pigs managed – or at least heavily exploited - at Hallan Cemi are also seen as an 'insurance policy' for hard times in a way that red deer could not be (Rosenberg *et al*, 1998, p35). Even this did not work in the long term, however. The people of Hallan Cemi appear to have relocated to the slightly later site of Demirkoy, on the western bank of the Batman River, where they returned to – or began – a cereal exploitation strategy (ibid.). The authors suggest that cereals have an advantage over nut-bearing trees because they are annuals, but this does not explain why pigs went out of favour. Pigs breed an annual litter 'crop' too, given the chance. Marvin Harris's (1975) arguments about the difficulties of keeping pigs in the habitats of the Near East cannot be supported here, because oak woodlands still proliferate in the region.

3.6: Implications for non-subsistence areas of life.

It is a criticism of post-processualists that traditional archaeological reports and other narratives typically progress "from environment and economy to society and settlement, to ritual and ideology" (Hodder, 1986, p21) and I apologise for perpetuating this well-trodden path in this and following chapters. In defence, food and subsistence strategies are the primary area of interest for the thesis, but no aspect of life is completely disconnected from others and subsistence must be put into context. It would be impossible to deny that terminal Pleistocene foraging, and early agriculture, did have repercussions upon other areas of human existence.

3.61:Technology.

Did a broad spectrum foraging lifeway necessitate new and improved hunting and gathering technologies? Superficially, the answer to this question is almost certainly yes. It is well known that some of the technology that we associate with agriculture, such as grinding stones and storage pits, was already invented before the Neolithic

(Flannery, 1969). Wild cereal exploitation has its own material culture, for example the sickle blade fragments with sickle sheen, and the bone handle interpreted as a sickle haft, found at 11,000 BP Saflulim (Goring-Morris, 1999). Traces of bitumen with imprints of basketry were found at Neolithic Tell Abu Hureyra, suggesting that bitumen lined baskets were used for storage during this period and perhaps before (Hillman *et al*, 1989). Stone grinding tools preserve well, but there are ethnographic examples of wooden grinding tools that may predate them (Hillman, 1989).

The evidence for fishing technology is mixed. Binford (1968) argued for the importance of aquatic resources in the Natufian, but aquatic resource remains are not abundant and there are only ten harpoon points found at Natufian sites – many of those at locations far from seas, lakes or rivers (Henry, 1989). The presence of large maritime fish, up to a metre long, at Hatoula, however, is good evidence for maritime fishing and thus boats (Lernau in Lechevallier and Ronen, 1985), just like the tuna of Franchthi and pre-Neolithic island colonization (Davis, 1991). It is doubtful how important these fish were to the day-to-day diet, however, and they are only relevant to the coastal areas. At the 19,000 BP site of Ohalo II, close to the Sea of Galilee, twisted fibres have been discovered which could have been used for netting fish or lagomorphs, both of which were present (Nadel *et al*, 1994).

Hunting of larger mammals may have been carried out using bows and arrows. Microwear analyses on the lithics at the Mushabian site of Tor Hamar in southern Jordan suggests that they were hafted onto a wooden shaft, probably using natural mastic (Henry and Garrard, 1988). Using Fenenga's guide (1953) that points weighing less than 3.5 grams are probably arrowheads rather than atlatl thrown darts, the Tor Hamar points appear to be arrowheads, since they weigh 2.5 gm at most (Henry, 1989). Red and yellow ochre has been used to decorate them, which Henry (1989) suggests may have been an ethnic identifier. This is possible, but there could be other reasons. Bright colours are an inter-species warning of poison, and it would be great to push the use of poisons in hunting back to the terminal Pleistocene, if only there was some way of testing this idea. The Harifian culture, which has a duration from about 10,600 – 10,100 BP, contemporary to the end of the Natufian, also has good evidence for arrowheads in the lithic assemblages, and red and yellow ochre, (Goring-Morris, 1991) but here the two lines of evidence are separate.

3.62: Trade.

The presence of exotics at several of the southwest Asian sites may point towards long distance travel and trade, and potentially co-operation between the various groups who lived there, though it is possible to press this argument too far. For example, thanks to the obsidian, greenstone beads and other exotic goods that are found at sedentary Jordan Valley sites, beyond the "suggested optimum of 5 km radius", the presence of mobile foragers in the higher hills and semi-arid regions to trade with is inferred (Bar-Yosef and Kislev, 1989, p636). This is odd because 'sedentary' really refers to the site and the community in general rather than all the individuals within it. We do not know how distinct the sedentary and mobile groups really were from each other – it is possible they shared a language, and that there were fairly fluid movements of people between groups, at least occasionally. Sedentary does not imply rooted to the spot. Also, just because mobile foragers are pushed to the marginal habitats in our own time does not mean that this has been the case since the dawn of sedentism (as Binford's 1968 model would seem to imply). The Mushabian people, who are suspected to have originated from Upper Egypt rather than the Levant, do not appear to have traded with the Geometric Kebaran people though they were contemporary and their territories overlapped, but they do trade with the later Early Natufians (Henry, 1989). Henry suggests that the Mushabians and Kebarans were so similar in most ways that they deliberately kept their tools different to define themselves, whereas the Natufians and Mushabians were so different that taking on cultural influences was a more attractive option. It is a tempting idea, but doesn't rule out the possibility that the groups were swapping less archaeologically visible 'commodities' such as ideas, linguistic terms and – highly probable – people, all along.

Exotic objects in all the various sites are often related to the sea. At Saflulim four sharks teeth were found, which appear to be contemporary with the site's occupation rather than fossils, though the site is well inland (Goring-Morris, 1999). At Ramant Harif, a nearby Harifian site, a similar shark's tooth was recovered (Davis, pers. comm. to Goring Morris). Marine molluscs, including pierced *Dentalia*, were also found (ibid.). Harifian sites, particularly the less ephemeral highland ones, have considerable evidence of exotic materials and art objects including basalt shaft straighteners, bell-shaped turquoise beads, large quantities of marine shells, rock crystals and bell-shaped fossils (Goring-Morris, 1991). This apparent 'wealth' exists despite their hamlets probably only being inhabited by 20 –30 people at a time, and their culture being considered "geographically peripheral to subsequent mainstream developments further to the north" (ibid. p173). Most of the mineral based materials and artefacts appear to be sourced from Maktesh Ramon, only 10-15 km east of Har Harif and thence probably within Harifian territory (if such a concept existed), but the marine shells may be evidence of longer distance contact. Sea-shell beads, obsidian, and copper ore (probably used as a pigment) were all found at Hallan Cemi but are unavailable locally and may be evidence of long distance trade (Rosenberg *et al*, 1998). Interestingly, though both Hallan Cemi and the site of Nemrik, to the east, have similar animal-carved pestles the evidence for contact is mainly in the other direction (ibid.). The presence of objects interpreted as 'maceheads' in the Hallan Cemi assemblage led the authors to the conclusion that the community were under population pressure and indulging in inter-personal violence. However, none of the other evidence in their paper remotely supports this theory.

3.63: Burial and belief.

Adult burials in Natufian sites show a male majority (children and sub-adults are difficult to sex accurately, however), which is possibly evidence for female infanticide, though it may simply be a reflection of different ways of dealing with the dead (Henry, 1989). We know the genders are treated differently in the burial rites, for example women are often buried together with dogs in the Natufian graves (Tchernov, 1991). This could be related to a lost belief system, or maybe women were more commonly associated with the community's dogs while both parties were alive for some more practical reason.[8] There are clay and stone figurines of women, often seated, at the later village sites (Bar-Yosef and Kislev, 1989), reminiscent of the Catal Huyuk figure. They are perhaps symbolic of fecundity, though this may be related to general natural fertility given the population problem widely believed to have existed (see above) and the possible infanticide. Some women over the age of twelve are also

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[8] It has been suggested that the presence of dogs, wolves and tame wolves in male and female burials at Lepenski Vir and Vlasac was a metaphor for the 'social other' category these animals filled. (Ivana

differentiated during life by having their upper central incisors removed, deliberately, for unknown cultural reasons (Smith, 1991).

Burials are associated with settlements, often under floors and in empty spaces, but rarely when there is more than one individual. Skulls are commonly removed from the adult skeletons and remain missing (Bar-Yosef and Kislev, 1989). The authors do not mention cut marks or breakages around the neck so perhaps the bodies were left to deflesh before the skull was removed. Preoccupation with the human head, and burial beneath the home, are factors that recur at later sites in the region such as Catal Huyuk and Jericho, and it has been argued that they are indicative of a new symbolic order that occurred around – or even encouraged – the emergence of agriculture (Hodder, 1990). Though the Harifian culture is contemporary with the end of the Natufian – and may even be simply a local version of it – one aspect that is definitely distinct is that the Harifian dead were not interred beneath the houses or in the immediate vicinity of the settlements (Goring-Morris, 1991). How the Harifians *did* deal with their dead is unknown, since no skeletons have been found, but it is effective evidence that not all of the communities living in the Near East at this time subscribed to the same symbolism, or at least its archaeologically visible manifestations.

3.64: Housing and social relations.

Of course, one of the central tenets of a sedentary way of life is permanent housing, and the early 'village' societies certainly do have more robust structures than those of earlier mobile groups. The highland Harifians, however, had very robust architecture including stone furniture, without the vast living areas and inferred high populations of their Natufian 'cousins' (Goring-Morris, 1991). Some aspects of the Epipaleolithic living sites do not seem drastically far removed from the mobile hunter-gatherer standard, however. For example at Hallan Cemi there are multiple small round houses focussed upon a central clear area, where dense concentrations of fire-cracked stones and animal bones – some still articulated – were found (Rosenberg, 1998). This seems to suggest food sharing, in the open, despite the separate sleeping arrangements, and a

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Radovanic, "Neither person nor beast – dogs in the Mesolithic." Research seminar at Durham degree of waste or affluence. There are also flat platform structures, which the authors interpret as storage silos. Similarly, in the pre-pottery Neolithic A sites in the Jordan valley fireplaces were found outside and inside the roofed rooms (Bar-Yosef and Kislev, 1989). This may suggest the vestiges of hunter-gatherer food sharing, but grain storage was in the form of large granaries *and* small bins (ibid.), perhaps related to a centralised distribution system. As well as the structures interpreted as domestic housing, Hallan Cemi also has two buildings that lack visible food-processing activity, have stone benches and well-kept floors and are interpreted as 'public buildings' (Rosenberg *et al*, 1998, p29). One also has an aurochs skull that was once displayed at the entrance, though aurochs do not appear to have featured in the inhabitants' diet. I would agree that these structures are good evidence of regular public meetings or other community functions, though obsidian processing does appear to have taken place in one of them (ibid.). However, the authors' conclusion that such activities are evidence of a 'social complexity' above the mobile hunter-gatherer average is dubiously founded. The Hallan Cemi meeting houses may be made of robust, archaeologically preservable materials, but the activities within them are not necessarily any more civilised or complex than a ritual conducted in the open air. We know mobile hunter-gatherers can have a complicated use of space that would not be traceable in the archaeological record (see, for example, Tilley's analysis of the Cree camp in 'A Phenomenology of Landscape', 1994).

Sedentism, and the later domestication of animals, may have had one important and lasting effect upon the settlements of these people, in that wild animals gradually became incorporated into the settlement. Taming of individual animals as 'pets' may have a much longer history (Serpell, 1989) but in the southwest Asian Palaeolithic there is good evidence for the domestication of wolves and the increasing commensality of other creatures. Recently it has been suggested that hawks and falcons may have been tamed very early in the Middle East – even as far back as the end of the Pleistocene – to be used as a hunting aid, like dogs (Dobney, in press). Sedentary villages immediately have an abrupt effect upon the local wildlife, essentially because there is severe competition even among these very adaptable species: wolves, mice, sparrows, rats, pigeons and humans (Tchernov, 1991). The

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canids may have been the most important in the peoples' minds. The presence of dogs in female burials has already been mentioned, and it is suggested that the canid puppy buried with the old woman at Ein Mallaha under her hand is indicative of an affectionate relationship rather than a gastronomic one (Davis, 1991). The corroded bone of Hayonim and Hatoula's Natufian levels is further evidence that dogs were digesting and defecating on site (ibid.), and presumably tolerated, or even welcomed. Combined with the largely unintentional manipulation cultivation of plants around the sites thanks to regular harvesting and human defecation (Butzer, 1982), these new 'commensal' species must have resulted in a very different patch of landscape when one approached a sedentary settlement. Hodder (1990) equates the focus upon the home and various symbolic attributes of the wild that are brought in and 'controlled' within the home as a necessary ideological 'leap' before the Neolithic, *per se*, could begin in earnest. The environmental evidence seems to indicate that many elements of the 'agrios' invited themselves into the 'domus' of their own accord.

3.7: Conclusion.

To summarize, was there a 'revolution' at the end of the Palaeolithic in southwest Asia? I do not think the evidence really supports this idea. Change in the emphasis of subsistence resources undoubtedly took place, but elements of the old system remained, right through to the Neolithic. Foraged fruits, seeds, fish and hunted mammals continued to supplement the products of cultivation in the Neolithic (Bar-Yosef and Kislev, 1989). 'Revolution' is almost certainly an unhelpful term, as is Neolithization, in the same way as 'Romanization' and 'globalisation' tend to imply the wholesale steam-rolling of one culture by another rather than the more realistic exchange of ideas. One becomes suspicious, after reading several very similar assessments of demographic tensions between 'poor' mobile foragers and 'rich' sedentary groups, that the tensions between colonists and natives in recent history, particularly in America, are subconsciously being used as a model. Ethnic and cultural boundaries are difficult enough to assess in historic periods, and their existence in terminal Palaeolithic southwest Asia remains unproven. The 'Broad Spectrum Revolution' in the Near East, and the later onset of farming, appear to be the result of a series of small adaptations, some but not all of them irreversible, which were conditioned on a local scale. As such, we might expect very different adaptations in other regions, and perhaps an even more variable chronology than actually exists. The extent to which this pattern is applicable to the contemporary communities in southern Europe will be assessed in subsequent chapters.

Chapter 4: 'Seek and you shall find'? The Greek Upper Palaeolithic and Mesolithic in context.

4.1: Introduction.

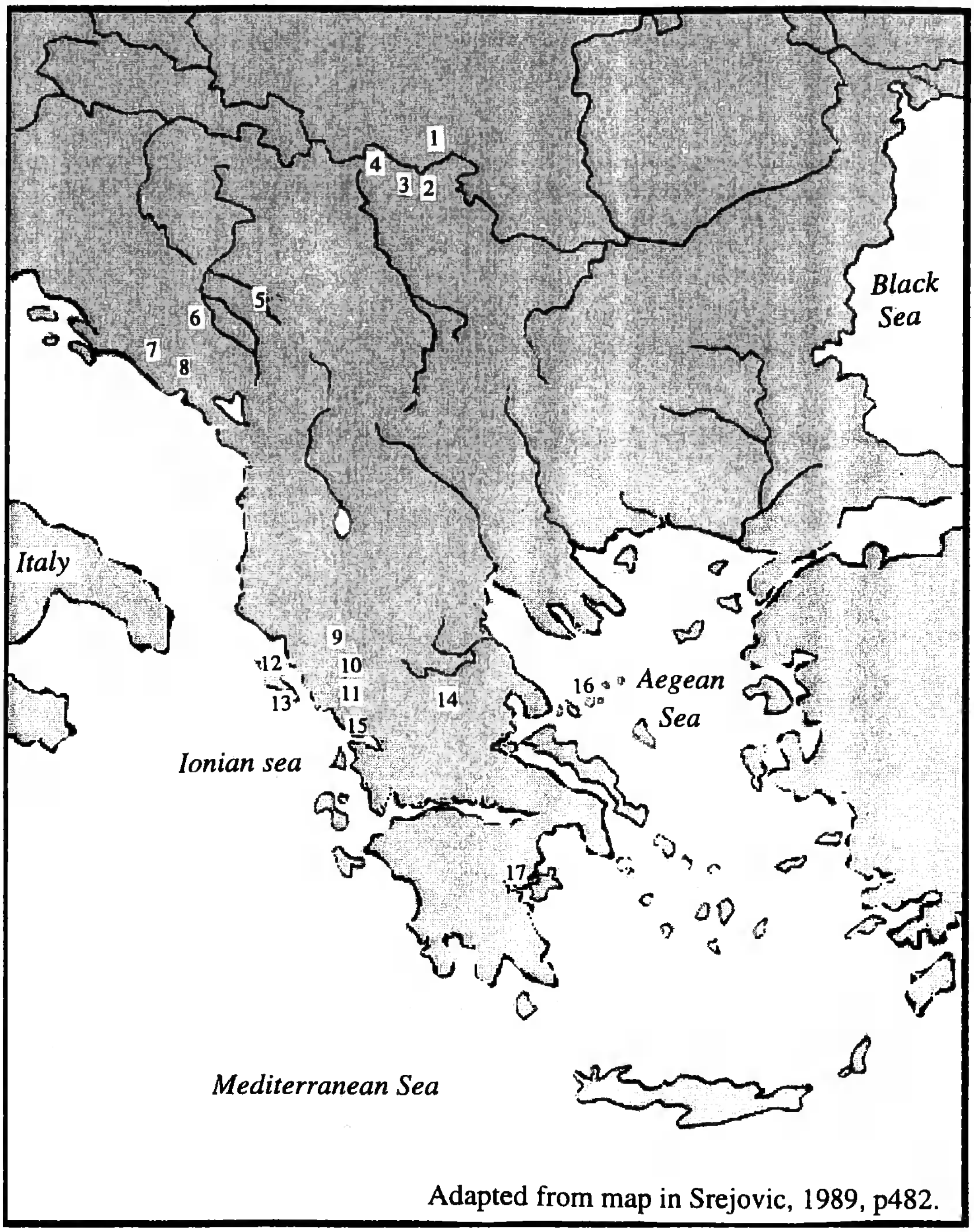
In this chapter the evidence for the late Upper Palaeolithic and Mesolithic occupation of Greece and the wider Balkan area will be reviewed, with emphasis on the faunal data. It is both desirable and necessary to look at the Balkans as a whole for two reasons: First, both LUP and especially Mesolithic sites are rare and sparsely scattered in Greece, whereas the situation in other Balkan countries is more promising. Secondly, as in other areas of Europe, geographical boundaries as exist today are meaningless in the context of the late Pleistocene and early Holocene, therefore it is more useful to have a wide-ranging approach and broad field of comparison. In order to put the Theopetra material in context I shall first explore the problems and opportunities encountered in the Greek and Balkan research. The changing environments and the animal resources available from the LUP until the later Mesolithic will be reviewed, as well as a summary of other social and settlement information such as technology, art and remains of the human inhabitants themselves.

4.2: Problems and Opportunities.

A problem that is by no means restricted to Greece or the Balkan region as a whole is the lack of a cohesive research programme. Despite a greater effort since the 1960s to survey for and investigate Palaeolithic sites in the Balkans, the distribution of known sites is still patchy. Epirus, for example, has been the focus of more intensive research than average (Bailey, 1995). It is still too early to talk confidently of biases in prehistoric settlement choices, but this does not prevent some practitioners from doing so.

An even greater problem is the almost complete lack of Mesolithic sites that are known in Greece (see map, Fig. 4a). Some sites have inevitably disappeared due to sea-level rise, alluvium, building programmes and such factors, but this is also the case for most regions and it is difficult to see why Greece has suffered any more than Italy or the Levant. Unfortunately some Mesolithic sites have simply been lost

4a: Greece and the Balkans, showing sites mentioned in Chapters 4 and 5.



Adapted from map in Srejovic, 1989, p482.

Key to Sites.

1. Cuina Turcului
2. Vlasac
3. Lepenski Vir
4. Padina
5. Medena Stijena
6. Odmut
7. Badanj
8. Crvena Stijena
9. Klithi
10. Kastritsa
11. Asprochaliko
12. Sidari
13. Grava
14. Theopetra
15. Preveza
16. Cyclope
17. Franchthi

through mischance. For example Markovits excavated Upper Palaeolithic and Mesolithic artefacts from at least three sites before World War Two then died in an air crash, so the location of two of the sites is unknown and much of the information is missing (Galanidou, forthcoming). Other probable Mesolithic sites have been found recently on the Ionian coast of southern Epirus, thanks to the survey of shifting sand dunes (Runnels *et al*, 1999). However these sites consist simply of lithic findspots and no bones, hearths[9], human remains, organic artefacts or anything other than lithics appear to have been discovered. The cave of Cyclope[10] in the northern Sporades, however, is another recent, exciting find with definite evidence of fishing and bird-hunting in the Mesolithic (Powell, forthcoming; Mylona, forthcoming) but unfortunately the mammal remains are more problematic (see section 5.10 in the next chapter). Traces of Mesolithic occupation have recently been found on other deserted islands in the vicinity of Yioura, and this is a promising development (Sampson, 2001). So, the present status of research is that we know of less than ten Mesolithic sites in the Greek peninsula, all of which have quite serious problems, and possibly another few sites with limited information recorded.

Recovery problems are also rife. Balkan cave sites such as Medena Stijena (Dmitrijevic, 1996) and even Theopetra itself have suffered disturbance of deposits due to the use of caves as animal pens, though thankfully the earlier periods are often spared. Even some of the 'classic' sites of the Balkans have suffered from these problems; Starcevo and Padina, for example, were both partially destroyed prior to excavation, and those parts of the two sites which could be excavated were highly disturbed (Clason, 1980). There is also the problem, common to most European regions, that some sites were excavated so long ago that the results are now considered inadequate, and in some cases they have not been published at all (Bailey and Gamble, 1990). The excavations of the 1930s were, in any case, not ideally suited to the needs of an archaeozoologist. At the 1932 excavations of Starcevo only the bones deemed identifiable (by the excavator) were retained, all the others were discarded. Also, no sieving took place, so only the bones of the larger fish species such as catfish and carp are present in the assemblage (Clason, 1980). Thankfully, this

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[9] Some of the flint tools, however, were burnt. (Runnels *et al*, 1999).

[10] Cyclope is found in the literature sometimes as Cyclops, and the island it is situated on can be transliterated into English as Yioura or Gioura. It is all the same place.

situation has been partially salvaged by further excavation in recent decades, though undoubtedly problems still exist. Even a modern, state-of-the-art excavation cannot avoid creating difficulties for the archaeozoologist. The taphonomic factors which ravage an early prehistoric cave assemblage (see Chapter 1) can only be unravelled to a partial extent. At Klithi, for example, the high fragmentation, lack of stratigraphic resolution and recording difficulties, made Gamble obliged to use NISP to quantify the material, which is less than ideal (Gamble, 1997). Clason encountered similar problems of quantification, exacerbated by the sometimes dramatic mixing of deposits[11] (Clason, 1980), and Dimitrijevic encountered the problem that MNI values never came to a figure larger than one at Medena Stijena (Dimitrijevic, 1996).

Hunter-gatherer sites in this region also suffer from comparison with the abundant later material. Gamble makes the point that if an agricultural site exhibits no changes whatever the climate, they are considered to be on a stable route to progress, whereas 'monotony' on a hunter-gatherer site is interpreted as boredom during the wait for agriculture (Gamble, 1997). The Neolithic record of Greece is certainly very rich, and it goes without saying that the classical period in Greece has been a major focus of archaeological research since the discipline was in its infancy, but this bias should be levelling out somewhat. At the present time there are dozens of academics who take a strong interest in the Upper Palaeolithic and Mesolithic of Greece, but there are still very few sites.

As in most problematic situations, however, the Palaeolithic and Mesolithic of the Balkans are replete with opportunities, and recent years have shown much progress. The first International Conference on the Palaeolithic Archaeology of Greece and Adjacent Areas (ICOPAG) was held on 6-11 September 1994 in Ioannina (Bailey, 1995), and the conference on the Greek Mesolithic held in Cambridge in 1999 seems to have brought together most of the researchers interested in this area. These and other meetings represent a good opportunity to raise the profile of early prehistory in Greece. The excavations at Klithi and their rapid publication are a step forward, as are the many projects which continue to bear fruit in the former Yugoslavia. The idea that

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[11] For example, the presence of domestic fowl even in Level I (late Mesolithic) at Starcevo is a good indication of contamination, since chickens were not even introduced from India to southern Europe until the late Bronze Age (Clason, 1980).

Serbia and Montenegro were uninhabited during the Mesolithic and were subsequently colonised by incoming agriculturalists has already been challenged (Srejovic, 1989).

Needless to say, the intense investigation of the multiple layers of Theopetra has already had an effect on the Mesolithic of Thessaly by proving its existence, as well as fleshing-out the known early prehistory of Greece generally. Geological and archaeological reconnaissance work carried out in east Thessaly by Runnels and van Andel since 1987 did not lead to the discovery of any Upper Palaeolithic or Mesolithic sites (Runnels and van Andel, 1999). This led them to believe that there was a 25,000 years hiatus of occupation between the last of the Middle Palaeolithic sites and the beginning of the Neolithic (ibid.). If this is so, the question arises, quite simply, of why. Why would the Peneios River have been avoided? They do not suggest that it dried up. Also, it is unlikely the people we know to have been present at Theopetra during the Upper Palaeolithic and Mesolithic would have been able to survive in isolation. There is nothing in the faunal evidence to suggest a long term occupation by a large sedentary group (see Chapter 5). The authors mention that even the Middle Palaeolithic findspots have been intermittently preserved in this area that was once wetland, due to river erosion and movement, and the chances of finding open air sites preserved are "commensurably small" (Runnels and van Andel, 1999, 217). It seems logical, therefore, that if Upper Palaeolithic and Mesolithic sites existed on the flatlands we have little hope of finding them, but the presence of humans at Theopetra during this period does suggest they were once there.

4.3: Animal resources and environment.

This section will be broken down into Late Upper Palaeolithic and Mesolithic to assess changes and continuity in environments across the Pleistocene-Holocene transition. The wider Balkan area will be examined as well as Greece, to see how similar environments and resources were across the region as a whole, and in order to aid comparison with Italy to the west.

4.31: Late Upper Palaeolithic Greece.

The environmental evidence available in Greece suggests a region experiencing the impact of the ice ages, but still highly variable. Even this southern region was not free of glaciers at the Last Glacial Maximum. The Pindus mountains (west of Theopetra) were glaciated during the LGM (Denton and Hughes, 1981, cited in Bailey and Gamble, 1990). The pollen-core sites in Greece are unfortunately somewhat widely spaced, but certain broad patterns do emerge. From about 20,000 until 15-13,000 BP. pollen records show that arboreal pollen is very low, and steppe vegetation is predominant (van Zeist and Bottema, 1982; see also diagram, Fig 4b). This is followed by a period in which some steppe vegetation is maintained but arboreal pollen increases, including *Pinus*, *Ostrya / Carpinus orientalis*, *Tilia*, *Corylus*, *Ulmus*, *Pistacia* and - in the Tenaghi Philippon catchment of Northeast Greece at least - high levels of *Quercus*. This is unusual, however, as the spread of deciduous oak forest in other areas of Greece is not recorded before 10,500 BP. (van Zeist and Bottema, 1982). It is interesting to note that several of these tree species bear potentially reliable and nutritious nuts. Such broad vegetation patterns probably obscure and mask as much of the 'actual' situation as they clarify, however. It is likely there would have been significant variation in the vegetation of the Balkans at the LGM, for example - people would have been familiar with several different vegetation zones within walking distance of each other (Bailey and Gamble, 1990).

The reliance upon vegetable foods in the Upper Palaeolithic generally was probably varied according to the geographical situation as well temporal factors such as season. In Epirus, for example, it is believed that plant and marine foods would not have been plentiful enough to distort the probable large-game emphasis (Bailey and Gamble, 1990). However, exploitation of plants at Upper Palaeolithic Franchthi - though modest compared with the Lower Mesolithic use of plants - is definitely present and encompasses 19 different species (Hansen, 1991). Perlès believes so few large animals could have been supported on the garrigue in the Argolid area around Franchthi that molluscs and plants had to be the best food sources (Perlès, 1999). This is perhaps comparable to the habitat around Caldeirão, but there the people had lagomorphs to exploit (see Chapter 9). Early indications from the palaeobotanical material at Theopetra suggest a wide range of plants used by the Palaeolithic inhabitants, some species of which became the cultivars of the Holocene (Kyparissi-Apostolika, 1998). This use of plant foods, therefore, can be seen as an area of similarity with the lifeways of the Late Pleistocene peoples in the Near East (Chapter 3), but it appears to be completely independent.

Similarly, the LUP fauna of Greece shows glacial elements but not to any extreme, and the situation appears to be variable. To the best of current knowledge, reindeer ventured as far south as Yugoslavia, but not to Greece, and fallow deer may have found refuge in Greece around 18,000 BP. (Bailey and Gamble, 1990). Dominant mammal species vary from site to site, as shall be seen below.

The animal bone material of Klithi cave, provides good evidence for the LUP animal resources of Epirus. The fact that this is almost undoubtedly an entirely human-accumulation of bones restricts the environmental picture that can be constructed, however, since the foragers seem to have been very selective in their chosen prey. There are very few carnivore bones recorded at Klithi (NISP for all carnivore species, all strata = 14, from over 140,000 specimens) (Gamble, 1997) and most of the deer specimens were artefacts rather than directly related to on-site subsistence (Bailey and Gamble, 1990). Caprids dominate the Klithi assemblage, representing 73% of the total NISP (Gamble, 1997). Other sites in the area have assemblages with higher numbers of other species. At Asprochaliko, deer and caprines are present in equal numbers, while at Kastritsa deer are predominant (77%), with equids and bovids making up the majority of the remainder (Bailey and Gamble, 1990). A subsistence strategy based mainly on large mammals can at least be inferred for Epirus. Moreover, at Klithi there is evidence of a fairly comfortable existence. The examination of the taphonomy suggests that bones were not intensively processed - whilst butchery marks and chopped open bones are known, some elements appear to have been thrown away whilst still connected by tendons (Bailey and Gamble, 1990). Though most of the ibex hunted around Klithi were mature - i.e. between 4 and 8 years old - there are also 43 neonatal bones (Gamble, 1997). These he attributes to kills of females of reproductive age - again, potentially a rather wasteful strategy, unless designed for some specific need or purpose. The neonatal ibex, and geographical data such as snow lines, suggest a spring and summer 'occupation', or at least stop-over, at Klithi (Bailey and Gamble, 1990).

Further south on the Greek peninsula, in the Peloponnese region, Franchthi cave has provided vast amounts of information on life in Palaeolithic and Mesolithic southern Greece. Unfortunately, however, the faunal material has, as yet, only been published in a piece-meal and inadequate form. Ibex appear to be present at Franchthi in the Palaeolithic too, but quite rarely (Payne, 1976). Some form of bovid species peaks at about 13,000 - 12,000 BP., perhaps indicating the presence of damp grasslands, which are then replaced by denser tree cover as red deer (and some *Sus*) become the dominant mammals at 10,000 BP. (Payne, 1982). The damp grasslands are purely speculative, however, as Payne cannot be absolutely certain whether the bovids in question are *Bos* or *Bison* (Payne, 1982), and *Bos* are surprisingly adaptable in any case (see discussion after Payne, 1982). In summary, Payne states that the Franchthi material reflects "the traditional hunter-gatherer picture" (Payne, 1976, p128), which seems to negate the entire reasoning behind research into the Palaeolithic and Mesolithic.

The environmental and animal resource data for what are presently the Greek islands is patchy and has its own problems. The rock shelter of Grava on what is now the island of Corfu[12] is attributed to the 'terminal Palaeolithic' and has a fauna which includes many large bovids, *Cervus elaphus*, *Dama*, *Capreolus*, *Equus*, some *Sus*, *Lepus*, *Vulpes*, *Hyaena*, *Meles*, *Mustela*, rodents and many large birds (Sordinas, 1969). Unfortunately no information was available as to how far the hyaenas and other carnivores may have been responsible for accumulating at least some of the other bones in the assemblage. Further abroad, the site of Aetokremnos on the Akrotiri peninsula of Cyprus is dated to the very end of the Pleistocene (the most reliable C14 dates average at about 10,030 ± 35 BP) and has a somewhat more exotic fauna than the mainland sites, including pygmy hippopotami and elephants (Cherry, 1990). Aetokremnos is made further distinctive by the fact that the settlers may have been of Levantine origin, and therefore at this date - even though it is still in the Pleistocene - they were contemporary with, and possibly knowledgeable of, Neolithic life-ways (Cherry, 1990).

4.32: Late Upper Palaeolithic in the wider Balkans.

There are several LUP sites in the Balkan region providing evidence of human occupation, some of which are still in a state of research. The site of Cuina Turcului on the banks of the Danube has evidence of human occupation close to the very end of the Pleistocene, radiocarbon dated to 12,600 ± 100 BP. (Srejovic, 1989). Beaver and wild pig remains form the majority, followed by chamois and ibex, birds and shellfish (Clason, 1980). The water-side location of this site is evident, though surprisingly fish do not feature in this occupation or the early Mesolithic re-settlement (Bolomey, 1973 cited in Clason, 1980). This may be a result of choice or technological limitations on the part of the Cuina Turcului hunter-gatherers, but the strong possibility of recovery inadequacies must be borne in mind. The lowest level at the site of Badanj in southern Bosnia-Herzegovina has been radiocarbon dated to 13,200 ± 150 B.P, with another human presence at around 12,000 B.P (Miracle and Sturdy, 1991). This site has an impressive range of ungulate species: chamois, goat (most likely *Capra ibex*), red deer, large bovids and ass (*Equus hydruntinus*) and, given the varied topography of the area, a hunting strategy encompassing several different habitats is envisaged (Miracle and Sturdy, 1991). All of the identifiable bones in the Pleistocene layers at Medena Stijena were derived from large mammals, including some horse, red deer, bovids, ibex, chamois, boar and brown bear (Dimitrijevic, 1996). Pupicina cave, in northeastern Istria - an area of Croatia - has late glacial faunal remains, again dominated by large mammals such as aurochs, chamois and some ibex (Miracle, forthcoming). Nugljanska Cave, also in Croatia, has layers beneath hearths that are very rich in animal bone, including microfauna, and flint artefacts. Both the lithics and the frequent occurrence of aurochs bones seem to point towards a late Glacial occupation, but C14 dates are awaited (Miracle, forthcoming). Generally, therefore, the Late Upper Palaeolithic is quite well represented in the Balkans and there is promise of exciting future developments.

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[12] Corfu was probably connected to the mainland in the Palaeolithic and even into the Mesolithic period

4.33: Early Mesolithic Greece.

Mesolithic sites - early or late - are rare in Greece, therefore the sites which are known and have been published take on an enhanced importance. The environmental conditions in the early Post-glacial are known, if somewhat vaguely. The spread of forest in Greece, particularly composed of oak, after 10,000 B.P. (van Zeist and Bottema, 1982) has already been mentioned. The forest was not necessarily particularly dense, however, as a further rise in temperature may have led to drier, more open conditions (van Zeist and Bottema, 1982). This habitat sounds similar to that postulated for the Hallan Cemi environs in Turkey (Chapter 3). It has been argued that climate improvement in the Postglacial was detrimental to equids and bovids, and – while deer and boar could adapt more easily – the dense forests present in northern Greece made them difficult to exploit (Perlès, 1999). This is problematic on two counts. First, bovids have different requirements – aurochs, for example, can live in forests and humid atmospheres. Secondly, hunting deer and boar in dense forests may be difficult, but hunter-gatherers in other parts of Europe, including northern Italy (Chapters 6 and 7) managed it.

At Theopetra, the sandy nature of the Mesolithic sediments suggests more humid weather conditions (Kyparissi-Apostolika, 1998), while the preserved plant remains found at Franchthi can provide information for the southern Argolid area. Here, the vegetation included not only oak woodland, but also juniper, pistachio, wild pear and almond (Hansen, 1991). The diet of the Mesolithic inhabitants of Franchthi included red deer, pigs, small prey, fish and molluscs (both marine and terrestrial) (Cullen, 1995) but also, unsurprisingly, an increased exploitation of plants. Around 28,000 seeds from 27 different species were recovered in the Lower Mesolithic deposits at Franchthi (Hansen, 1991). A certain amount of diversification can therefore be inferred, at least for this site, which compares well with the range of resources at Natufian sites (Chapter 3). As before, however, the large mammals possibly constituted the bulk of the diet in terms of volume even if their NISP and MNI counts turn out to be low.

(Cherry, 1990).

4.34: Early Mesolithic in the wider Balkans.

As at Franchthi, some continuity of site use from the Upper Palaeolithic into the Early Mesolithic is inferred for several of the Balkan sites, though this does not rule out an occasional hiatus of occupation. Srejovic goes as far as to argue for sound continuity in Serbia and Montenegro from the 'Epi-Tardigravettian' to the final Palaeolithic and into the Mesolithic (Srejovic, 1989). This seems ambitious. Some change in subsistence certainly occurs in the early Postglacial of the Balkans. Pupicina cave remains occupied but there is evidence of mussel gathering in the Early Mesolithic levels: study of oxygen and carbon isotope variation by H. Kenny on these mussels has established that they were harvested in the autumn (Miracle forthcoming). Since the mussels have been gathered from an estuarine situation on the coast, they seem to have been brought at least 20 kilometres inland to the cave (ibid.). Though this is little more than a day's walk for a fit forager, it does imply a certain amount of wide-ranging effort in food procurement.

At the site of Sebrn, also in Croatia, early Postglacial levels - C14 dated to 9280 ± 40 b.p and 9070 ± 90 b.p. - are still dominated by large mammals, but they are the classic Mesolithic triumvirate of red deer, roe deer and boar (ibid.). A dramatic increase in the NISP recorded for roe deer and wild boar also occurs in the early Postglacial levels at Badanj (Miracle and Sturdy, 1991), though MNI counts remain low. Odmut cave, located by the Piva river, has a layer dated to between 10,000 and 7,200 B.P which is rich in both ibex and fish (Srejovic, 1989). Therefore a certain amount of inter-site diversity can still be noted in the Balkans during this period.

4.35: Later Mesolithic Greece.

In Greece the Later Mesolithic period is inevitably entangled with the early Neolithic evidence, especially since there is so much of the latter and so little of the former. At Theopetra, occupation of the cave continued even when Neolithic tells had become common throughout Thessaly (Kyparissi-Apostolika, 1998), so it shall be very important indeed to see whether there is any continuity of occupation at the crucial 'border' between the two dominant lifeways of foraging and agriculture. Though, to be sure, this dichotomy, and the archaeological obsession with it, are largely of our own making and unlikely to reflect adequately the priorities of the living peoples. The situation at Franchthi during this period is fairly well known despite the paucity of published material. Domestic ovi-caprids 'appear' at Franchthi at 8000 B.P and never lose their dominance from that time (Payne, 1982). Prior to this, however, the lifeways interpreted for the Upper Mesolithic levels at Franchthi are perhaps the most fascinating of all. In this part of the assemblage large blue fin tuna dominate, shortly followed by an increase in obsidian originating from Melos (Rose, 1987 and Perlès, 1990 cited in Cullen, 1995). Both of these factors suggest that the people of Franchthi had sea-going boats at this time. Franchthi cave was only 2 kilometres from the coast during the Mesolithic (Cullen, 1995), so a more marine- 'centred' lifestyle at this time would make sense. The change in the shape of the coast-line as well as its proximity to the site was also a likely factor in the sudden attraction of fish as a resource, as a more uneven coastline made catching large tuna easier (van Andel in discussion of Payne, 1982, also Bintliff, 1977, p244). Recently van Andel has suggested that demic diffusion into Greece at the Pleistocene-Holocene transition was probably largely by sea travel (van Andel, forthcoming), but where he believes these colonists came from is unclear, as is why they would have wanted to permanently move. In support of this argument, however, the lithics associated with the tuna-fishing phase at Franchthi *are* distinct from other European Mesolithic tools (Perlès, 1999). This could be an adaptation to the specifics of sea-fishing and fish-processing rather than the result of cultural contact, however.

Extensive fishing, fish processing and even fish-storage in the form of drying and smoking are suggested to have been practised by the foragers of Mesolithic Cyclope, as evidenced by the abundant fish bones, fifty-five fish hooks and features on the cave floor (Sampson, forthcoming). Obsidian from Melos is also present, implying long-distance contact (ibid.).

A diet of predominantly marine resources is also a fairly sound interpretation for Sidari, the less well-known Mesolithic site on the coast of what is now the island of Corfu. Though some bones of small game are found at Sidari, the site is actually made up of a shell-midden, the molluscs in question are mostly *Cardium edule* (Sordinas, 1969). In combination with the flint evidence, which appears to be imported to the area, Sordinas goes so far as to suggest that Sidari was actually a settlement of 'mariners' from the Adriatic coast (Sordinas, 1969). Though this idea has undeniable appeal, it would perhaps be encouraging to ascertain the source of the flint before relying too heavily upon it's 'exotic' aspects. Is it possible the source is now beneath the sea, but somewhere quite local? Recently, after literally decades of looking for sites similar to Sidari in the area and finding only Epigravettian lithics, Sordinas has wondered whether Sidari is perhaps Aceramic Neolithic rather than Mesolithic at all (Sordinas, forthcoming). This tentative conclusion unsurprisingly caused a great deal of disappointment when announced to a roomful of people interested in the Greek Mesolithic. That the small amount of information we have on the Mesolithic in Greece raises more questions than it does answers is one of its more tantalising aspects.

4.36: Later Mesolithic in the Wider Balkans.

In contrast, the later Mesolithic period of the rest of the Balkans has a fuller record, and has received a great deal of attention. The Balkans generally are sometimes seen as a link between the Near East and Western Europe that provided a 'highway' for the movement of people and ideas, but it can be argued that the mountainous and complex environment was more of a filter - or even a barrier - that made such movements more difficult (Bailey, 1995). The Balkan Mesolithic is certainly interesting in its own right, quite separate from any role in the subsequent spread of agriculture. The widespread interest is also at least partially due to the stunning sculptures found at Lepenski Vir on the Danube, though its neighbour, Vlasac, is equally rich in archaeological evidence and the two sites may have been occupied contemporaneously for at least a couple of generations, around 6000 B.P. (Chapman, 1993). In addition to the art, the faunal material is also quite rich from this area, however, and raises many intriguing possibilities. The sites of Starcevo and Padina have revealed an impressive range of resources, including large and small mammals, birds, fish and molluscs (Clason, 1980). The environment around Starcevo appears to have been quite varied, with the river, streams and ponds in the marshes, and a wooded plain with some clearings (Clason, 1980). The importance of the wetlands is reflected in the faunal remains, including the birds - many species of which are aquatic. At Padina beaver mandibles are found with the lower borders and incisors missing, interpreted as having been cut out for use as tools (Clason, 1980). Another more ritual use must remain a possibility, however, especially given the context of similarly mutilated beaver mandibles at the (albeit distant) site of Oleneostrovski Mogilnik (O'Shea and Zvelebil, 1984). One strange anomaly that separates the two sites is the fact that sturgeon were present in the fauna of Padina but not Starcevo, although the inhabitants of Starcevo caught other large fish (Clason, 1980). Clason's interpretation is that the 'farming' inhabitants of Starcevo concentrated upon mammals - both wild and domestic were exploited at this time - whereas the foragers of Padina relied more heavily upon fish (p172). This does not adequately explain why Starcevo has a complete lack of sturgeon in particular, while other wild resources are being used, including fish. I suspect a more specific social practice was at work, such as a taboo, or even some sort of agreement between the inhabitants of the two settlements.

One food item that links the Mesolithic subsistence of Padina, Vlasac, Lepenski Vir and - though less frequently - Starcevo, is the apparent consumption of domesticated dogs. The evidence is fairly conclusive, such as long bones split open for marrow and scorch marks from cooking processes, though gnaw marks on the dog bones implies that living dogs were wandering through the settlements quite freely (Clason, 1980). We have seen in the Near Eastern sites that domesticated dogs are present and appear to be wandering the settlements, consuming scraps (Chapter 3, section 3.64). In the Balkan sites, however, the relationship between the humans and dogs, while possibly affectionate, is certainly also a gastronomic one. To me, this seems to throw open the whole debate about the supposed distinctions between domestic and wild, and suggest that the marked human ambivalence towards animals is very old indeed.

4.4: Living Sites.

The environmental evidence, including faunal material, is therefore quite rich in both the Palaeolithic and Mesolithic in the Balkans, and less so in Greece. Hopefully, the information from Theopetra itself will contribute to a more equal balance. Further to the environmental and direct subsistence evidence, however, the question remains 'What do we really know about these people?'. Fortunately many of the sites with large quantities of environmental information are also rich in evidence of technology, and some art. Also, very importantly, the settlements themselves can tell us a great deal about what life was like for these people, and the skeletons of the inhabitants provide very direct clues. It is to these sources of information that we now turn.

The placement and form of the settlements can usually reveal some information about life during the Palaeolithic and Mesolithic in this region. Theopetra itself has a somewhat dramatic location with good views over the surrounding landscape. It is quite possible this feature was one of its attractions for the foragers who chose to stay there. Inside the cave, there are successive occupation deposits. There is an Early Upper Palaeolithic layer with numerous hearths, flint tools, charred seeds and mysterious clay objects. Whilst ten or eleven contemporary hearths seems a great deal for one cave it must be remembered that Theopetra has proportions to dwarf a gym or ballroom: it has an area of 500 square metres and a floor-to-ceiling height today of 4-5 metres, a considerable reduction from the original height (Kyparissi-Apostolika, 1990). Later on, the hearth and tool evidence for the Mesolithic layer was denser in the interior area of the cave, rather than the cave mouth despite the more temperate weather conditions (Kyparissi-Apostolika, 1998). It is possible this is because of warmth and/or protection from the rain, but it may also be related to the fact that there is a very slim area of land between the cave mouth and the steep drop down the hillside.

Elsewhere in Greece, Klithi cave is also situated in a somewhat precipitous location, in the mountains of Epirus (Bailey and Gamble, 1990). It is interesting that both Klithi and its sister site of Megalakkos would have been available for human use before 16,000 years ago but were not chosen, unlike the other Epirus rock-shelter of Asprochaliko which has evidence of human occupancy from the Middle Palaeolithic until the post-Palaeolithic (Bailey and Gamble, 1990). Other sites have advantages that are obvious even to us. It is possible to understand some of the reasoning behind the occupancy at Grava, on Corfu, for example. Sordinas describes it as a "fine" shelter, south-facing with excellent views of the landscape and a large entrance (Sordinas, 1969, p399). Medena Stijena and Badanj in the Balkans are also south-facing rock shelters (Dimitrijevic, 1996 and Miracle and Sturdy, 1991 respectively), and their proximity to rivers is another likely factor in their appeal to human occupants. It is a pity that the study of settlement patterns in Greece has been biased by factors largely outside of archaeologists' control. Conceivably many sites in Greece and the wider Balkans have disappeared beneath the sea or thick layers of alluvium, so that it is impossible to compare settlement choices in these areas adequately. Similarly, while the Balkan evidence of hunter-gatherer settlements is comparatively rich it tends to be clustered around the rivers, leading to the speculation that incoming farmers populated a largely empty lower Danube plain and central Danube basin (Clason, 1980). It is possible that discoveries of new sites will address these imbalances eventually.

Inside the caves and rock-shelters there is some good evidence for the ways in which the people made use of their living space. Within the Klithi cave, warmth seems to have been an understandable priority. There is a hearth towards the back, in a sheltered area, which appears to have been the focal point of life, where food was prepared and eaten, and tools were made. There would have been enough space for five to ten people at a time (Bailey and Gamble, 1990). A large hearth (1.4 x 1.1 m) with associated fire-cracked rocks was found further north, at Pupicina (Miracle n.d.). Fire-cracked rocks are thought to be associated with early cooking methods (Renfrew, 1985) and therefore offer a glimpse of domestic life at this time. Spatial analysis at Medena Stijena has also discovered a definite concentration of finds which indicate an 'activity area', where bones were modified for food and possibly artistic uses (Dimitrijevic, 1996).

The Danube complex of Late Mesolithic settlements can be regarded, for the moment, as a separate case. Lepenski Vir and Vlasac have, unlike the other early prehistoric sites of this region, been analysed as to their possible social-symbolic meanings as well as more logistical considerations. Chapman's (1993) study, inspired by Foucault's work on space and power relationships, is similar in some ways to the 'phenomenological' approach used by Tilley when trying to understand the placement of Mesolithic and Neolithic monuments in Britain (Tilley, 1994). The results are intriguing. It is suggested that the inhabitants of the Danube sites drew directly on landscape features to order their living space. For example the trapezoidal mountain opposite the Lepenski Vir site may well have inspired the trapezoidal shape of the houses (Chapman, 1993), which seems highly plausible. The site is also next to a natural whirl pool, which is commonly represented as a source for the community's fish in their art works The whirl pool shape may also have been reflected in the central area of the settlements, perhaps used for dances, meetings and so on (ibid.). It is encouraging to be able to speculate on what made the area special for the people who lived there.

4.5: Human remains.

Human skeletons have not been found at all of the Balkan sites, but much information has been gleaned nevertheless. Thus far, human remains have been found at Theopetra in Mesolithic and Neolithic levels, but in relatively small quantities. The study of the Neolithic human bones has already produced interesting results. It appears the population was robust, but rather short in stature, and unusually free of pathologies for people of this period (Kyparissi-Apostolika, 1990). Of course the sample size is rather small as yet, and there is the common problem of deducing how representative the remains at the site are of the living population. Unfortunately the human remains from the Mesolithic layer are also rather few in number, but they do include the full skeleton of a young woman (Kyparissi-Apostolika, 1998). Two further Mesolithic human bone fragments were discovered during the faunal analysis (see Chapter 5). At Franchthi the Mesolithic human remains count was more than doubled by sifting out all those bones that had been bagged with the fauna by mistake (Cullen, 1995). Similarly there are only two human fragments recorded from Klithi, and these are tabulated within the faunal report (Gamble, 1997). The two examples of human bone at Klithi are an anomaly, stranger than either none or many. If these are teeth, then it is possible they came from individuals who were still alive when they visited the rock-shelter. Alternatively they may, perhaps, have been introduced by scavenging animals, but this seems unlikely given the rest of the deposit.

The Franchthi material is extensive and has received thorough analysis. The Mesolithic burials represent 15-34 individuals, representing a good range of ages and both sexes, and 22 shed milk teeth were also found, indicating the presence of children and juveniles (Cullen, 1995, see tables 1-2). There is also some evidence of children on site during the Upper Palaeolithic at Franchthi, but there is no evidence for mortuary ritual during the sporadic occupations of the Upper Palaeolithic (ibid.). More sedentism during the Mesolithic is implied. Cullen points out that it would be easy to assume that the burial of group members near the entrance of the cave in the Lower Mesolithic was intended to act as a territorial marker. However there is no evidence that the graves were visibly marked, so a stranger approaching the site may have been completely unaware of what was beneath his or her feet (Cullen, 1995). These foragers did not necessarily share our modern obsession with partitioning, property and boundaries. Cullen argues that the burial of group-members at the living site is an act of social inclusion of the dead with the living (Ibid; p286). Unfortunately the study of the human injuries, nutrition and other biological data at Franchthi is still awaited (Cullen and Cook, forthcoming).

Finds of human remains have also been extensive at the Mesolithic sites by the Danube. Interestingly, it seems that in the Early Mesolithic sites of this area, bodies were buried with care within the cave but slightly apart from the focus of domestic life for the living people, whereas by the later Mesolithic human remains are closely related with the domestic sphere (Chapman, 1993). This seems similar to the burial beneath Natufian homes in the Near east, but the Balkan peoples do not appear to have practised removal of skulls unlike their eastern contemporaries (Chapter 3). At Vlasac, a wide range of locations within the living site appear to have been chosen, and the corpses are in various positions (see table 1, in Chapman, 1993) before burial customs are scaled down dramatically in Phases 2 and 3. Child burials become rare, and children no longer receive grave goods, but adults are also affected - adult burials are less complete in terms of body parts, and their grave goods eventually disappear altogether too. Of course, some death rituals may leave no archaeological trace whatsoever, but there does appear to be a trend towards increasing impersonalisation in these later burials. By contrast, in the late Mesolithic deposits at Padina, a double burial was found, unusual in that the two individuals were buried in a sitting position, with their faces towards the Danube (Chapman, 1993). Burials in a sitting or standing position are sometimes interpreted as being the graves of shamen (Srejovic, 1969; O'Shea and Zvelebil, 1984), which is certainly one possibility. The fact that these corpses were facing the Danube again reinforces the importance of the river to this community.

4.6: Technology.

By 1990, relatively few Upper Palaeolithic flint tools had been found at Theopetra, and those that had been found tended to be broken (Kyparissi-Apostolika, 1990). The lithic analysis is not yet complete, but the low artefact density still holds (Adam, 2000). Interestingly the Upper Palaeolithic tools at Theopetra are sometimes made of 'exotic' materials, while the Mesolithic stone was sourced locally (ibid.). Like Franchthi, the Mesolithic tools at Theopetra lack geometric microliths, the microburin technique and other features which are often found in Mesolithic assemblages in other parts of Europe. At Franchthi projectile inserts disappear in the Lower Mesolithic, suggesting limited big game hunting or the use of traps (Perlès, 1999). One tiny tanged arrowhead was found at one of the lithic scatters on the Ionian coast (Runnels *et al*, 1999), but lithic analysis generally shows that Greece became more and more isolated from the rest of Europe during the Tardiglacial, and this isolation lasts into the Mesolithic (Perlès, 1999).

The tool evidence in the rest of the Balkans is very interesting in that there are suggestions of widespread contacts and influences on the industry. At Badanj, for example, there is typological similarity between the lithic assemblages and those of the southern Adriatic area in Italy (Whallon, 1989, cited in Miracle and Sturdy, 1991, and Whallon, 1999). Even when there is a marked change (C14 dated to around 12,380 ± 110 BP) in the technology at Badanj, moving towards a more microlithic industry, this still mirrors the transition in the Italian lithics (ibid.). In the later period, the lithics of the Iron Gates region show some links with those of Sidari, as well as Odmut (closer to the Adriatic coast) and Dekilitazh, on the Black Sea coast (Srejovic, 1989). The late Mesolithic flints of Sidari are elsewhere described as 'rather clumsy' (Sordinas, 1969) which raises the possibility that such parallels are the result of coincidence, or simply tools that are difficult to attribute to any specific style. The tools found at Klithi, therefore dating roughly between 16,000 and 13,000 B.P., are generally microliths, but the cut mark evidence on the bones suggests use of a heavy, chopping instrument with a sharp edge (Gamble, 1997). It is possible that these tools were more likely to be curated, or at least less likely to be lost.

The non-lithic technological evidence is quite rich in this region. At Klithi, as has already been mentioned, most of the red deer specimens proved to be artefacts (Bailey and Gamble, 1990), but bone tools are also found made from the remains of other species. Whilst the tools made of caprid bones were probably made on site, the presence of tools made of red deer antler may indicate that they were curated - or at least that this material was preferred (Adam and Kotjabopoulou, 1997). Most of the bone tools at this site have old breaks - i.e. either sustained during use or early deposition - and some have been 'fired' at the ends to increase strength (Adam and Kotjabopoulou, 1997). It is also suggested that the hunter-gatherers at Starcevo used animal bone as a raw material, such as cattle and red deer bones to make fish hooks (Clason, 1980).

There is some interesting evidence for experimentation and innovation in the Palaeolithic and Mesolithic material culture of these Balkan foragers. At Theopetra there are signs that successive groups of inhabitants were experimenting with clay. Unfired lumps of clay are present from at least as early as 33,000 B.P, while slightly-baked clay objects are found in the rich layer dated to about 26,000 B.P with the ten hearths (Kyparissi-Apostolika, 1998). Since these slightly-baked objects were found associated with hearths and charred seeds there is a possibility that they were fired accidentally due to their proximity to the hearth, but that does not explain their actual presence, or their function - if they had one. Another innovation was found at Klithi. Needles are present from the first occupation at Klithi and are therefore almost contemporary with the first recorded needles in Western Europe, c. 18,000 B.P. (Adam and Kotjabopoulou, 1997), perhaps suggesting parallel invention. One scenario in the literature that would benefit from further research and interpretation is the chamois predation by human groups at Badanj. The authors explain how the chamois was ideally suited to the cold, sharp and difficult terrain and thorny vegetation of the 'angry karst' landscape (Miracle and Sturdy, 1991). I would be interested to know if the humans had to take extra measures to hunt the chamois in this harsh area - for example by employing bow and arrow technology, and even specialised clothing to protect their feet and legs.

Several of the Near eastern technological aspects seem to be missing in the Balkan Upper Palaeolithic and Mesolithic, such as evidence of sickles and grinding tools, despite the use of plant resources we know to have occurred at Franchthi and Theopetra. Of course, most plants do not require these artefacts for successful processing.

4.7: Art.

There is little evidence for 'art' in the pictorial or sculptural sense in the Balkans throughout the periods under study, until one encounters the monumental sculptures of Lepenski Vir. Indications of personal ornamentation, however, are quite common. At Klithi, heavily worn bone spatulae stained with red ochre have been found (Adam and Kotjabopoulou, 1997). They may have been used in hide preparation, but could also have had a role in decorating clothes or the body itself. Perforated red deer canines were also discovered at Klithi (Adam and Kotjabopoulou, 1997), which may have been for use as pendants - though these artefacts are so ubiquitous they need not necessarily have the same functions and meanings everywhere. *Cyclope neritea* shells are common in the Mesolithic of Franchthi - most have been pierced from the inside, suggesting they were intended to be strung together (Cullen, 1995). Pierced shells at Klithi are distinct from those of Franchthi not only in their older date, but also in that they are 'finished', whereas the coastal site of Franchthi bears more indications of production (Adam and Kotjabopoulou, 1997).

Stones also seem to have ritual uses and meanings in the Balkans, whether modified or *au naturel.* Engravings are found at the late Pleistocene site of Cuina Turcului, supposedly precursors to the 'sacred stone' sculptures of Lepenski Vir (Srejovic, 1989). As proof of a continuous tradition this is dubious evidence indeed, especially as engravings are found in many other cultures and geographical areas. The Lepenski Vir sculptures themselves can possibly be interpreted as 'ancestral guardians' who protected the settlement from floods while the people were away (Chapman, 1993). Attractive this idea may be, but it does have problems. My main objection is that it has already been established that the settlement was not protected at all - the site was flooded at least once every year, and the community had to work hard to make their homes habitable upon their return (Chapman, 1993). By virtue of their shape and material the sculptures *survived* the flooding but they did not prevent it. The fish-like appearance of the stone faces does suggest some celebration of aquatic life, as do the other landscape features referred to above (Chapman, 1993). An equally striking but more intimate and perhaps more mysterious use of stones is implied by those that are present in grave contexts at Franchthi[13] and in other European sites (Cullen, 1995), including the individual buried at Riparo Tagliente (Chapter 6).

4.8: Conclusion.

To conclude, therefore, the Palaeolithic and Mesolithic of the Balkan region are rich in information, despite the problems outlined earlier. Greece itself is less endowed with evidence, making our interpretations rest heavily upon the sites that are known. Theopetra will undoubtedly serve as a 'bench-mark' site for Thessaly, just as Franchthi does for the far south of the peninsula and the recent extensive publication of Klithi serves for Epirus. It is hoped the following chapter will make a valuable contribution to the body of Greek archaeozoological data which exists outside of Epirus. The contrast with Italy (see Chapter 6) will undoubtedly be interesting, as there do appear to be connections between the two regions above and beyond their association as geographical neighbours. In some ways these connections appear to be more striking than any similarities between Greece and the Near East. Though some factors do correspond – for example the environmental conditions, and the use of plants in the diet – but the first of these is outside of human control, and the last is probably a simple case of parallel but unconnected subsistence choice. The little information we have does tend to suggest a more maritime culture in Greece than the greater part of the Near East, unsurprising given the geography of both regions and a dichotomy that has lasted well into historic times (see, for example, Herodotus, writing in the fifth century BC).

Perhaps it is undue optimism, but personally I doubt that the Greek peninsula was an empty landscape during the early Holocene, available to any group of Near Eastern travellers who wished to colonise it. We can hope for more sites to be found, but it is quite possible that the Mesolithic sites in Greece - with rare exceptions - were so short-lived and ephemeral that we will never find any trace of them.

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[13] One of the Lower Mesolithic burials at Franchthi was of a 25-29 year-old man who had died from violent blows to the forehead. He was buried in a semi-contracted position with his arms crossed. Fist-sized stoned had then been carefully piled over his chest and pelvis (Cullen, 1997).

5: Theopetra cave, Results and Implications.

5.1: Introduction.

Excavation at Theopetra cave has been in progress since 1987 under the direction of Dr. Kyparissi of the Ephory of Palaeoanthropology & Speleology, Athens. The excavations have revealed deposits dating from the Middle Palaeolithic, Upper Palaeolithic, Mesolithic and Neolithic. Theopetra is highly important, as it is the first Mesolithic site to be discovered in Thessaly as well as one of the few Mesolithic sites known in Greece generally. Unfortunately the faunal sample from the Mesolithic period remains small, with 293 fragments examined thus far, 60 of which were identifiable to species level. From this small sample considerable species diversity has been recognised, however, including small caprids, hare, pigeon (*Columba* sp.) and other birds, *Sus* sp., and several small carnivores. The Upper Palaeolithic fauna is also a small, problematic sample and, though evidence of human input to this faunal material is present, it remains limited.

The aim of this chapter is to:

1. Examine the species that were found in Theopetra cave and what they tell us about changes in the surrounding environment.
2. Assess the degree of human and animal input to the fauna.
3. Compare the Palaeolithic and Mesolithic evidence and put them into context with other known sites in Greece.

5.2: The Site

Theopetra Hill is situated on the north-western side of the Thessalian Plain. Five kilometres to the west lie the foothills of the Pindus mountains, and the Lethaios river runs close to the base of the hill today. The cave itself is located on the north-eastern slope of the limestone hill (Kyparissi-Apostolika 1990, see also Fig 5a). It is a large cave, 500 square metres in area and originally 8-9 metres high from base to ceiling. The cave mouth faces north (Fig 5b).

Fig 5a: Photo of Theopetra Hill.

Fig 5b: The view from the cave mouth today.

Two human skeletons have been found buried within the cave, one dated to the Upper Palaeolithic, the other to the Late Mesolithic (Kyparissi-Apostolika 1998). There are also multiple burning episodes in the Middle Palaeolithic depths that are probably anthropogenic in origin (Karkanas 1998) and considerable artefactual evidence (see forthcoming proceedings of the 'Theopetra Cave: Twelve Years of Excavation and Research' conference).

5.3: Methods.

The assemblage from Theopetra was the first of the four sites in this project to be analysed. Unfortunately it was also the smallest and most problematic sample. Acids in the soil have destroyed bones that were in the centre of the cave (see Fig. 5c), leaving little preserved to analyse. In order to maximise the output of results detailed notes, including measurements, were taken of all the indeterminate fragments as well as those specimens that could be identified to taxon. The latter were recorded using the numerical code as outlined in chapter 1.

All of the available bones from trench Λ8 have been analysed and these constitute the majority of the Palaeolithic sample. However, work undertaken at the site during the summer of 1999 has also provided a substantial Palaeolithic sample from the neighbouring trench of M9. Both trenches are close to the East wall of the cave and deep within it. Since the bone material in the central area of the cave has suffered disturbances and intense destructive forces it was hoped Λ8 and M9 would provide material in a better condition.

A smaller number of bones from Mesolithic deposits were available for analysis. These come from trenches Z6, H6, Γ8, and Δ7, where all earlier bones have been destroyed by soil acids, and a small upper sample of Λ8. Only specimens from bags labelled as Mesolithic by the excavators have been used. There are 60 identifiable Mesolithic specimens in total. For the purposes of comparability in the tables and figures that follow, these bones have simply been grouped under the heading 'Mesolithic'.

Fig. 5c: Theopetra cave interior

The shaded area covers the trenches where bone material has been dissolved.

The stratigraphy at Theopetra is complicated (see Fig 5d) and has suffered various disturbances over time, including looting and the use of the cave as a sheep pen. Separation of individual depositional events has not been possible at this stage as work on the stratigraphy is ongoing. In the figures and tables the Palaeolithic material has been grouped into depth categories for the purpose of comparison. In order to maintain the depths noted on the bag labels, a rather rough system had to be adopted. Here is an approximate guide to the time periods the depth categories of Λ8 and M9 represent:

1.27-1.90 m. –Tardiglacial.
1.90-2.75 m. –Late Upper Palaeolithic. (LUP)
2.62-3.04 m. –Early Upper Palaeolithic. (EUP)
3.04 m and below. – Early Upper Palaeolithic, perhaps some late Middle Palaeolithic.

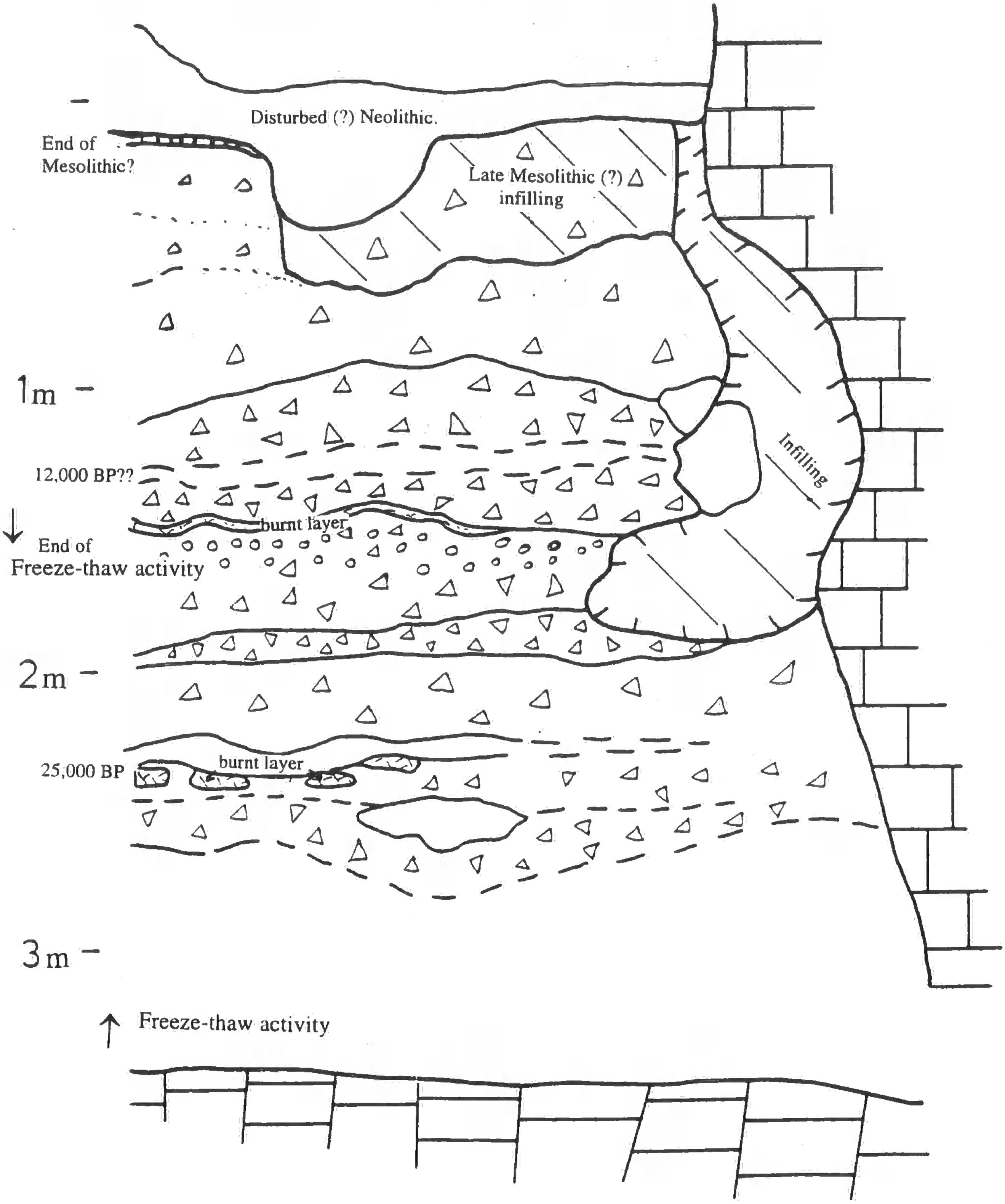
5.4: Taphonomy.

The bones that have preserved away from the acid are in surprisingly good condition, on the whole. 4479 bone fragments have been examined so far, 11% of which were identifiable to species. This is reasonable considering the age of the material and high fragmentation rate. As can be seen in Fig. 5e most of the fragments, throughout the strata, are less than 3 cm long. Almost all of them are less than 6cm. Small, hard body elements such as teeth and phalanges are readily identifiable whereas long bones are quite rare and usually broken into small pieces. The fact that larger unidentifiable pieces were found at the deeper levels probably relates to the fact that larger species are found at this stage, for example cave bears and horses.

Only five specimens were identified explicitly as fresh fractures. Three of these are suggestive of marrow extraction by humans and will be discussed below. The other two examples cannot be reliably attributed to human action.

Gnawing data can be seen in Fig 5f. It is evident that carnivore gnawing is a constant feature throughout the assemblage, but is never abundant. Pitting has been attributed to the gnawing of carnivores' teeth upon bones that have already been stripped of

Fig. 5d: Stratigraphy of Theopetra trench Λ8, north section.



Adapted from sketch and details provided by P. Karkanas.

Fig 5e : Theopetra. Indeterminate fragment length by depth.

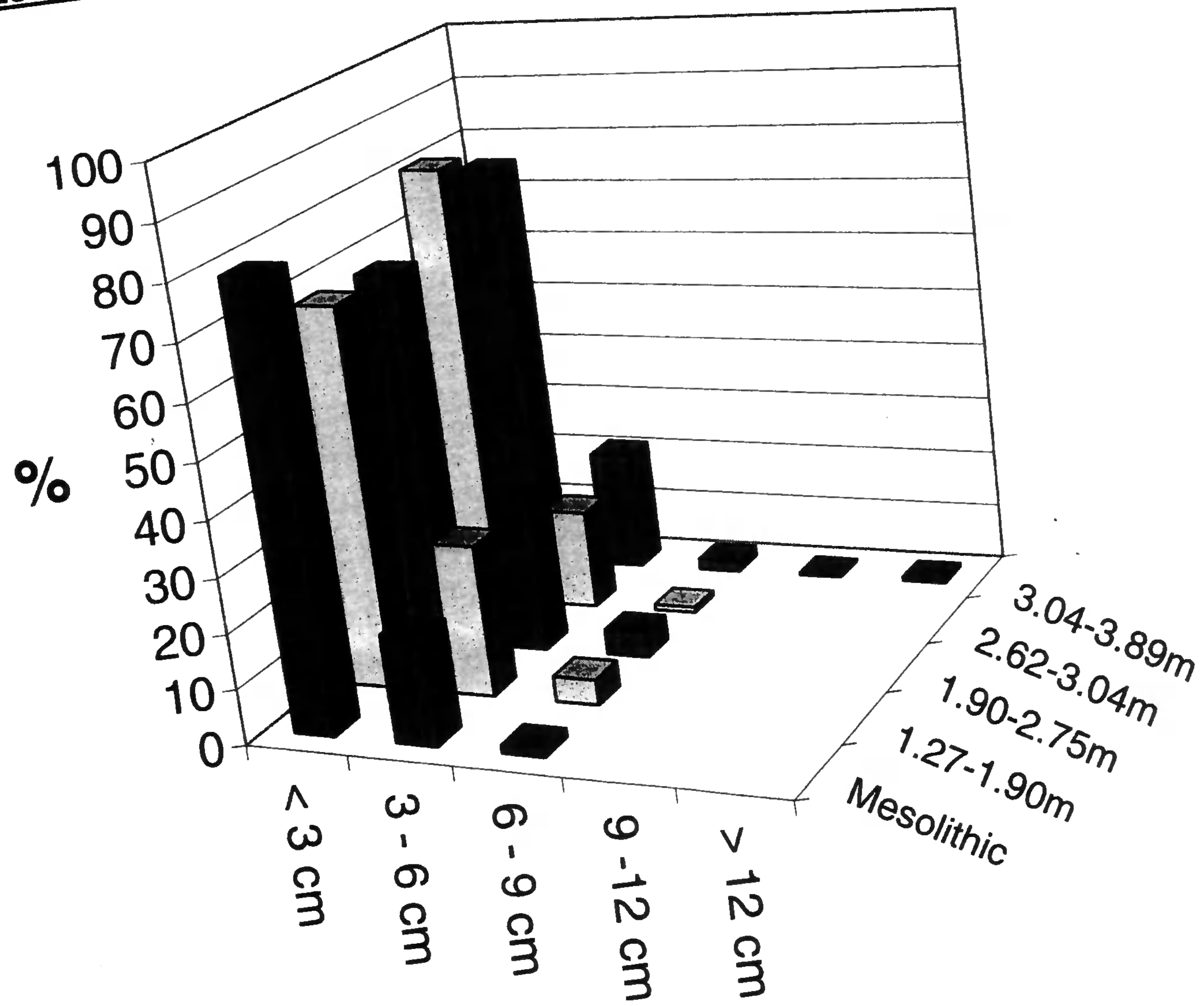


Fig. 5f: Theopetra, gnawing damage to fragments.

		Palaeolithic			
	Mesolithic	1.27 - 1.90m	1.90 - 2.75m	2.62 - 3.04m	3.04 - 3.89m
Pitting	4	7	19	17	13
Scoring		1	2	8	1
Pitting + Scoring		1	2	5	3
Pitting + Crenulated edges				3	
End-slurping				1	
Acid-etching		1	2	1	
Other	1	8	12	13	6
Rodent gnawing		4		2	2
Rodent + Carnivore		1	1		1
Total Fragments in group	293	**468**	**1064**	**1337**	**917**
Total gnawed (carn.)	5	**19**	**37**	**48**	**24**
Total gnawed (rod.)	0	**5**	**1**	**2**	**3**
% gnawed (carn.)	*1.7*	***4***	***3.5***	***3.6***	***2.6***
% gnawed (rod.)	*0*	***1***	***0***	***0.1***	***0.3***

Note : only definite gnawing damage is recorded here. Fragments which have been gnawed by carnivores and rodents have been counted twice. Mesolithic sample is derived from trenches Z6, H6, 8, 8 and 7. Others are 8 and M9.

their meat, and it is therefore associated with dens rather than kill-sites (Binford 1981, 49, uses the example of dog-yards). The constant, low presence of pitting at Theopetra therefore suggests that the cave was more likely to have been a den than a kill-site, which is not unexpected.

Rodent gnawing is rare. Small rodents are present in the microfauna but the majority of these are likely to have been introduced to the cave when already dead.

5.5: Results

Herbivores of all sizes are well represented in the Theopetra assemblage (see Fig. 5g). *Capra ibex* is a consistent feature throughout the Palaeolithic layers but does not dominate the sample at any point, in contrast with other Palaeolithic sites in Greece such as Klithi (Gamble, 1997). *C. ibex* disappears in the Mesolithic sample, whereupon smaller caprids become more common. The deer species are quite frequent. Interestingly, *Capreolus* is not present in the Mesolithic, but does occur in the Palaeolithic. Roe deer are more adaptable than is usually thought (Corbett 1966, 162), but their presence does argue against consistent cold conditions in these layers as well as for some tree cover. The fact that horse remains are only found at the deepest layers is probably significant. They suggest that open, fairly dry grasslands were available during the Middle Palaeolithic – Early Upper Palaeolithic in the Theopetra environs. The frequency of hare (*Lepus* sp.) tends to support this.

Carnivorous mammals are a constant feature of the assemblage at Theopetra. There are 76 identified specimens in total, plus a large number of broken carnivore teeth in the unidentifiable fraction. At least eight different carnivore species are present, some of which may have actually lived within the cave:

5.51: Ursus.

The most striking incidence of carnivore presence is of course, the abundance of *Ursus* sp. bones in the deepest levels of Λ8. The large size of some of the teeth, combined with comparisons with pictures and descriptions in Kurten (1976), suggest

Fig. 5q: Theopetra. Species NISP by depth.

		Palaeolithic				
	Mesolithic	1.27 - 1.90m	1.92 - 2.75m	2.62 - 3.04m	3.04 - 3.89m	**Totals**
Capra (c.f *C. ibex*)		13	17	22	6	**58**
Capra /ovis	27	3	11	12	7	**60**
Equus sp.			3	5	5	**13**
Equus / Bos		1			1	**2**
Cervus elaphus	1	10	6	6	2	**25**
Dama dama				1		**1**
Cervus / Dama		3				**3**
Capreolus		1	3	7		**11**
Sus scrofa	2		2	1	4	**9**
Sus sp.	1					**1**
Ursus sp.			5	8	31	**44**
Crocuta sp.				1	1	**2**
Felis sp. (large)	1	1		1		**3**
Felis sylvestris	1			1		**2**
Lupus		10	1	1		**12**
Canis sp.	1					**1**
Vulpes vulpes	1	1	2		2	**6**
Meles meles		2	1	1	1	**5**
Martes sp.			1	1		**2**
Lepus sp.	7	1	5	14		**27**
Castor			1			**1**
Corvids (small)	2	8	12	9	4	**35**
Corvids (medium)		1				**1**
Pigeon	11	1	5	1	3	**21**
Partridge			5	5	7	**17**
Aquatic birds	1	3	1	2	2	**9**
Birds of Prey	1	1	1	2		**5**
Reptiles	3	1	8	47	1	**60**
Totals	**60**	**61**	**90**	**148**	**77**	**436**

The Mesolithic sample is derived from trenches Z6, H6, 8, 7 and an upper sample of 8. All other samples are from trenches 8 and M9.

that these are members of the extinct *Ursus spelaeus* species rather than the brown bear, *Ursus arctos*. Different age groups of bears have been recognised. Six of the teeth are heavily worn. Two of these badly worn teeth have caries through the centre. Poor dental health is not uncommon among cave bear populations and may have contributed to their decline (Capasso and Caramiello, 1999). It is likely that these teeth are derived from at least one very old bear (>20yrs.). Five bear teeth, in contrast, were unworn or just coming into wear. The individuals were already large, indicating the presence of one or more juveniles. In addition there are neonatal bear bones. There is not abundant evidence of gnawing on bones below 3 metres – less, in fact, than in some of the other levels, although several of the bear bones themselves show distinct puncture marks. If cave bear cubs were born in winter, like brown bears today, and females kept a yearling 'nurse' bear with them in the den (Kurten 1976) we may surmise that Theopetra was used as a winter den during this early period. It also seems plausible that the old bear was female, and died during hibernation, whereupon her offspring also perished.

5.52: Crocuta.

There are only two NISP representing hyena in the Theopetra assemblage: an isolated tooth from 2.62 metres and the near-complete mandible from 3.24-3.31 metres. The isolated maxillary tooth was worn, with a broad hole at the tip. The mandible (see Fig 5h) has teeth in an advanced state of wear. The three hindmost teeth are worn down to the pulp cavity. It is suspected, therefore, that the hyena was senile, though the intense use that hyena jaws are subjected to may distort this ageing pattern. There is also another isolated tooth from a very large carnivore, found at 2.97 metres, that does not match the morphology or texture of *Ursus*. It is worn flat and has a smoothly worn groove at the top of the root. This may also be derived from a hyena.

The evidence for a hyena den is considerably less convincing than for *Ursus*, but it remains a possibility. Hyenas are renowned for their bone crushing potential and have been observed eating the bodies of their own species (Brain 1981, 66), so it is likely that additional hyena bones were once present. Both *Crocuta crocuta* and *Hyaena brunnea* of today's Africa have a wide dietary repertoire, including tortoises and carnivores as well as large herbivores (Pienaar 1969; Brain, 1981). The abundance of

Fig 5h: Hyena mandible found at Theopetra.

bone fragments between 2.62 and 3.04m, and the range (though *not* the frequency) of carnivore modification (see Fig. 5f) suggest some occupancy by carnivores, possibly hyenas, at this period of the Palaeolithic.

5.53: Lupus and *Felis.*

Both of these species were found, and may have contributed some bone material to the sample. Three phalanges and six teeth of *Lupus* were discovered between 1.61 and 1.74 metres in trench M9. There is nothing in this small group to suggest the presence of more than one individual. The teeth are in near-perfect condition, suggesting that they are derived from a young wolf. This depth dates to 12,000 BP. and is likely to be situated towards the end of the extremely cold period represented by freeze-thaw debris. Though wolves today mostly prey upon large animals, small game is also eaten, including hares, snakes, lizards and birds (Mech 1970, 178). The shell of a tortoise may be too tough for a wolf, however. Flightless or sessile birds may be more at risk to wolves (Hagar, J. A. pers. comm. to Mech 1970, 178).

The best large cat specimen – an ulna from 2.72-2.80 metres – is approximately lynx size. This ulna has severe pitting on the olecranon. It is possible that big cats were using Theopetra as a base occasionally but, given what we have already said about hyena predation, this individual may have been introduced to the site as prey.

5.54: Small carnivores.

Incidences of fox, wild cat, badger (*Meles meles*) and martens have also been noted. All are at least partially associated with woodland, and may have contributed to the microfaunal remains.

5.56: Birds.

All of the depth categories examined contained at least some bird remains. These were generally in very good condition. The bones of small corvids are the most numerous (Fig 5g). These are likely to be derived from the jackdaw (*Corvus monedula*) or chough (*Pyrrhocorax* sp.). Both inhabit Greece and are present throughout the year. Chough prefer a rocky, mountainous habitat. Jackdaws are more widespread, but also prefer open country with rocks and some trees (Heinzel *et al.* 1972, 306 and 310). Either species, therefore, is likely to have been local to the cave environs, and neither is characteristic of intensely cold conditions.

Pigeons, the Columbidae, were found at almost every depth in the Theopetra sample. The specimens were most similar to *Columba livia*, the rock dove. *Columbia livia* inhabits rocks, cliffs and hillsides, and sometimes nests on cave ledges (Heinzel *et al.* 1972, 170). It is still common around the site today.

The partridge bones found in the assemblage were closer to *Alectoris* (e.g. the red-legged partridge or rock partridge) than *Perdix*, the more common partridge (see Cohen and Serjeantson 1996). Partridges generally inhabit open country, and *Alectoris* also prefer drier locations (Heinzel *et al* 1972, 102). The fact that they are only found in the deepest layers is probably significant, again, of more steppe-like conditions.

Some aquatic birds were also noted in all depth categories. Unfortunately, the two water-birds found between 1.53 and 1.62 metres were not attributable to a specific taxon. A large duck coracoid found at 1.55 metres in M9 was comparable to a mallard, an all-year resident of Greece. Two aquatic birds were found in the penultimate depth category. One, the proximal phalanx of the major digit, found at 2.72-2.80 metres, was identified as either a widgeon or shoveler. Its surface had been etched by stomach acid. Between 2.80 and 2.85 metres the ulna of a teal was identified. It is interesting that all three of these duck species are winter visitors to Greece today (Heinzel *et al.* 1972, 52, 56 and 54). One of the aquatic bird specimens found in the deepest layer was also the bone of a teal, the other was a member of the plover genus (Charadriidae), as was the specimen found in the Mesolithic sample. This Mesolithic specimen was possibly a lapwing, another winter visitor to Greece (ibid., 124).

Though few in number, the birds of prey may have contributed to the wealth of microfauna found in the cave deposits (see below). The coracoid of a small owl, comparable to a Little Owl (*Athene noctua*) was found at 2.72-2.80 metres. *A. noctua* are quite adaptable, but prefer an environment with some trees (Heinzel *et al.* 1972, 180). Another small owl bone was found in the Mesolithic sample of Λ8. Specimens of small raptors, usually kestrels, have been found in the deeper layers of Λ8, below 2 metres. These prefer an open habitat with crags or scattered trees (ibid, 94). The phalanx of a large raptor, possibly *Aquila*, was found at 1.48-1.58 metres.

5.57: Microfauna.

Microfaunal remains have been generally abundant in the deposits examined. The Mesolithic samples examined are rich in microfauna, with 1171 specimens derived from several trenches. Very small birds, mammals *and* amphibians are present in the Mesolithic and Tardiglacial, whereas amphibians are rare in the deeper layers.

5.6: Evidence of Human Agency.

To date little of the Palaeolithic and Mesolithic faunal material examined so far can be attributed to human agency. By contrast, the evidence for animal occupancy of Theopetra is good, as has been seen above. This anomaly may be partially attributed to the position of the main trenches where bone has been preserved. Perhaps human groups utilised the central and rear areas more intensely. Some evidence has, however, been found:

5.61: Cut marks.

Two specimens with cut marks have been identified. One, a fox pelvis, is from 1.53-1.62 metres (Λ8) and is Upper Palaeolithic in date. Three smaller nicks were found close to a deeper cut (see Fig. 5i). The main cut mark is deep and v-shaped. It is possibly the result of dismembering the femur from the pelvis (c.f. figs. 4.22 and 4.24 in Binford 1981, 113 and 115), though the marks are not as close to the acetabulum as those in Binford's examples. The position of the cut mark does not correspond well with skinning marks. At the very least, the cut mark proves that humans exploited foxes in the Late Upper Palaeolithic at Theopetra.

Fig 5i: Cutmark on a fox pelvis.

Fig 5j: Cutmark on a caprid rib.

The other specimen, a caprid rib, also from 1.53-1.62 metres, with a series of fine cut marks, probably represents a more simple case of butchery (Fig. 5j). The cut marks are close to the articular head of the rib, but not actually upon it. This is likely to result from removal of the 'tenderloin' meat (Binford 1981, 113). Hence, human exploitation of large caprids for food can also be inferred.

5.62: Fractures.

A red deer metacarpal from 2.72-2.80 metres, A8, exhibits potentially the best example of marrow extraction in the assemblage (see Fig. 5k). The green-stick fracture compares well with an example (albeit of a metatarsal) illustrated in Binford, 1981 (155). This appears to be a good case of marrow processing by hominids, and may be contemporary with the burning episodes in the Middle Palaeolithic (see below). However the fact that the heavily gnawed feline ulna was found in the same bag raises doubts.

Marrow extraction may also be inferred in the Mesolithic sample: two left ovi-caprid humeri[14] were found exhibiting green-stick fractures in trench Z6, depth 1.23/1.37 metres. One example is comprised of the distal condyles plus part of the diaphysis, while the other is the distal end only.

5.63: Burning.

51 fragments have been found thus far in the Palaeolithic sample that are definitely burnt or show discoloration suggestive of burning (see table, Fig. 5l). Unfortunately most were small fragments in poor general condition and none were securely identified to species. Six of the burnt or discoloured specimens are referred to in the notes as 'chunk' or 'chunky', meaning that though they are small in size they are thick-walled and therefore derived from large, sturdy animals. It is evident that most of the burnt fragments are not concentrated between 1 and 2 metres, where the pierced red deer canines and bones with cut marks were found, but rather between 2.67 and 2.85 metres. Twenty-nine out of the 51 were found in this level: 57% of the total in

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[14] These specimens, however, are of dubious provenance. See section 5.10 below.

Fig 5k: Red deer metacarpal with evidence for possible marrow extraction.

Fig 5l: Theopetra. Burned fragments.

Trench	Depth	Shape	Length (cm)	Colour / texture	Heat source (from Shipman, 1988 and David, 1990)
I 8	1.42-1.53	Flake	2.4	Black	'Camp-fire'
	2.29-2.37		1.4	Black	'Camp-fire'
	2.62	Chunk	3.6	Blue-white, cracked. Some black.	'Camp-fire'
	2.62	Chunk	2.4	Black on interior curve	'Camp-fire'
	2.65/2.80	Tibia frag. Large	3.4	Grey, with black and white patches	'Camp-fire'
	2.67-2.72	Irreg.	1.3	Blue-white.	'Camp-fire'
	2.67-2.72	Chunk	2.4	Black	'Camp-fire'
	2.67-2.72		1.5	Black (patchy)	'Camp-fire'
	2.67-2.72/2.78		3.1	Pale grey/ grey-pink Cracked	Hotter, >680 C
	2.67-2.72/2.78	Jagged	2.8	Black, dark grey-brown	'Camp-fire'
	2.67-2.72/2.78	Chunk	2.3	Black one side, dark grey-brown the other	'Camp-fire'
	2.67-2.72/2.78	Chunk	1.6	Dark grey	'Camp-fire'
	2.67-2.72/2.78		1.7	Dark grey	'Camp-fire'
	2.67-2.72/2.78		1.9	Dark grey, black	'Camp-fire'
	2.67-2.72/2.78	Narrow	1.65	Black	'Camp-fire'
	2.67-2.72/2.78	Flake	1.2	'Burnt'	
	2.67-2.72/2.78	Flake	2.2	'Burnt'	
	2.72-2.80	Jagged	3.6	Black	'Camp-fire'
	2.72-2.80	Jagged	3.4	Dark grey	'Camp-fire'
	2.72-2.80	Jagged	3.35	Dark grey	'Camp-fire'
	2.72-2.80	Jagged	2.1	Dark grey	'Camp-fire'
	2.72-2.80	Jagged	2.3	Medium grey	'Camp-fire'
	2.72-2.80		1.8	Black	'Camp-fire'
	2.72-2.80		1.6	Grey.	'Camp-fire'
	2.72-2.80	Right tibia frag. Probably red deer	5.8	Black and dark grey	'Camp-fire'
	2.72-2.80	Jagged	1.7	Black and dark grey	'Camp-fire'
	2.72/2.80	Angular	2.6	Black and dark grey	'Camp-fire'
	2.72/2.80		1.5	Black	'Camp-fire'
	2.72/2.80		1.05	'Slight burning'	
	2.80-2.85	Flake	0.9	Blue-white	'Camp-fire'
	2.80-2.85	Chip	0.4	Blue-white	'Camp-fire'
	2.80-2.85	Sharp, narrow	1.1	Black	'Camp-fire'
	2.97-3.04	Fresh break (side)	2.9	Black	'Camp-fire'
	2.97-3.04	Jagged, rough	4.25	Black	'Camp-fire'
	3.01	Jagged	2.7	Dark-brown patches	'Camp-fire'
	3.10-3.17	Sharp	1.8	Brown	'Camp-fire'
	3.10-3.17	Chunk	1.7	Black and brown	'Camp-fire'
	3.20-3.89	Rib frag	3	Black one side	'Camp-fire'
	3.20-3.89	Rib frag (medium)	2.5	Flecked with black	
M9	1.31/1.54	Straight + narrow	2.1	Black	'Camp-fire'
	1.31/1.54	Small, sharp.	1.1	Black underside	'Camp-fire'
	1.45	Flat, sharp	2.1	Dark-grey	'Camp-fire'
	2.10/2.17	Chunk	1.9	Black	'Camp-fire'
	2.27/2.38	Chip	0.9	Black	'Camp-fire'
	2.58/2.74	Chip	1.8	Blue-black + white	
	2.74	Chunk	unknown	Black	'Camp-fire'

Fig 5l continued: Theopetra. Burned fragments.

I 8	1.37/1.47	Tibia frag. ovi-caprid	unknown	Black	'Camp-fire'
	1.37/1.47	Metacarpal frag. Prob. ovi-caprid	unknown	Black patches (under side)	'Camp-fire'
	1.37/1.47	Small.	1.4	Dark-brown.	'Camp-fire'
	1.37/1.47	Small rib end	1.2	Dark-brown.	'Camp-fire'
	1.47/1.57	Pigeon bone		Black.	'Camp-fire'
	1.47/1.57	Pigeon bone		Black.	'Camp-fire'
	1.47/1.57	Pigeon bone		Black.	'Camp-fire'
	1.47/1.57	Pigeon bone		Dark brown-black.	'Camp-fire'
	1.47/1.57	Pigeon bone		Dark brown-black.	'Camp-fire'
	1.47/1.57	Interior frag.	2.2	Black	'Camp-fire'
	1.47/1.57	Small, sharp.	unknown	Black	'Camp-fire'
	1.57/1.67	Flat, sharp	1.7	Black	'Camp-fire'
	1.57/1.67	Interior frag. Small	unknown	Black	'Camp-fire'
	1.76/1.86	Rib frag. Medium	1.8	Black patches	'Camp-fire'
	2.08/2.18	Light, spongy	2.1	Brown	'Camp-fire'
	2.08/2.18	Rib frag. Small	2.25	Black	'Camp-fire'
	2.08/2.18	Small, sharp.	1	Black	'Camp-fire'
Z10	2.40-2.53	Light, spongy	2.4	Black	'Camp-fire'
H11	2.60/2.76	Sharp	1.2	Black	'Camp-fire'
O 11	Unknown, context a/a 282	Jagged	2.15	White	Hotter, >680 C
			1.5	Black	'Camp-fire'
		v.small worn tooth	1.4	Black (root)	'Camp-fire'

Brown-black indicates temperatures from 370-540 Celsius, grey is higher: 540-700 C. Both fall within the short duration camp fire range, while very pale fragments have been burnt at a higher temperature for longer (Shipman, 1988; David, 1990).

just 18cms of matrix. Of course, burned fragments are not an automatic indication of anthropogenic activity. If the matrix in which bone fragments are buried is rich in organic material and dry then it can burn (Lyman 1994, 384). There are layers within the cave that are rich in burnt remains and phytoliths, indicating the former presence of plant material, but there is also considerable evidence for a moist micro-environment and water-borne sediments (Karkanas 1998). Karkanas does not believe the multiple burnt layers in Episode II (below two metres) are natural, but the motivation for regular burning of plant debris within the cave is still uncertain. If this section of the strata was completely free of gnawing evidence and carnivore remains we could have even more confidence in an anthropogenic cause – unfortunately this is not the case. A burnt layer, dated to around 25,000 BP has been discovered at about 2.4 metres in Λ8. It is possible these small burnt fragments have slipped down from this layer. Most of the burned fragments have been heated at a fairly low temperature and/or for short periods (Shipman 1988, fig.7, 279; David 1990). This may correspond well with Karkanas's interpretation of a brief grass or brush fire – perhaps as a cleaning exercise.

Seventeen burnt pieces were found in the Mesolithic layers of trench Γ8. These included five pigeon bones – namely two coracoids, two scapulae and a sternum, almost certainly derived from the same individual bird – which were all burnt black or dark brown. This trench has evidence for several hearths being present, one of which was radiocarbon dated to more than 9000 BP (Kyparissi-Apostolika, pers. comm.). Whilst it cannot be ruled out that this partial pigeon carcass was the prey of a raptor and was subsequently burned accidentally, this is the best evidence for Mesolithic cooking of small resources we have for the moment. In relation to the former possibility, it should be noted that a talon of a bird of prey was found at the same depth, along with 49 microfauna which were also burnt.

5.7: The animal bone from H6.

The Mesolithic fauna from trench H6 may be of particular interest as this was the location of the late Mesolithic burial of a young person, possibly a female (Stravopodi *et al.* 1998). A piece of a human child's pelvis was found among the animal bones

Fig. 5m: Mesolithic animal bone from trench H6.

	NISP	MNI
ovi-caprids	2	1
large cat	1	1
wild cat	1	1
fox	1	1
hare	4	1
pigeon	2	1
corvid	2	1
aquatic bird (plover or lapwing)	1	1
reptile	1	1

H6 was the trench in which a human skeleton dated to the Mesolithic was found.

from this trench, and has since been transferred to Dr Stravopodi. The identifiable animal specimens number just 15 but encompass the usual variety of mammals, birds and a reptile specimen (Fig. 5m). Neither of the ovi-caprid specimens was notably young. Among the Mesolithic bones from this trench there was also a pelvis which was most comparable to a squirrel (*Sciurus* sp.) and 250 microfauna including very small mammals, amphibians and small birds.

5.8: The problem of the Mesolithic 'sheep'.

The Mesolithic assemblage is dominated, surprisingly, by small ovi-caprids, making up 44% of the total identifiable sample. These are disturbing in several ways. First, they are indistinguishable from domesticated sheep and goats in the reference collection, and quite distinct from chamois skeletons observed elsewhere[15]. Secondly, many of these ovi-caprid specimens are clearly very young, especially those from trench Z6 – three specimens are under three and a half years old, and four specimens are neonatal. Thirdly, we already know that the Mesolithic layer is very thin and the overlying Neolithic deposits have been severely disturbed. During some preliminary analysis of material from Neolithic layers that I carried out for Dr. Hamilakis during summer 1999 it was observed that neonatal and young ovi-caprids were frequent. This supports my suspicion that the ovi-caprids in the Mesolithic sample, at least those in trench Z6, are in fact Neolithic contaminants, perhaps resulting from disposal of still-born or ill herd animals. However, it is intriguing that the Z6 layers were well defined (Kyparissi-Apostolika, pers. comm.). The possibility that early Holocene hunter-gatherers acquired domesticated ovi-caprids from neighbouring groups with herd animals assumes that there were such groups circulating in the area at the time, which is not necessarily the case. It is very important that we establish the exact date of these specimens before reaching definite conclusions. Radiocarbon dating of the ovi-caprid specimens is planned but the results are still awaited. If the dates received are Mesolithic, the sheep will have to be DNA tested to finally rule out the possibility that they are chamois. It is interesting to note that a similar anomaly has been encountered

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[15] I have compared the specimens with chamois skeletons in the collection at the Natural History Museum, London and with a chamois skeleton borrowed from Professor Clive Gamble (University of Southampton). The second opinions of Dr Peter Rowley-Conwy, Dr Keith Dobney, Dr Anthony Legge and Dr Paul Halstead were also sought and the conclusion is unanimous – these specimens are sheep.

at Cyclops (Trantalidou, forthcoming). This site also dates to the Mesolithic, and would be an excellent Mesolithic site, if not for the sheep.

5.9: Discussion.

In summary there are some subtle differences between the EUP, LUP and Mesolithic layers. The very early Upper Palaeolithic environment appears to have been fairly dry and open. There is some good evidence for human exploitation of red deer in this period, along with burning episodes, but the evidence for human occupation is inter-leaved with that of cave bears and other fauna. EUP layers exhibit little evidence of human occupancy, but a variety of gnawing damage suggests that animal occupation of the cave continued.

Human occupation, at least briefly, is more certain between 1.27-1.69 metres (Tardiglacial). Exploitation of foxes, caprids and red deer is evident. There is also less evidence for large carnivore dens. The absence of horse, partridge and hare in the Late Upper Palaeolithic implies less open country, though *Lepus* returns in the Mesolithic. This may be due to human subsistence choices, but this is speculative for the moment, as no hare bones exhibit recognisable human modification.

The amphibians in the LUP and Mesolithic sample suggest damper conditions within the cave, but the change in general environment is not dramatic. The disappearance of ibex may be related to a spread of trees into the uplands, since chamois are known to be more tolerant of woodland (Corbett, 1966, 178). However, these 'chamois' are almost certainly intrusive sheep, as mentioned above. The cracked humeri are good evidence that caprids provided subsistence for humans, whatever species they are. The absences within the assemblage are interesting in themselves when compared with the other Mesolithic sites. Unlike Franchthi (Payne 1975 and 1982), *Bos* and fish are almost completely absent. The classic red deer/wild boar/roe deer triumvirate does not dominate at Theopetra – indeed, as has been mentioned, roe deer are absent in this part of the assemblage even though they were present in earlier periods. Woodland species are certainly present in the fauna, such as wild boar and *Felis sylvestris*, but taxa that favour a woodland habitat are present at every level of the Theopetra assemblage and do not suddenly proliferate during the early Holocene. Aquatic resources, including fish, are almost completely absent just as in the earlier periods. This lack of aquatic remains is understandable given Theopetra's inland location, up a steep hill from the nearest river. It is certainly an immediate contrast with the resources represented at Franchthi and Sidari (Payne 1975, 1982, Sordinas, 1969) and the recent discoveries at Cyclops, Youra (Powell, Mylona, forthcoming). There is no obvious taphonomic reason for the absence of fish at Theopetra, since sieving was routinely carried out and small, fine bones, such as those of frogs, have preserved remarkably well. Of course, Cyclops, Franchthi and Sidari (Sordinas, 1969) are coastal sites while Theopetra is inland, but animals that frequent fresh-water are also rare at Theopetra. There is just one bone from a beaver, for example – a femur found at 2.21 metres in Λ8, slightly above the 25,000 BP burnt layer.

5.10: Can the Theopetra bones tell us anything about the diet of the Mesolithic people in Thessaly?

In summary, it becomes clear that 60 identifiable specimens from a problematic layer in which most bone material has probably dissolved are not an ideal basis on which to assess whether the early Holocene hunter-gatherers at Theopetra practised a 'Broad Spectrum' subsistence strategy. Inhabitants of other sites in the Balkans apparently did forage a wide range of resources, for example Franchthi (Payne 1982, Cullen 1995), Pupicina (Miracle 1998) and Cuina Turcului (Clason 1980). This is particularly unfortunate since Theopetra is the only site in Thessaly with a definite Mesolithic presence that is currently known. The existing evidence does certainly point to utilisation of small resources local to the cave such as pigeons, reptiles and hares but all of these species are present in deeper layers too, and there is little to prove beyond reasonable doubt that these animals represent human meals. There are, however, quite sharp divisions between the faunal species that dominate the immediately preceding late glacial layers and those of the Mesolithic (Fig. 5n). For example, the incidence of red deer has actually diminished, which is something of a surprise. Ibex has completely disappeared, though it was never as abundant as at Klithi and other southern European sites (Gamble 1997), and therefore its absence may be explained by the simple 'bad luck' of poor preservation. Pigeon numbers appear to have risen.

Fig. 5n: Direct comparison between Mesolithic fauna at Theopetra and the preceding phase.

	Mesolithic	1.27 - 1.90m
Capra (c.f. ibex)		13
Capra /ovis	27	3
Equus sp.		
Equus / Bos		1
Cervus elaphus	1	10
Dama dama		
Cervus / Dama		3
Capreolus		1
Sus scrofa	2	
Sus sp.	1	
Ursus sp.		
Crocuta sp.		
Felis sp. (large)	1	1
Felis sylvestris	1	
Lupus		10
Canis sp.	1	
Vulpes vulpes	1	1
Meles meles		2
Martes sp.		
Lepus sp.	7	1
Castor		
Corvids (small)	2	8
Corvids (medium)		1
Pigeon	11	1
Partridge		
Aquatic birds	1	3
Birds of Prey	1	1
Reptiles	3	1
Totals	60	61

To put the Mesolithic fauna in context with the following Neolithic, as has been discussed ovi-caprids are already a dominating factor in the Mesolithic sample, via one channel or another. Conversely, Dr Hamilakis's preliminary results from the Neolithic material (Hamilakis forthcoming) suggest that around 10% of the sample is derived from wild fauna. Some of these species, such as wild cat, red deer, wild boar and hare, also feature in the Mesolithic. This perhaps indicates a certain continuity of habitat type between the two periods. Interestingly Dr Hamilakis makes no mention of ibex among the Neolithic sample studied so far although the environs of the cave appear ideal for this species. This suggests that whatever happened to diminish the local ibex population in the early Holocene – whether climate change or human interference – the species did not replenish itself greatly. As I have already said, however, the absence of ibex in such a small sample may be statistical rather than real.

5.11: Conclusion.

To conclude, the Palaeolithic fauna from Theopetra allows us to envisage a cave used by humans, but also several other species, both large and small. Fairly dry and open environmental conditions such as steppe or wooded steppe seem likely through much of the period. The Mesolithic fauna from Theopetra, enigmatic though it is, has provided a link between what is already known about the environs and resources of the site in the Palaeolithic and Neolithic. By necessity this chapter has also outlined the many problems involved in interpreting this small but important, and as yet unique, assemblage. It is to be hoped that future work will recover further sites and assemblages in Thessaly dating to the early Holocene that will enable us to expand upon the tentative conclusions reached here. If not, the Mesolithic in Greece will continue to be a huge gap in our knowledge. We know that humans inhabited inland Greece during the Mesolithic – and there is no logical reason why they should not have lived there – but how they subsisted is still clouded in mystery.

Chapter 6: "If it ain't broke don't fix it." The Upper Palaeolithic and Mesolithic in Italy, a review.

6.1: Introduction.

The Italian peninsula constitutes the smallest of the geographical regions considered in these review chapters, but is of extreme importance and interest all the same. As with the other regions the early prehistoric archaeology of Italy is not without its problems. Partially, these difficulties are those of excavation and recovery. For example, many of the excavations were done so long ago that material has literally been lost, or is of inadequate quality for modern research (Mussi, 1986, 1990). One extreme instance is the burial at Riparo Tagliente itself, where piecemeal excavation over the decades has resulted in the loss of the person's head and upper body, and probably some grave-goods (Guerreschi and Leonardi, 1984). Another inadequacy highlighted only ten years ago was the way in which animal remains used to be examined only with the aim of environmental reconstruction or as chronological indicators (Mussi, 1990). Palaeolithic archaeological publications of the Italian peninsula, even in the post-war period, have sometimes limited the artefactual and faunal reports to the 'belles pièces' and 'shopping lists' of animals (Barker, 1981, p40). Of course, such a cavalier attitude towards fauna is not restricted to Italy, and it is hoped that the present research on the faunal remains found at Mondeval de Sora and Riparo Tagliente, and other recent work, can go some way towards addressing this issue. Royston Clark's recent work (Clark, 2000) on the Mesolithic hunting sites of Trentino provides a thorough faunal analysis as well as considering the lithic assemblages and their raw material sources. 'Economic' and 'symbolic' interpretations of Italian prehistoric caves tend to be the subject of different papers by different practitioners (Skeates, 1997) – hardly an unusual phenomenon, it must be said. The dissemination of archaeological information to an international audience has also been rendered awkward, however, by publishing largely in Italian, and often in local journals (Mussi, 1986). On the other hand, if one takes the trouble to read the Italian literature, the level of detail can be excellent, and the dignity with which prehistoric peoples are accorded surpasses the usual tone of Anglo-American works. Perhaps this is a product of the language.

Nevertheless, the Upper Palaeolithic and Mesolithic archaeology of this region, including Sicily, is incredibly rich. In this chapter evidence for vegetation, diet, technology and art will be reviewed. I will also examine ritual, human remains and living sites[16] in order to form a broad view of life and the human experience in this transitional period, and to put the Riparo Tagliente and Mondeval de Sora results which follow (Chapter 7) in context.

6.2: Upper Palaeolithic.

The lithic based chronology of the Upper Palaeolithic, like that of Iberia, differs from the widely recognised framework of southern France. Indeed, the difference is even more substantial, as the Gravettian period is thought to have lasted until the very 'end' of the Palaeolithic, but with variations and innovations over time. Hence, there is no Solutrean or Magdalenian in the Italian Palaeolithic literature, though the technologies do seem similar. The beginning of the Upper Palaeolithic in Italy is known as the Uluzziano period, and corresponds with the Chatelperronian of Western Europe, but it also co-exists for a while with the 'proto-aurignaziano' (Guerreschi, 1992). This Proto-Aurignacian period has been dated to 30,980 ± 720 a.C. (*avanti Christo*) at the site of Castelcivita, but has also been found at Mochi and – slightly later – in strata 25 at the Riparo Tagliente (Guerreschi, 1992). Subsequently, there is the Gravettian era, with the 'Final Gravettian' taken to be slightly before 20,000 B.P., which is in turn replaced by the 'Early Epi-Gravettian' until 16,000 B.P. (Mussi, 1990). The vast majority of Late Upper Palaeolithic sites in Italy, however, belong to the next four millennia, and are also known as [Late] Epi-Gravettian, which, to add to the confusion, is sometimes used for sites dated to what – in other parts of Europe – would be called the Mesolithic (Barker, 1981). Reluctant as we may be to set any store by these temporal labels, the impression one gets from this succession of tool typologies is of remarkable continuity in Italy. This is something I will examine in more detail at the end of the chapter. The actual end of glaciation starts at about 13,000 B.P. with multiple oscillations in temperature until the beginning of the

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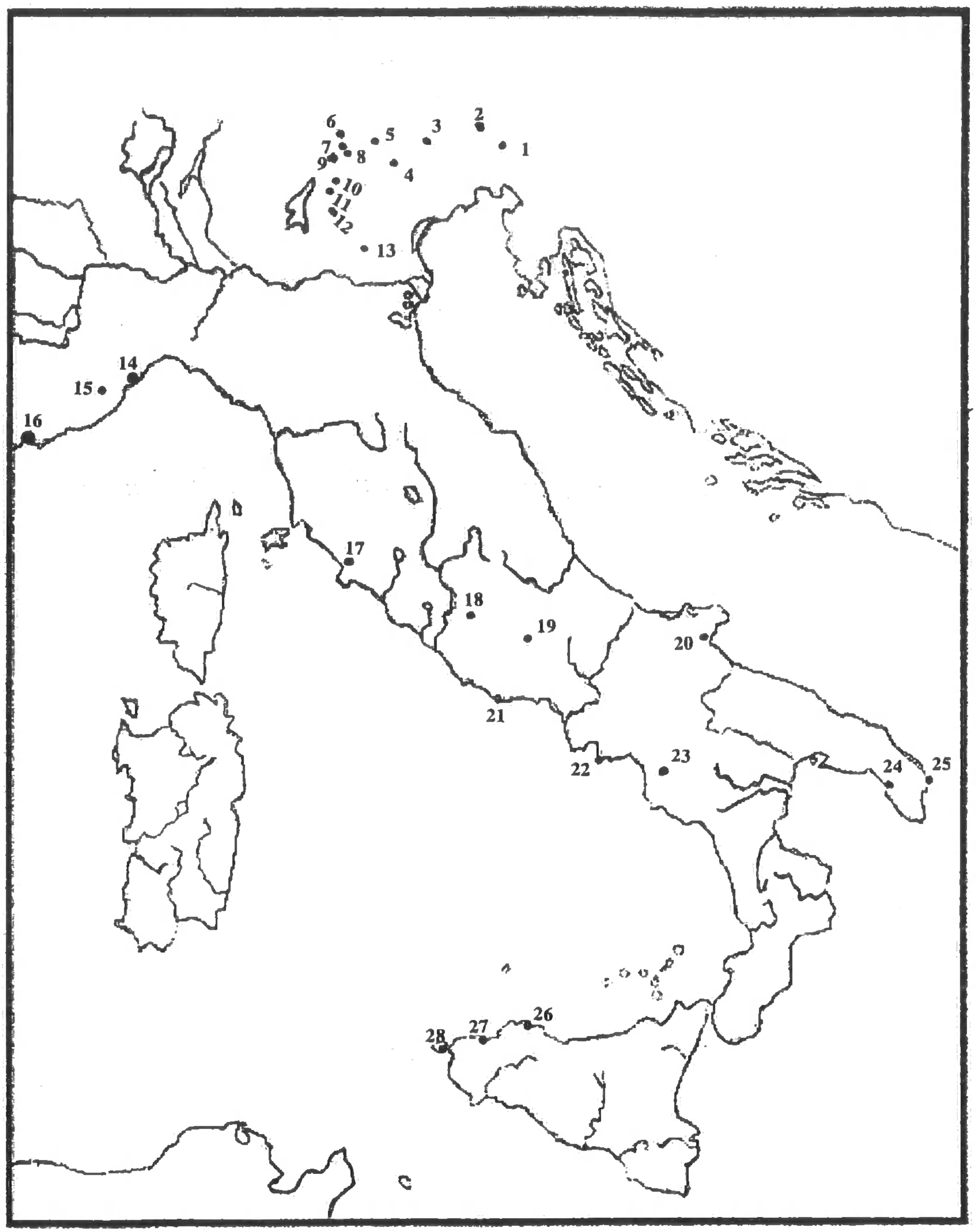
[16] The distribution of sites mentioned in the text of this and the following chapter is available in Fig. 6a.

Fig 6a: Important Italian sites mentioned in Chapters 6 and 7.



Key to Sites

1 Riparo Biarzo
2 Verdi di Pradis
3 Mondeval de Sora
4 Ripari di Villabruna
5 Colbricon
6 Vatte di Zambana
7 Riparo Pradestel
8 Riparo Gaban
9 Riparo Romagnano
10 Riparo Battaglia
11 Fiorentini
12 Riparo Tagliente
13 Grotta Paina
14 Arene Candide
15 Stefanin / Nasino
16 Barma Grande
Fanciulli
Caviglione
Mochi
Baousso de Torre
17 Grotta La Fabbrica
18 Grotta Polesini
19 Grotta Continenza
20 Grotta Paglicci
21 Riparo Blanc
22 Grotta La Porta
23 Grotta di Castelcivita
24 Cavallo / Uluzzo
25 Grotta Romanelli
26 Grotta dell'Addaura
27 Grotta dell'Uzzo
28 Grotta Genovesi

Holocene, as elsewhere (Tagliacozzo, 1992). A table of the approximate chronology can be found in Fig 6b.

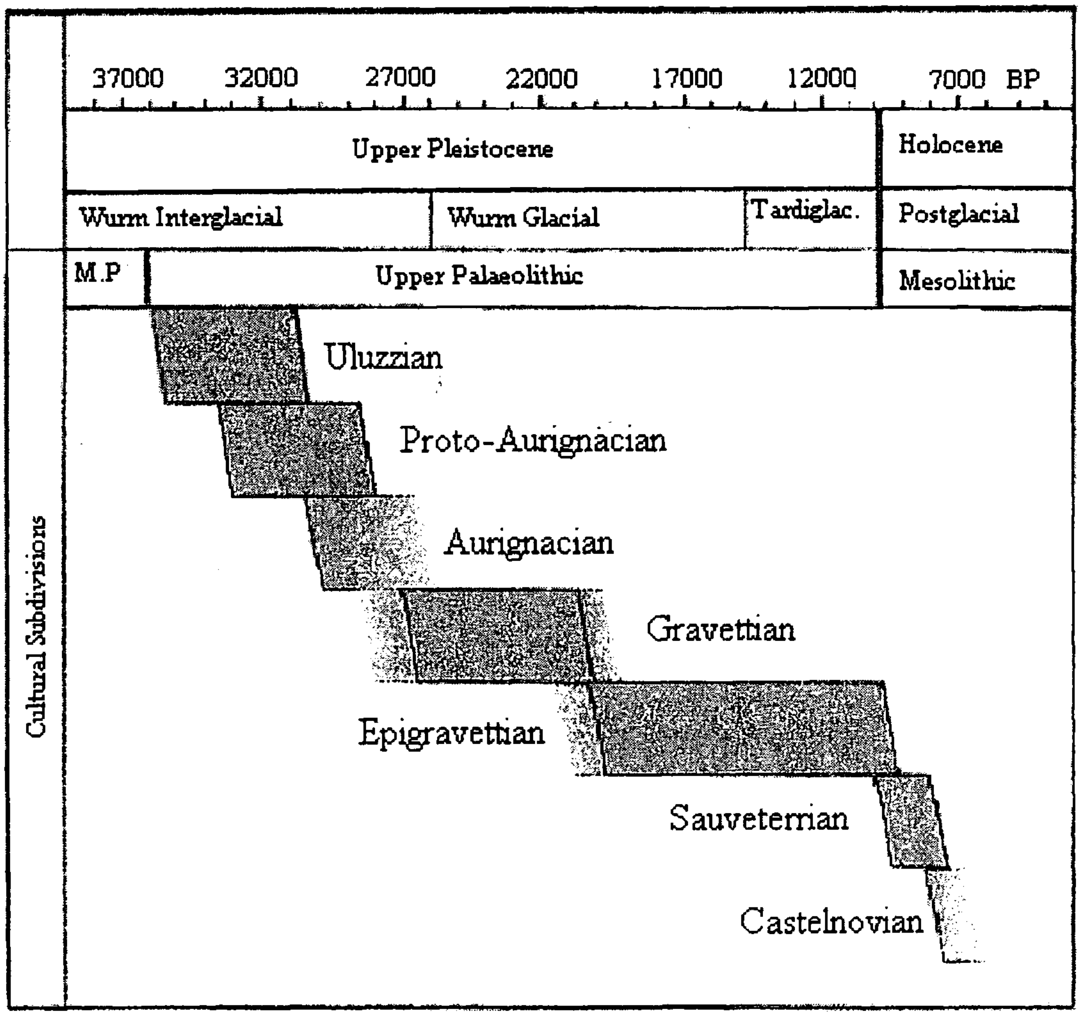
6.3: Mesolithic.

There is no clear distinction between the late Epi-Gravettian lithic assemblages and their 'Mesolithic' successors. There are many sites attributed to the Epi-Gravettian in Italy and their dates span more than 3000 years, i.e. up to 8690 ± 80 B.P. (Grotta Romanelli Strata D) and potentially even later, though these late dates are dismissed as too recent to be accurate (Guerreschi, 1992). There are clear climatic changes around the usual 10,000 B.P. mark, but with some geographical variability as before. The end of the Pleistocene in Italy appears to have had different ecological effects depending upon location, and there is little noticable synchronicity or uniformity between the Mesolithic human groups (Radmilli, 1975). Of course, this may merely reflect the limitations of the archaeological record in assessing contact between communities. The Mesolithic in Italy is split further into the Sauveterrian period (around 9950 – 7850 B.P.) and the Castelnovian (7500 – 6500 B.P.), the end of which roughly corresponds with the beginning of the north Italian Neolithic (Guerreschi, 1992).

6.4: Vegetation, Fauna and Environment.

Although the time periods may be analogous, the ways in which the vegetation and general environment changed over the Pleistocene-Holocene transition differs from region to region. The glaciation certainly had a profound effect on the Italian peninsula, but the results were patchy. The Alps, for example, were heavily glaciated, which affected the north of Italy severely, but the central area of the country suffered far less geological effects as the Apennines were only glaciated in the highest areas (Barker, 1981). As in France and central Europe, the Aurignacian period in Italy was dry and cold, with some rare *Pinus sylvestris* but generally characterised by steppe conditions (Cattani, 1992).

Fig. 6b: Chronology of the Italian Upper Palaeolithic and Mesolithic.



After Guidi & Piperno, 1992, Table 6, p527.

At about 30-35,000 B.P. the sea level in the northern part of the Adriatic would have been more or less at its present level, but around 16,000 B.P. it dropped again to – 130m (Barker, 1981). Hence, at the Last Glacial Maximum (LGM), there would have been a marshy plain joining northern Italy to the Yugoslavia region (Mussi, 1990). When this Adriatic plain became totally flooded at the end of the Pleistocene the herds of large mammals that had flourished there would have had to move or face extinction (Clark, 2000). Sicily would also have had a connection to the Italian mainland at the LGM (Mussi, 1990). It is possible that Sardinia was reached by sea in the Epi-Gravettian, as the stretch of water would have been much reduced (Guerreschi, 1992).

After about 15,000 B.P. the micro- and macro-mammal assemblages point to increased aridity in southern Italy, but the pollen records of the Venice area show little variation in the vegetation of the Palaeolithic in general (Mussi, 1990). Records are rather more detailed for the northern Apennines area at the end of the Pleistocene thanks to the work of Lowe and Watson (1993), but their study sites are more than a hundred miles from Riparo Tagliente. Pollen and coleopteran analyses from the northern Apennines indicate a drastic reduction in arboreal pollen (except *Pinus*) during the Younger Dryas, and the presence of cold-adapted beetle species. These replaced the leaf-litter beetle species (oak, willow and birch species are mentioned) found between 11,800 B.P and 11,000 B.P. (Lowe and Watson, 1993). This gives us little hint of the vegetation in the Italian Alps, however, as both pollen and beetle samples tend to be amassed from a rather localised catchment area.

The faunal data for Upper Palaeolithic Italy is rather more detailed and, unlike the vegetation, there is evidence for their contribution to the human diet. At the Grotta del Cavallo – the Uluzziano type site in southern Italy – the 31,000 B.P. fauna is predominately that of large mammals: horses, red deer, wild boar, chamois, roe deer and ibex, but the method of hunting is unknown (Guerreschi, 1992). Other Uluzziano sites, however, do give us some indication. For example the bone points of Castelcivita and Grotta la Fabbrica[17] are interpreted as javelin points, for either throwing or stabbing (Guerreschi, 1992). In northern Italy during the last glacial the

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[17] See map of sites: Fig 6a.

forest species (red and roe deer, wild boar) suffered dramatic reductions, but were able to survive in the refugia of central Italy (Tagliacozzo, 1992). At the LGM, the Grotta Paglicci provides us with a fauna showing an increase in ibex, the appearance of marmot and a decrease in equids (Sala, 1983 cited in Mussi, 1990). It may have been a hunting and butchery camp rather than a living site *per se* (Tagliacozzo, 1992). On a wider scale the LGM faunas tend to be of large mammals, including sea mammals occasionally, with the appearance of fishing only at the end of the Pleistocene (Mussi, 1990), probably related to the sea level rise. In the Epi-Gravettian it is notable that most of these hunted mammals are of larger than average size (Broglio, 1975). Specialism is not unknown – for example the abundance of chamois at the autumn-winter site of Polesini (inland, west-central Italy) which were mostly young adults, and may have been hunted for their soft skins as well as for food (Tagliacozzo, 1992). Neither, however, is diversity of diet unusual in these late Upper Palaeolithic sites. Along the Adige valley, at Pradestel, Romagnano III and Vatte di Zambana food remains include red and roe deer, ibex, chamois and some wild boar, but also carnivores, birds, fish, turtles, egg shells and molluscs (Boscato and Sala, 1980 cited in Tagliacozzo, 1992). The diversity of food remains in the Epi-Gravettian is partially a result of human choice and ability but also gives us some idea of the patch-work of varying habitats they were able to draw resources from (Guerreschi, 1992). It is particularly unfortunate that the plant fraction of the diet is so rarely mentioned in the literature of Upper Palaeolithic Italy, but we can perhaps speculate – on the basis of the faunal habitats – that woodland fruits, nuts, and aquatic plants were available to be gathered.

Deglaciation had already begun during the final Epi-Gravettian, leading to an increase in the number of summer campsites in Alpine areas (Guerreschi, 1992). However, the early Holocene in Italy sees an immediate and sharp rise in the pollen of *Quercus*, and *Betula*, and these are followed by *Fraxinus*, *Corylus* and, finally, *Abies* (Lowe and Watson, 1993). As before, these pollen results can only be considered reliable for the northern Apennine area. Lake Hirschbichl provides good pollen deposits for the Trentino region in northern Italy – again indicating a proliferation of arboreal species in the post-glacial period, with *Picea* (spruce) dominating even the higher ground by 9000 B.P. (Clark, 2000). The plant macrofossil evidence from Lake Hirschbichl contains carbonised pine wood, burnt needles and larch/spruce wood, accompanying a drop in the arboreal pollen, which is interpreted as the result of natural forest fires (Oeggl and Wahlmuller, 1994, p81). Clark (2000) interprets the same evidence as a sign of anthropogenic burning episodes, but it is unclear why either interpretation is the more sound.

In addition, intriguing information regarding vegetation and environment in the Sauveterrian comes from research at Mondeval de Sora itself. The lacustrine sediments close to the rock-shelter have been sampled for pollen and mineralogical analyses. The preliminary results from this research show that carbonised pollen has been discovered in the Mesolithic levels, which may suggest that anthropogenic burning was carried out in this Alpine environment (Alciati *et al*, 1994). The authors are very cautious, however, in that the true chronology of these lake sediments and their possible contemporaneity with the presence of human groups is still in question. My hesitations with this conclusion do not lie with the chronology but with the basis of the supposition. I understood that it was *charcoal* one looked for in the pollen sample, not 'carbonised pollen' (Lowe and Walker, 1984). There is also the question of what exactly they would have been burning, given the prevailing vegetation around the site is unclear during the Sauveterrian. By the Castelnovian we have pollen evidence from Mondeval de Sora which includes pollen from a small and morphologically abnormal *Pinus*, some water species and Alpine Prairie (Alciati *et al*, 1994). Of course, the presence of a more wooded environment during the Sauveterrian would elucidate certain anomalies within the faunal assemblage (see Chapter 7) but I am still hesitant to accept the anthropogenic burning hypothesis in this case. Whilst it would be interesting to know that the foragers in the Mondeval and Hirschbichl areas were modifying their environments, they may just as easily have taken advantage of natural forest fires. Both would have achieved the same end – new growth of grazing vegetation to attract prey species.

There are other, less problematic, indications of human use of plants during the Mesolithic. There is evidence for the gathering of hazelnuts and bilberries in northern Italy, and of acorns, arbutes (fruits of the strawberry tree) and vegetables in central Italy (Cattani, 1992). In addition, there is some evidence for the gathering of grapes in the Aurignacian and the Mesolithic, but not the interceding Gravettian (Mussi, 1990). Grapes, acorns and hazelnuts can all be stored to a certain extent. Furthermore, the two blocks of resin found in the Castelnovian grave at Mondeval de Sora provide us with evidence that humans tapped pine resin, which may have had therapeutic properties (Cattani, 1992) and also used 'propolis' – a mixture of resin, wax and pollen produced by bees (Alciati *et al*, 1994). Clark (2000) suggests that the resin and propolis in the Mondeval de Sora grave may have been carried around for hafting projectiles, or gluing on the flight feathers of arrows.

As with the vegetation, some changes in the faunal repertoire have already begun before the Mesolithic period began. In this case, however, it is a matter of human subsistence choices and foraging techniques as well as climatic and environmental factors. By the end of the Pleistocene and beginning of the Holocene many remains of birds, molluscs, fish and turtles are found on some sites, as well as the mammals of before. This is believed to have accompanied a move towards sedentary life, though large game do not always appear to have lost their former importance (Tagliacozzo, 1992). In terms of animal resources, the difference between the Sauveterrian and the Castelnovian lies in the actual diminution of fishing in the later period and a rise in the gathering of molluscs. This may be due to the rising sea level, which resulted in less beach and more cliffs (Guerreschi, 1992). Cave sites near the coast, where marine molluscs start to play an important role in subsistence, include La Porta, Cavallo, Romanelli and Uluzzo (Radmilli, 1975). At the Riparo Continenza (Abruzzo) there is an impressive breadth of subsistence, at least in the animal resources. The remains of red deer, wild pig, roe deer, wolf, ibex, shrew, mole, badger, wild cat, hare, fish (mainly trout), edible snails, and wetland birds such as ducks, herons and bitterns have all been found (Skeates, 1997). Naturally, it is doubtful that humans captured all these species, and even if they did it may not have always been for food. Trout fishing is believed to have been the speciality of the Continenza foragers (Wilkens, 1987, cited in Tagliacozzo, 1992). What this list does provide us with is an indication of the rich and varied habitats the group(s) at Continenza enjoyed, and the variety of foraging methods and apparatus they may have had to hand.

At the site of Romagnano, tortoises were also captured (Broglio, 1975). The actual quantity of these small resources at Romagnano III and other Mesolithic sites in the Trentino (Pradestel, Vatte di Zambana), however, and their relative 'importance' to the human diet is in doubt. Clark's recent work stresses the frequency of large mammal bones at these sites: primarily red deer, but also roe deer, ibex, chamois and wild boar (Clark, 2000). Furthermore these large mammal bones were intensively processed for marrow – an important resource that other foodstuffs cannot always replace (see Chapter 2).

The main difference in the subsistence of the Sauveterrian and Castelnovian of the Trentino, in Clark's view, is a shift from group-based 'intercept' hunting – often in the highlands - to more individual 'encounter' hunting in wooded habitats (Clark, 2000). His argument, based on detailed faunal analysis that shows a reduction in upland fauna such as ibex, as well as other evidence, is persuasive. It is possible to envisage a situation in which increased forestation was regarded as a nuisance by the early Mesolithic hunters, who were still trying to subsist in an 'Upper Palaeolithic' way. By the later Mesolithic, however, changes in technology, settlement site choices – and perhaps simply people's expectations – had made woodland living desirable. In other parts of Italy there is more indication of a shift to smaller resources. Around 8500 B.P. land snails become very important to the subsistence of people at the Riparo Blanc, where the hunting of mammals is considered to have been secondary in nourishment terms (Radmilli, 1975). This seems hard to believe, but certainly snail remains must have been so abundant at some of these Mesolithic sites for their former inhabitants to be nicknamed in the literature as the 'escargotières' (Radmilli, 1975).

The subsistence base at the Grotta dell'Uzzo (Sicily) is broad from the Epi-Palaeolithic into the Mesolithic, with red deer, wild boar and marine resources all rich. The red deer, most of which were adult males between the ages of three and five years, and bones of migratory birds have provided seasonal information which suggests that Uzzo was a sedentary site (Cassoli *et al*, 1987, cited in Tagliacozzo, 1992). In the level dated between 8600 and 8200 B.P even whales and dolphins were exploited, probably having been beached (Cassoli *et al*, 1987, cited in Tagliacozzo, 1992).

6.5: Technology.

As has already been stated, the lithic developments of the Upper Palaeolithic in Italy lack a Solutrean or Magdalenian phase, but the Gravettian industries do go through innovations such as the advent of backed, shouldered and tanged points (Otte, 1993). The actual development of these new tools seems to have taken place in 'multiple centres' but then spread rapidly (Otte, 1993, p60). The shouldered points, for instance, are found all over Italy at 18,000 B.P and may suggest the wide practise of new hafting technology (Mussi, 1990), and possible contact with the Balkans rather than western Europe (Higgs *et al*, 1967 cited in Mussi, 1990). This limited contact between Italy and Franco-Cantabria is also suggested by the lack of any drying or smoking apparatus in the Italian archaeological record, whereas such structures have been found in the LUP of France (Mussi, 1990). This is probably a preservation and recovery bias, as it is unlikely the diet of the Italian communities made storage unnecessary. The Epigravettian tools start with an abundance of burins and scrapers (Guerreschi and Leonardi, 1984) and progressively diminish in size, with the 'final Epigravettian' tools showing a tendency towards microliths like the successive Mesolithic (Guerreschi, 1992). It is suspected that by the last phase the tools were so small they were unsuitable to hold directly in the hands (Guerreschi and Leonardi, 1984).

The raw material for the Epi-Gravettian tools at Riparo Tagliente was very local – sourced only 3 kilometres away – like the ochre, which was from an area only 4 km away as the crow flies (Guerreschi, 1992). This local source may have been important, as there was so much flint worked at Tagliente that it is considered more than a single group could have needed, and hence exchange is postulated (Guerreschi and Leonardi, 1984). Of course, this assumes that we can assess the needs and aims of the prehistoric communities, which – in flint as in food – is actually a very tenuous assumption to make.

Evidence of bone working is found at Riparo Tagliente, Biarzo, Grotte Verdi di Pradis and Ponte di Veja, with most tools made from large animal diaphysis fragments and – more rarely – red deer antler (Guerreschi and Leonardi, 1984). It is suggested that the bones were worked initially with flint tools and then refined with a more delicate substance such as sandstone.

In level 4a at Paglicci, which appears to have been deposited during the transition from the Older Dryas to the Allerod, micro-wear analyses have been carried out on the lithic assemblage. Donahue found that most tools were used in the capture of game, and the processing of meat and hides, while examples of tools used in bone and wood-working were much rarer, and no tools were found with evidence of antler-working or plant processing (Donahue, 1985). There is also regular re-use of old tools, and modifications to make one tool-type into another, leading Donahue to think that flint resources were too precious to waste for this group.

As in the subsistence resources, the lithic assemblages employed at the post-glacial sites tend to be very diverse, with 'classic Mesolithic' geometric microliths at some sites, and specialized tools for shellfish exploitation at others (Barker, 1981). A tendency towards microliths is already a feature of the final Epi-Gravettian technology (Guerreschi, 1992). It is alleged that the bow was in common usage in the Italian Mesolithic, as arrowheads are a possible component of the Sauveterrian lithic assemblages (Guerreschi, 1992). 'Arrow tips' may be something of a misnomer, as ordinary microliths were also components of projectiles. There is good evidence in other parts of Europe that microliths were used in multiples (up to thirty-five) on shafts to improve the lacerating efficiency of projectiles, and to make them more reliable and maintainable (David, 1986; Myers, 1989). Harpoons with alternate 'teeth', made from horn or antler, are also known in the Italian Mesolithic (Guerreschi, 1992). Again this seems to under-line the importance of aquatic resources.

The grave-goods found at Mondeval de Sora are particularly interesting as they may provide us with a clue as to what constituted a personal 'tool-kit' in the Castelnovian of northern Italy – at least for a middle-aged man. Interestingly, a similar mixture of stone and bone tools, once contained in a bag, and a resinous lump, were found above the left forearm of the young man of Villabruna[18], who was buried around 12,000 B.P (Cattani, 1992). A variety of functional and possibly symbolic items were recovered at Mondeval. These items include four deer antlers and three other deer bones all with traces of use-wear. An elk telemetacarpal and a deer proximal metatarsal have been fashioned into points, but these are believed to have been used as shroud fasteners

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[18] He is estimated to have been about twenty-five years old when he died (Cattani, 1992), hence 'young' is somewhat arbitrary. It is intriguing that both Villabruna, in the Cismon valley, and

rather than forming elements of the man's personal equipment (Alciati *et al*, 1994). In addition there is one of the above mentioned harpoons; an *exhausted* core; 33 lithics in various states of completion; other flint blades; the lumps of resin and propolis; and a boar's tusk with traces of use (Alciati *et al*, 1994). There are several interesting features here. First, there is the exhausted core. There is some indication that many of the grave goods were contained in bags when they were placed by the man's left side, therefore the presence of the exhausted core may simply imply that no-one sorted the contents prior to the burial. Alternatively, the core may tell us that all of a person's possessions were included in the grave whether they had a use in the 'next life' or not, and therefore throw the whole concept of a 'next life' into doubt. Of course, this still leaves the question of why the *living* person kept the core. Finally there is the possibility that the exhausted core had another function, though – unlike another core in the trousseau – there were no signs of it having been used as a percussor. Secondly, the harpoon suggests that the man had either been fishing or was planning to do so in the future, even though the food debris evidence from the site itself provide little evidence of fishing at Mondeval de Sora (see Chapter 7).

6.6: Art.

Italy has a rich collection of Upper Palaeolithic art, particularly interesting from an archaeozoological perspective in that most of them either depict animals figuratively or are fashioned on an animal-based medium. Often both. Even the early Uluzziano sites have yielded some shell ornaments (Guerreschi, 1992). Perforated marine shells (for example *Cyclope neritea*) are ornaments that are also found later, at the Riparo Tagliente, where it is suggested that they may have been used to decorate the seams of clothing (Guerreschi and Leonardi, 1984). Thus we have a fairly good instance of 'body-art', or symbolism incorporated within a functional item, if this interpretation of the shells' use holds true. A mixture of shells and perforated fish vertebrae have certainly been used to make a three-stranded necklace, found in a triple burial at Barma Grande (Mussi, 1990). Pierced red deer teeth were also found around the head of a 13-14 year old boy buried in the Gravettian levels of Paglicci, suggesting they were sewn onto a cap, as well as others that may have been part of a bracelet and

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Mondeval de Sora are sites in the Dolomite mountains, even though they are separated by several anklet (Guerreschi, 1992). The Grotta del Paglicci also has the oldest known mobiliary art in Italy. It is an incised ibex on a fragment of long-bone shaft, and also features geometric motifs, from strata 20C, 20,270 ± 360 and 20,160 ± 330 a.C. (Guerreschi, 1992). Most art, however, is attributed to the Epi-Gravettian - but this is problematic as all parietal art is dated on a stylistic basis and on the occupation debris found within the cave, which is of limited use in sites such as Paglicci which have more than one occupation layer (Guerreschi, 1992).

Pierced 'batons' and 'wands' are found, again usually made on animal-sourced material. An example from the Grotta del Caviglione was made from a horse metacarpal, with the perforation at the distal end (Mussi, 1990, fig 7.5, p136) while all four of the *batons percès* from Arene Candide were made from elk antler (Mussi, 1990). From the Grotta di Paina was found a bear's penis bone (probably *Ursus speleus*) that had been incised with linear marks (Guerreschi and Leonardi, 1984). The Grotta Polesini has several examples of Epi-Gravettian mobiliary art. These include a broken representation of a red deer on travertine, a schematic canid, covered in spots, on a pebble and a profile study of the head of a hare, depicted on a broken piece of bone (Guerreschi, 1992, fig 1, p213). The picture of the hare is a particularly fine naturalistic representation. We will never know the exact meanings and uses that these works of art embodied for the communities and individuals that made and experienced them, but it is interesting to note the variety of animals portrayed, and the lack of any definite direct connection with day-to-day activities at the site. The site of Polesini, remember, is interpreted as an autumn-winter specialist chamois hunting camp but, as we have just seen, the art found there depicts a red deer, a hare and a canid. Whereas at Paglicci the presence of an ibex in the art could, perhaps, be connected to the increase in ibex meat in the diet, and thus an inferred increase in the encounters between humans and ibex.

One of the most interesting examples of parietal art in Italy is the 'scene' in the Sicilian cave site of Addaura. It is unusual on several counts, including the fact that it appears to be a real scene rather than a collage of individual images. Representations of humans are known in the Italian Upper Palaeolithic art – e.g. the stencilled hands at

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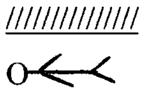
thousand years of time.

Paglicci, four humans on the walls of the Grotta Genovesi (Guerreschi, 1992) and a pregnant-looking 'Venus' found at Barma Grande (Mussi, 1990) – but at Addaura the humans out-number the animals. Guerreschi (1992) believes the Addaura figures are all male, but there is one figure that is more likely female – several months pregnant and possibly carrying a sack on her back. There is another whose size, shape and contrasting pose when compared to the other figures suggests it may be a woman.

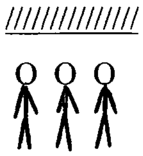
The evidence for art is not as rich in the Italian Mesolithic as in the Upper Palaeolithic. Of course, the relative time period is much shorter, and the possibility of body-art, language-based art forms and art expressed in other perishable materials is something archaeologists always have to keep in mind when comparing ancient lifestyles. Some decoration is certainly present in the archaeological record of the Italian Mesolithic. The Mondeval de Sora skeleton had atrophic deer canines that may have been sewn onto his clothing (Alciati *et al.*, 1994), as was indicated in earlier burials. One of the children, said to be a boy, buried at the Arene Candide site had 400 squirrel caudal vertebrae on his chest (Cardini, 1980, cited in Guerreschi, 1992). Thus we may envisage a tunic front decorated with squirrel tails. The perforated sea-shells (*Columbella rustica*), red deer canines and notched and coloured shell artefacts found at Riparo Continenza are not directly associated with human remains (Skeates, 1997), but again they are quite likely to have been used for personal ornamentation. I have found no reference to parietal art dating to the Mesolithic in Italy. There is a female statuette in antler, however, found at the Mesolithic site of Riparo Gaban, which is reminiscent of similar Upper Palaeolithic figures (Guerreschi, 1992). The emphasis upon animal imagery apparent in the Upper Palaeolithic does not seem as significant in the early Holocene art, but – as the examples mentioned above demonstrate – animal sourced raw materials are still being used.

6.7: Living Sites.

Many of the sites where evidence of Upper Palaeolithic human occupancy has been found have already been mentioned above, but now it may be useful to outline the reasons why sites were chosen, and their distribution around the landscape. The regional distribution of sites mentioned in the text of this and the following chapter can be found in Fig. 6a. The Gravettian era peoples appear to have also lived mainly in the openings of the caves, rather than deep within them (Guerreschi, 1992). By the time of the LGM, there is an expansion in the number of sites, including new location choices such as Sicily and the central Italian mountains, and the reoccupation of old sites, which may point towards a growing population (Mussi, 1990). It may be partially a factor of preservation, but there seems to be a custom during the Gravettian and early Epi-Gravettian in Italy of human burial deep within caves. It is also clear that they preferred either the whole body to be parallel to the walls or a large boulder or – if this is impossible, e.g. in a multiple burial – just the head next to the wall (Mussi, 1986). Thus:



(single)



(multiple)

There may have been a complex religious or cosmological reasoning behind this, but my initial impression is that it is reminiscent of the common desire – even in today's high security houses – to sleep nestled against a wall. There are no known instances of burial at the cave entrance at this time, in contrast to Franchthi (see Chapter 4). The actual living areas continued to be the mouths of caves and rock-shelters through the Epi-Gravettian, as well as possibly open-air sites, but these are difficult to trace (Guerreschi, 1992). Certainly we can be sure that at least some of the dead members of the community were not excluded entirely from the living sites, even though they were buried slightly separate from the main foci of living activity.

More information is available for the types of living site chosen in the later Epigravettian. During the Allerod warm oscillation it was possible to move into sites such as the Riparo Bataglia and Fiorentini because the ice had receded, flora and fauna had re-colonised the Alps (Guerreschi and Leonardi, 1984). There are said to be two distinct forms of settlement in the final millennia of the Pleistocene: the first, in caves and rock-shelters, close to a water-source, with mountain and meadowland for multiple subsistence opportunities, and flint resources nearby (e.g. Riparo Tagliente, caves A, C and E of Ponte di Veia, the Grotte Verdi di Pradis and Riparo di Biarzo). The second type of settlement is at the base of the mountains, on flat ground, near small lakes and pools, for example the site of Contrada delle Barozze (Guerreschi and

Leonardi, 1984). Donahue's assessment of level 4a at Paglicci (around 11,950 ± 190 B.P.) seems to fall between these categories. He sees it as a winter camp, for a small task group primarily involved in hunting and butchering activities, who exploited game from the Tavoliere plain and used the cave's location in the Gargano uplands as a convenient look-out post (Donahue, 1985). In this case, however, the winter weather-conditions would have made flint quarrying difficult, and may have led to the curation mentioned above (Donahue, 1985).

Much has already been said about Mesolithic living sites with respect to the resources available around them, but it is also useful to consider the movements around the landscape that people may have undertaken. For example, Cattani states that Mesolithic foragers were able to avoid the problem of constantly supplying themselves with firewood by the temporary nature of their encampments (Cattani, 1992). There are other ways of avoiding this problem, and other stimuli for frequent movement, and it is difficult to see why firewood would have been in short supply during a more forested era. Study of the provenance of the lithic raw materials at Mondeval de Sora and its associated sites have revealed that much of the stone is non-local. The 'green stone' is found close to the site, but the nearest source for the hyaline quartz is in the Aurine Alps, 60 kilometres away as the crow flies (Broglio and Lunz, 1983, cited in Alciati *et al*, 1994). The interpretation given is that Mondeval de Sora was the meeting place for two groups of people, from north and south. It is unclear why one group could not have travelled south to Mondeval, from the Aurine Alps, carrying some hyaline quartz with them.

There is some evidence for caves, rock-shelters and open sites being occupied in the Mesolithic. Presumably the climate was temperate enough to make open-site living a possibility. It is known that the cave sites usually have a better view over the locality than the open sites, but the rock-shelters are preferred. Was a view over the landscape not a priority in these more wooded times? This is possibly because the living space they offered was more extensive than that of caves, but it remains to be seen how both compare with open sites, since the latter are also excavated via trenches (Skeates, 1997). There may also have been some antipathy to the use of deep caves as homes because they held some other importance, or because the combination of a 'good view' with light and air made rock-shelters the most favourable option.

6.8: Human remains.

We have already touched upon burial practices in the section above, but it would be worthwhile going into more detail about human remains as the Italian Palaeolithic record is relatively rich in this area, especially in comparison with Iberia. Unfortunately, very little appears to have been written about the health and morphology of the people in the burials. Burial practices that appear to be specifically ritualised will be reviewed in the section below. There are 13 graves, with 17 individual skeletons, in the Gravettian or early Epi-Gravettian in Italy. There are two double burials and one triple (Mussi, 1986). This sample is large enough to reveal intriguing patterns but too small to allow any conclusions that are really concrete. For example, out of the 17 inhumations there are only four that do not have accompanying red ochre. They are the 'old lady' of Fanciulli, the burnt skeleton of Barma Grande and his or her contemporary at the same level, and the Baoussa da Torre adolescent male, who was buried face down and without any grave goods (Mussi, 1986). Thus there is no clear age distinction on who was buried with ochre and who was not, but some sort of social exclusion is a plausible interpretation. We are, of course, hindered in any interpretation by the knowledge that these burials are unlikely to be representative of the original population, most of whom were either not buried or have not been found (Mussi, 1986). There are no known human burials from the Early Epigravettian 'Shouldered tools Phase' or the 'Evolved Epigravettian' caves and rock-shelters, but burials become relatively common again from about 13,500 B.P. onwards (Mussi, 1986). This may simply be related to the augmentation in the number of human-occupied sites in the later period. It has been estimated, with reservations, that the population numbers may have been as many as 500,000 people (Guerreschi, 1992).

The so-called 'necropolis' of Arene Candide is actually late Pleistocene, not Holocene in date, as radiocarbon has dated it to 10,330 ± 95 B.P. (Mussi, 1986) but it is so late it offers some room for comparison with Mesolithic inhumations. Whether compared to Mesolithic burials or Upper Palaeolithic burials Arene Candide has distinct 'peculiarities' (Mussi, 1987, p551). Unlike the prevailing age distributions in other places of burial in the Palaeolithic and Mesolithic of Italy, not only children but also foetuses have been buried at Arene Candide, and they are furnished with very rich grave goods (Mussi, 1986).

Mesolithic inhumations are scarce in Italy, generally. There are only twenty in total: 8 men, 5 women, 4 adults of indeterminate sex and 3 infants (Tarli, 1992). The oldest Mesolithic Italian burial is the skeleton of a woman, around fifty years old, found in level 10 at the Vatte di Zambana (Guerreschi, 1992). She was 150cm tall, lying on her back with her face turned towards the left. No traces of grave goods were found, but she was partially covered with stones. Radiocarbon dates for this skeleton are 6050 ± 110 a.C. and 5790 ± 150 a.C (Guerreschi, 1992), and hence it is earlier than the Mondeval de Sora burial. The position of the body, lack of grave goods and use of stones are all features that can be found in the Upper Palaeolithic burials as well. By contrast with Arene Candide, the 10 graves at the Grotta dell'Uzzo do not necessarily comprise a 'necropolis' as they were buried – it appears – at different times, even the double burials (Guerreschi, 1992). Grave goods appear to be scarce, and there are no items that we would consider prestigious. One of the double inhumations at Uzzo was of a man lying flat on his back, with another strongly flexed male skeleton interred later, over his chest in a transverse position (Guerreschi, 1992). If this was more than just an accidental coincidence, then it may perhaps suggest that the position of the grave within the site was significant but the bodily position was not standardised. Study of the teeth of the Uzzo skeletons, and those of the nearby Mesolithic site of Molara, have revealed high levels of dental calculus compared with individuals at other Mesolithic and EpiPalaeolithic sites in southern Europe (Tarli and Repetto, 1985). The likely cause of these caries are foodstuffs such as honey, figs, carobs, Irish strawberries and *Tamarix mannifera*[19] in the diet, which are plausible from the palaeobotanical evidence (Constantini, 1981, cited in Tarli and Repetto, 1985). Combined with the faunal data, it appears that the Mesolithic groups in Sicily had a very broad and probably quite plentiful diet, even if it ruined their teeth.

The contents of the Mondeval de Sora Castelnovian burial have already been outlined above, but the skeleton itself is of considerable interest. The individual is considered to be robust, around forty years old, and 167cm tall. He was suffering from poliostotic dysplasia (Rosy-Cajal disease), which is slow to develop and therefore associated with old age, and he is described as having a Cro-Magnon facial structure (Alciati *et al.*, 1994).

6.9: Evidence of Ritual Behaviour.

As the last section in the consideration of the Upper Palaeolithic record, it may be useful to tie together the evidence for ritual behaviour. The Italian literature tends to refer to this as 'Intellectual and Spiritual Life' (e.g. in Guerreschi and Leonardi, 1984, section 6.6), which is a better description of what we are really interested in. The best we can usually hope for, however, are the 'snap-shots' of ritual. In the 'scene' of Addaura, the male figures may be dancing, and wearing head-dresses with bird-like beaks. Of course they may be meant to represent mythological beings, rather than real humans in costume, but it does give us an idea of ritual practice. In the centre of the Addaura picture is what may be interpreted as a homo-erotic scene. It is unclear what relation the red deer stags and other animal bear to the human figures represented. Much of the art, as has been discussed above, may suggest that animals had an important role in the cosmology (or, more likely, multiple cosmologies) of this time, but the main source of clues is in the burial practices. Sometimes the two lines of evidence are combined – for example the Riparo Tagliente buried individual has been covered in stones, one of which was incised with a naturalistic image of a lioness (Guerreschi, 1992). In another case where stones featured in the burial practice, perhaps to mark the position of the young man of Villabruna's grave, some of the stones were decorated with schematic designs (Guerreschi, 1992). The prevailing location of burials in the Epi-Gravettian has already been touched upon in relation to the organisation of living areas. However, it may be added that most of the individuals were buried lying on their backs with their heads towards their left sides, with notable exceptions such as the contracted positions of the 'Negroid'[20] burials of Fanciulli and Paglicci and the face-down adolescent of Baoussa da Torre (Mussi, 1986). This latter position, and the lack of any grave goods, is suggestive of punishment. However, the

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[19] *Tamarix mannifera* – French Tamarix. A Mediterranean coastal plant producing sweet, sticky substances. (With thanks to J.Huntley for this information).

[20] I do not know on what basis they are described as 'Negroid'. Presumably it is related to facial structure.

excavations were done in the last century, probably without extensive sieving, so smaller or more delicate grave offerings are likely to have been lost (Mussi, 1986).

In the graves found dating to after 13,500 B.P. it is even harder to see any common burial practices: ochre is present in some graves but not in others, grave goods are generally scarce or lacking, and the use of stones is more ephemeral (Mussi, 1986). However, in all of the 15 recorded Final Epi-Gravettian burials, the skeleton was found lying on its back, and there is one common grave offering found – a whole or fragmentary horn, which is taken to be a symbolic item rather than personal possession (Mussi, 1986). The other notable artefact in the Final Epi-Gravettian graves is the 'garment', richly decorated with perforated shells, which covered the two children buried side by side in Level C of the Grotta dei Fanciulli (Mussi, 1986). Perhaps the relatively tragic event of the death of two children, at more or less the same time, provoked a variation in the prevailing burial customs of this period.

Again, the majority of the evidence for spiritual beliefs and general behaviour in Mesolithic Italy comes from the clues burial practices provide. While at Arene Candide the grave goods are plentiful, and encompass the ornate personal, the ritual, the every day and even raw materials, grave goods are usually lacking or scarce in true Mesolithic burials (Mussi, 1986, p551). The presence of raw materials in the Arene Candide graves is suggestive of the concept of an after-life similar to the 'now' life, perhaps in contrast to actual personal belongings. Grave goods certainly appear to have been scarce at the Grotta dell'Uzzo, apart from stones, which were sometimes put into direct contact with the bodies (Guerreschi, 1992). Interestingly, the Uzzo burials conform to an inner cave/close to a wall pattern of grave position (Mussi, 1986, table 3), reminiscent of the earlier practice. Stones are also an important element in the burial at Mondeval de Sora. The lower body (from the pelvis down) was covered in stones, and only volcanic stones or calcareous marls were chosen, though local dolomite would have been much more easily available (Alciati *et al.*, 1994). Of course, if he was wrapped in a shroud as the positioning of the bone points suggests these stones could not have been in direct contact with the body, but the similarity is intriguing. The Mondeval man's left hand was placed vertically against his body, with the fingers slightly bent, as if he had been holding something, which has since rotted away (Alciati, *et al.* 1994). Therefore flowers, wood or wooden artefacts, off-the-bone meat, other food, leather or other cloth items, and human hair are all possibilities. It is interesting that red ochre, so prevalent in Upper Palaeolithic burials, does not seem to be mentioned in the Mesolithic literature.

6.10: The Later Mesolithic – Summary.

There is evidence for a certain amount of change in the Italian later Mesolithic-Neolithic transition, but also some continuity. It is not a clear-cut case of incoming colonial farmers. At the Grotta Continenza, for example, which has the rich Mesolithic subsistence evidence, there is a clear and definite stratigraphic break between the human bones dated to the Mesolithic and the burials of the early Neolithic (Skeates, 1991). By contrast, there are open-air Neolithic sites in the inter-montane valleys and basins of Abruzzo that show evidence of continuity with the Mesolithic. In these sites, the hunting of red deer, fishing and fowling seems to have co-existed with the presence of domesticated pigs (Skeates, 1991). This is interesting as – though there is no chance that ovi-caprids were domesticated in Italy – pigs, dogs, and oxen are a more complex case, since their wild progenitors are native (Tagliacozzo, 1992). Pottery co-existed with 'Mesolithic tools' in several parts of Italy, and in the upper deposits of Arene Candide faunal species identical to those of the earlier period are found in the same layer as dog bones and Stentinello ware (Radmilli, 1975). This is an excellent example of the piecemeal and arbitrary nature of so-called 'neolithization'. We appear to have people who have adopted the use of new pottery, and accepted the concept of domesticated animals, but have carried on eating more or less the same things, possibly in a slightly different way (because of the pots). Another case of overlap between resource use is the case of marine molluscs at Grotta dell'Uzzo where *Patella*, *Monodonta* and crabs are all found during the late Mesolithic and early Neolithic (Tagliacozzo, 1991). Interestingly, *P.ferruginea* goes into rapid decline during the process of 'neolithization' (ibid.). It is not alone. Horse, elk and bison had already become rarer as the Mesolithic progressed (Guerreschi, 1992) and, during the advancing deforestation of the agricultural period, elk, lynx and other Italian forest species became extinct (Tagliacozzo, 1991).

6.11: Conclusion: Continuity or Change in the Italian Upper Palaeolithic/Mesolithic transition?

It has become clear that there is evidence of both change and continuity over the Upper Palaeolithic – Mesolithic transition in most aspects of life. If one looks for changes, then the lithics are the most distinct innovation, and even they go through a smooth transition rather than a sudden influx, as we have seen. It has been said that new elements in the lithic industry is the only distinguishing difference between the Upper Palaeolithic and Mesolithic (Broglio, 1975). There is an apparent difference in the use of the landscape, since Sauveterrian occupancy of caves often continues into the Castelnovian, but most of the Upper Palaeolithic living sites fall out of use (Guerreschi, 1992, lists on pp229-230). The intensification of resource use should also be considered (Guerreschi, 1992), but even this has already started in the LUP. A true case of the 'Tardiglacial Paradigm' (Morales *et al.*, 1988) it might be said, but there are exceptions to this rule. No clear pattern of foraging choices and techniques exists over the transition. We simply have trends. This is something Mondeval de Sora and Riparo Tagliente demonstrate adequately in themselves (Chapter 7).

7: Riparo Tagliente and Mondeval de Sora, Results and Implications.

7.1: Introduction.

This chapter examines the faunal material from two important sites in the Italian Alps that have already been mentioned in the previous section, Riparo Tagliente and Mondeval de Sora. These rock shelters are neither contemporary nor identical, as the former is dated to the Upper Palaeolithic while the latter has a purely Holocene occupation, but they do share a similar location and environmental setting, and provide us with an opportunity to look at change and continuity in north Italian subsistence over this important time period. Much work on the Mondeval de Sora assemblage, especially the fragmentation patterns and other taphonomic filters, has already been done by Outram (Outram, 1998), and the fauna is all stored in Durham. The larger faunal collection from Riparo Tagliente, however, is currently held in the Department of Anatomy, University of Torino. The Riparo Tagliente fauna is to be published in full at a later date (work carried out by Dr Giacobini and Dr. Cilli at the University of Torino), and the sample was far too large to study in its entirety in the six weeks available, so the research was designed accordingly. The aims and objectives of the research were to:

1. Identify species exploited by humans for food and other uses, and any changes in the suite of resources.
2. Assess the degree of carnivore input to each assemblage.
3. Investigate, if possible, how the animals were hunted, butchered and cooked.
4. Look at the season of occupation of each site.
5. Put the results in context with other known sites in the region.

7.2: The Sites.

Both sites are located in northern Italy, in the sub alpine region (see Fig 7a). Riparo Tagliente is the more famous site of the two, partially because it has a wealth of anthropogenic material including art (see previous chapter), and partially because it has been excavated since 1962 (Aspes, 1984). The site was discovered by a local man, Mr. Tagliente, and named after him (Giacobini, pers. comm.). Tagliente is on the left bank of the Valpantena River, 250m above sea level in the Alpine foothills

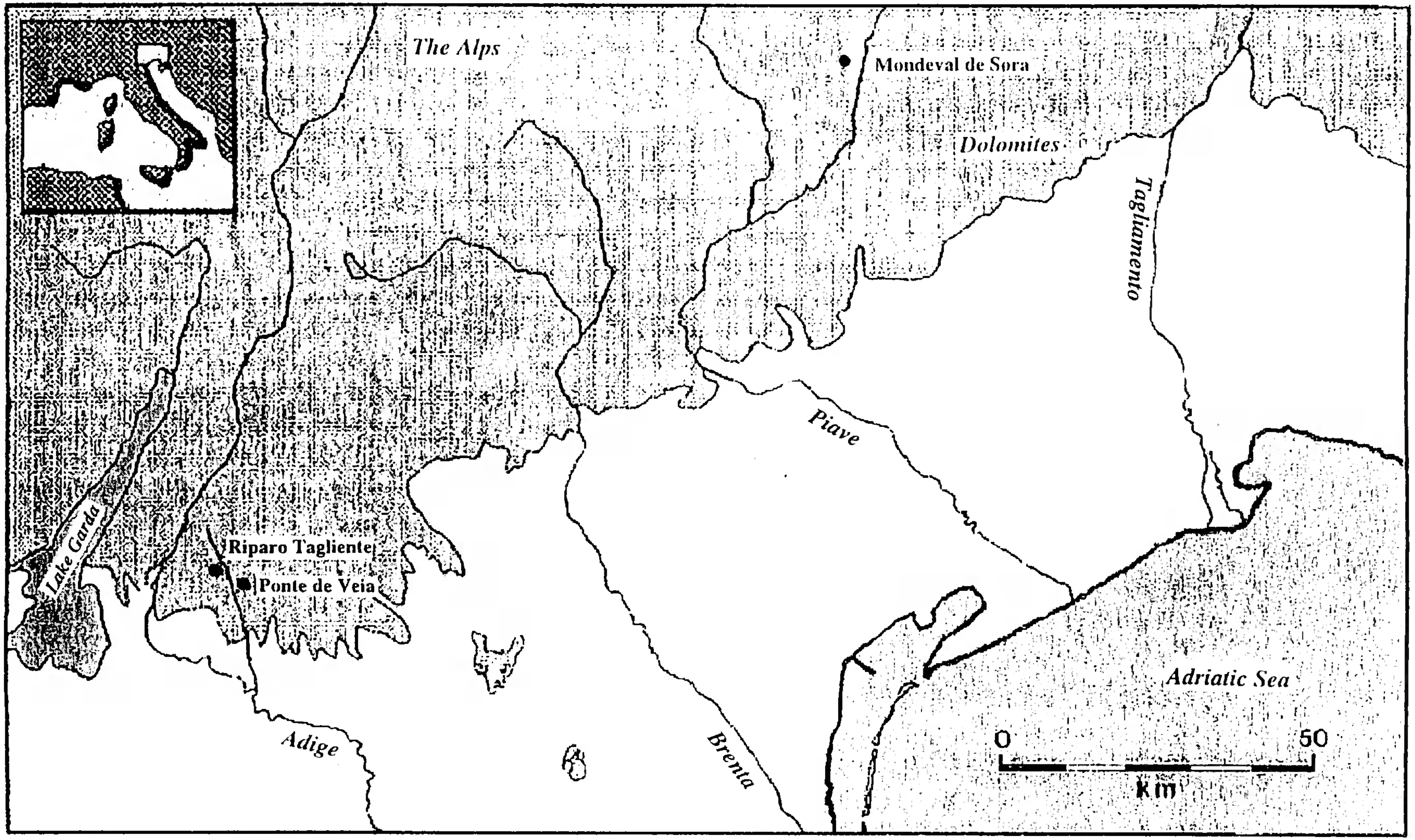

Fig 7a: Location of the Sites. The shaded area indicates land > 200m ASL.

(Guerreschi, 1992). The site is approximately 10 km from flatter land, and about 25 km from Lake Garda (Broglio, 1975). On the other side of the river is the cave of Ponte di Veia, with middle Epigravettian deposits (ibid.), where the ochre found at Tagliente was sourced. There are Mousterian and Aurignacian deposits at Riparo Tagliente, followed by a hiatus, then a deposit dating to the Tardiglacial period, with Epigravettian tools. There is little doubt that the majority of the deposits at Riparo Tagliente are there because of human activities. There are dense anthropogenic deposits below the rock overhang itself, but a great quantity of animal bones and chipped flint was also found at the exterior (Guerreschi and Leonardi, 1984). There is also believed to have been a wooden pile structure in the rock-shelter (ibid.). While environmental studies appear to show that the preceding periods were cold and dry, the layers we shall be concentrating on (13-6) provide evidence of a climatic amelioration, with increased humidity (Aspes, 1984).

Mondeval de Sora is further to the east, and at a higher altitude. Research at Mondeval de Sora began in 1986, a year after the site itself and several other contemporary find-spots (mainly flint scatters) were discovered in the Val Fiorentina area. Antonio Guerreschi of the University of Ferrara headed the excavation project. Mondeval is situated 2100 metres above sea level in the Dolomite mountains; making it one of the highest known Mesolithic sites in Europe. The site is a rock shelter rather than a cave, at the base of a steep rocky slope in the Forcella Giau valley. Towards the south of the site flows the Rio Cordon, and the presence of a lake during the site's early occupation is confirmed by the presence of lacustrine deposits (Alciati *et al*, 1994). Thus, fresh water would have been readily available to any inhabitants – a fact that will become doubly relevant later in this chapter. The first evidence the excavators have found for human occupation of the site is in the Sauveterrian, in the 7th Millennium B.P, but the site was also used in the Castelnovian period (6th millennium BP). The human burial, examined in the previous chapter, is part of the Castelnovian deposit. During the Pleistocene, glaciers would have made the rock-shelter inaccessible. As was mentioned in the previous chapter, the pollen studies carried out on samples from the Castelnovian soil (i.e. not the resin or propolis, which may have been curated some distance) indicate an Alpine prairie environment, and water's edge plants which support the presence of a lake (Alciati *et al.*, 1994).

7.3: Methods.

7.31: Mondeval de Sora.

Thirty-six boxes of animal bone have reached Durham from Mondeval de Sora. This is, to the best of our knowledge, the entire faunal assemblage from all periods, including the later Copper Age and Medieval utilisation of the site. Every bag within these boxes has been sorted for identifiable specimens, which were then separated from their original bags and labelled appropriately for ease of recording. The associated 'debris' did not go to waste, since samples from this abundant material formed the basis of a chapter in Dr. Alan Outram's PhD thesis (Durham, 1998). The further analysis of the identifiable quotient builds upon Outram's earlier work. Identification has been carried out using the Durham reference collection and Schmid 1972. Recording follows the usual SPSS numerical code (see chapter 1). All of the main bodily elements have been studied in depth, including loose teeth when reasonably complete, but ribs and vertebra (apart from the axis and atlas) have been excluded from the database. All species have been identified where possible, with the exception of microfauna, which require a more specific reference collection from the local environs. Animal bone from the early Holocene was abundant, especially in Context 8, but also in Contexts 31, 25, 32 and 14. Context 14 is the earliest – the original pavement that underlies the richer deposits. Castelnovian deposits reasonably rich in identifiable animal bone were contexts 100, 4, 4b and 101. Radiocarbon dates are available for context 4b, taken from charcoal samples:

8380 ± 70 BP (R – 1937)
7330 ± 59 BP (R – 1939)
5875 ± 60 BP (R – 1941)
4160 ± 55 BP (R – 1936)

This wide disparity is rather worrying. Context 4b is made up of sediments that filled the burial pit (context 5). As the Castelnovian deposits have been affected by later erosion, younger debris may have been mixed in. The Sauveterrian layers have been dated using their lithic typologies alone (Alciati *et al.*, 1994).

7.32: Riparo Tagliente.

The time available for studying the Riparo Tagliente assemblage was more restricted than for Mondeval de Sora, and the assemblage much larger – filling over 100 boxes – so the research design for this sample was rather different. Analysis was concentrated on the contexts towards the end of the Pleistocene – contexts 13, 12, 11, 10, 9, 8, 7 and 6. The entire material for each context was sorted in the search for useful specimens, except for layer 6, which was research undertaken on the last day of fieldwork.

Layer	Period	Details	C14 date, if available.[21]
6	Epigravettian		
7			
8			12,040 ± 170 BP
9			
10a		I lithic workshop	12,650 ± 160 BP
10b			
10c		II lithic workshop	13,070 ± 170 BP
10d			
10e		III lithic workshop	13,270 ± 170 BP
10f			
11			
12			
13			

Teeth and mandibles were common in the sample and in a relatively good condition and, as teeth provide us with a variety of information such as species, approximate age at death and season of death, it was decided to concentrate upon the dental evidence. Unlike Mondeval de Sora the mandibles at Riparo Tagliente were often relatively complete with several teeth in a row, so assessment of age and season of death could be ascertained with more confidence. The following elements were recorded:

Mandible
Mandible fragment
Loose deciduous teeth: D2, D3, D4.

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[21] Information on dates kindly supplied by Antonio Guerreschi.

Loose premolars: P2, P3, P4.
Loose molars: M1, M2, M3.

In the case of marmots, incisors were also recorded, as these can potentially be aged[22]. Each red deer tooth in a tooth row or loose tooth was identified to species and its eruption status noted (with reference to fig 1, p89, in Brown and Chapman, 1991b). The wear stage was sketched schematically in order to check the age at death (using fig 4, p526 in Brown and Chapman, 1991a). Eruption status and wear patterns were also recorded for wild boar, and assigned ages using Table 1 in Rowley-Conwy (forthcoming), and for roe deer (using information in Legge and Rowley-Conwy, 1988, p25) though this species is more problematic. Notes were also taken on neonatal long bones, when found, but this information was not included on the database.

7.4: Mondeval de Sora Results.

7.41: Sauveterrian

The Number of Identifiable Specimens (NISP) for the Sauveterrian contexts alone is 941 (see Fig 7b). This is much higher than was expected at the outset since the MdS assemblage is generally in a very poor state of preservation. The identification rate, based upon Context 31, which Outram counted in full, is approximately 5.9 %. Outram has argued convincingly that the animal bone was boiled down for marrow and bone grease, intensively broken up, and then dumped within the cave (Outram, 1998). Unsurprisingly, given this treatment, most of the bones recorded as ‘complete’ are in fact loose teeth that have, themselves, been broken out of the maxilla or mandible. All body parts appear to be represented at least once (Fig.7c), including extremities and non-food elements such as horn and antler, suggesting that whole carcases were brought to the site for processing. Horn and antler may have been valued as raw materials, but as only small scraps were recovered it was difficult to be sure. The fact that teeth and phalanges are both more robust than long bones *and* more abundant within the body itself gives a quantitative impression that is falsely high –

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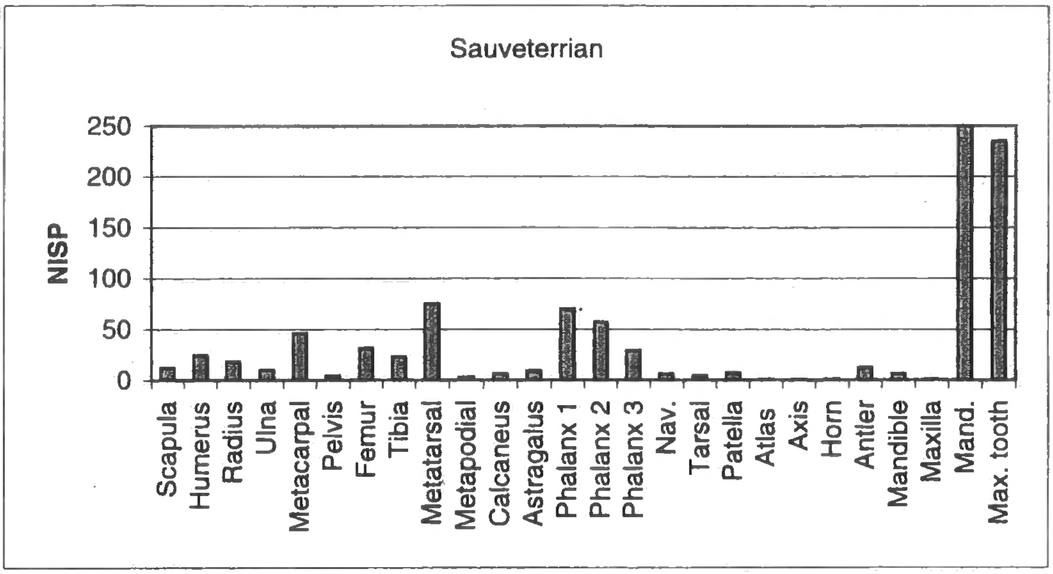
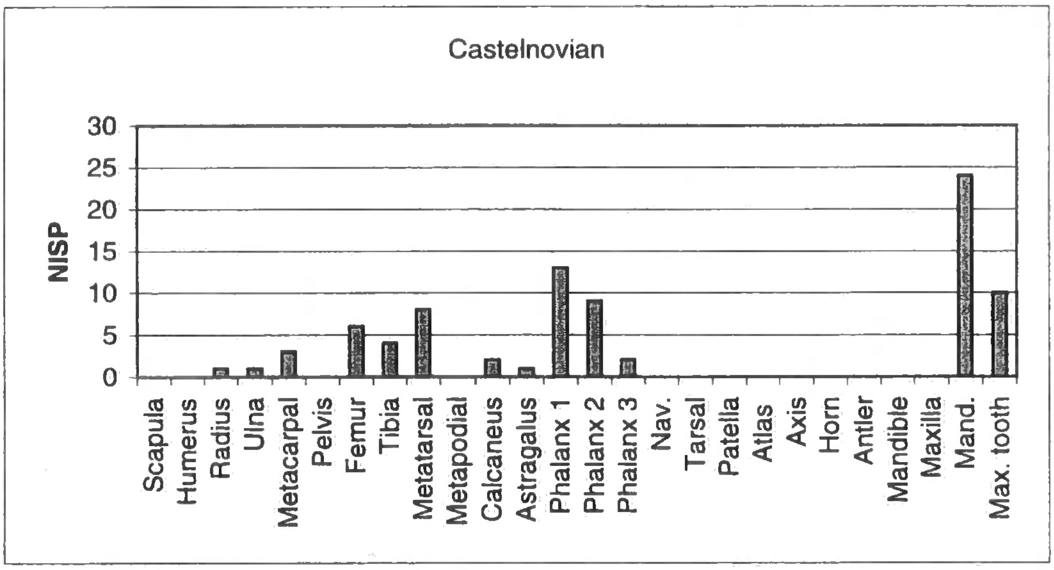
[22] The woodchuck, *Marmota monax*, can be aged from its teeth (Munson, 1984). As *Marmota marmota* is closely related, and has a similar life history, it was therefore hoped that Munson’s methodology could be used.

Fig. 7b: Mondeval de Sora NISP and MNI values.

	Sauveterrian			Castelnovian		
	NISP	%	MNI	NISP	%	MNI
Red deer	630	*67*	16	31	*36.9*	2
Ibex	209	*22.2*	7	27	*32.1*	1
Chamois	56	*6*	6	19	*22.6*	1
Roe deer	1	*0.1*	1	1	*1.2*	1
Wild boar	10	*1.1*	1	0	*0*	0
Bovid	2	*0.2*	1	0	*0*	0
Bear	16	*1.7*	1	3	*3.6*	1
Fox	2	*0.2*	1	0	*0*	0
Hare	15	*1.6*	2	3	*3.6*	1

Fig. 7c: Element representation at Mondeval de Sora.





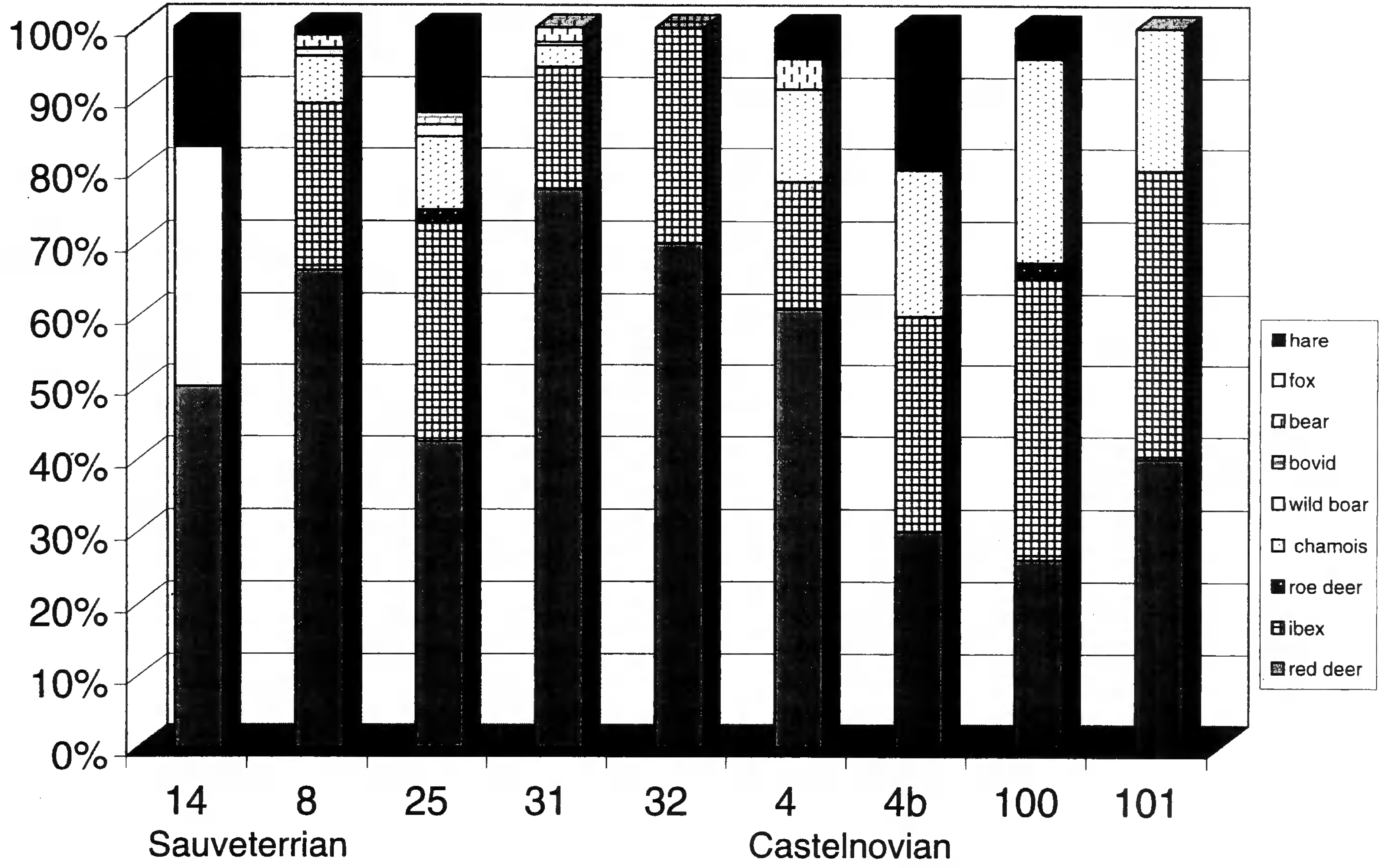
The intense fragmentation of animal bones has resulted in small, dense elements being more readily identifiable. It appears whole carcases were brought to the site.

after corrections MNI counts (Minimum Number of Individuals) are quite low. For example the all-context Sauveterrian MNI for red deer is just 16 individuals, and that of ibex is seven individuals. However it is possible that the carcases of some individuals may have been processed so intensively that all of their bones were reduced to indeterminate pieces.

The major surprise in this research was that 630 of the identifiable specimens – 67 % of the total Sauveterrian mammals – were attributable to red deer (*Cervus elaphus*). This is mainly interesting in that the location of the site, high in the Italian mountains and above the tree-line, would make MdS an excellent candidate for a 'classic ibex hunting site'. Recent research has argued that there is in fact very little that can be taken as classic or predictable about ibex hunting in prehistory (Phoca, forthcoming) and MdS supports this hypothesis convincingly. Ibex *are* present in every Sauveterrian context, apart from Context 14, but always in lower numbers than red deer (see Fig. 7d for relative proportions). Overall, ibex contribute 22 % of the mammal bone. Other species are much rarer, though chamois do provide 6 % of the Sauveterrian assemblage. Again, they are a species that might be expected in this habitat. Wild boar certainly were *not* expected, even in low numbers, since their preferred habitat is deciduous, swampy woodland (Burton, 1985, pp121-2). While it is plausible that red deer moved into the highlands to graze during the summer, wild boar are highly unlikely to have been encountered locally. The presence of these wild boar specimens may indicate that the Mondeval people were foraging very widely, or that the boar teeth were brought to the site for purposes other than day-to-day food. The grave goods of the buried man at Mondeval de Sora did include a boar tusk with wear traces (Alciati *et al.*, 1994), so we know wild boar teeth had a practical use in the Castelnovian. However, it must be said that in the Sauveterrian layers of MdS wild boar teeth seem to have been treated in the same rough and casual manner as those of other species.

Another interesting anomaly is the relatively high proportion of hare specimens in Context 25. This pattern is also evident, though rather less concrete owing to the paucity of the sample, in Context 14. Intriguingly these contexts also have high levels of burnt specimens (see section 7.43). It is difficult to be certain, but these results may be features of small resource foraging and roasting, perhaps on short 'reconnaissance'

Fig. 7d: Proportions of species present at Mondeval de Sora.



trips to the site, in contrast to the relatively industrious hunting and processing activities reflected in the samples of Contexts 8 and 31.

7.42: Castelnovian.

The Castelnovian sample is much smaller, with a total NISP of only 84. Compared with the Sauveterrian sample, however, it is interesting that the proportions of red deer and ibex appear to be levelling out in this later period, with chamois also relatively more abundant (see Fig 7b). As before the MNI counts are very low. Perhaps this bone material also represents a short stay at the site, with a variety of animals hunted, but the probability of mixed deposits in the Castelnovian makes it difficult to be certain.

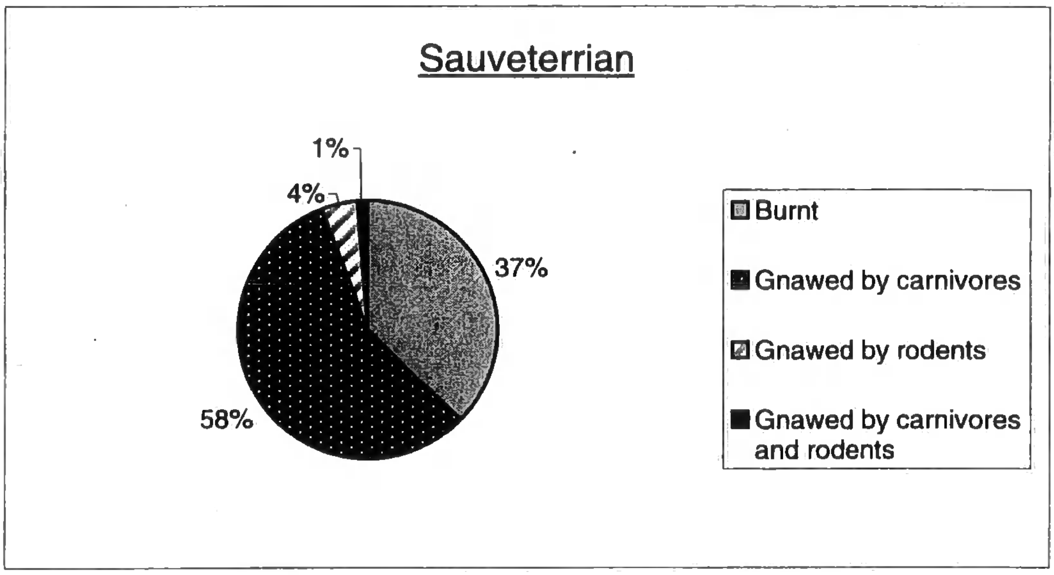
The bags from context 4b included some labelled 'pulizia scheletro' (cleaning of the skeleton), 'pulizia sepoltura' (cleaning of the grave) and even cleaning of the skull interior, but unfortunately all of the specimens contained within were small indeterminate fragments, or microfauna. These bones are almost certainly not related to grave goods. It is more likely that they trickled in along with surrounding soil when the soft tissues and shroud decomposed.

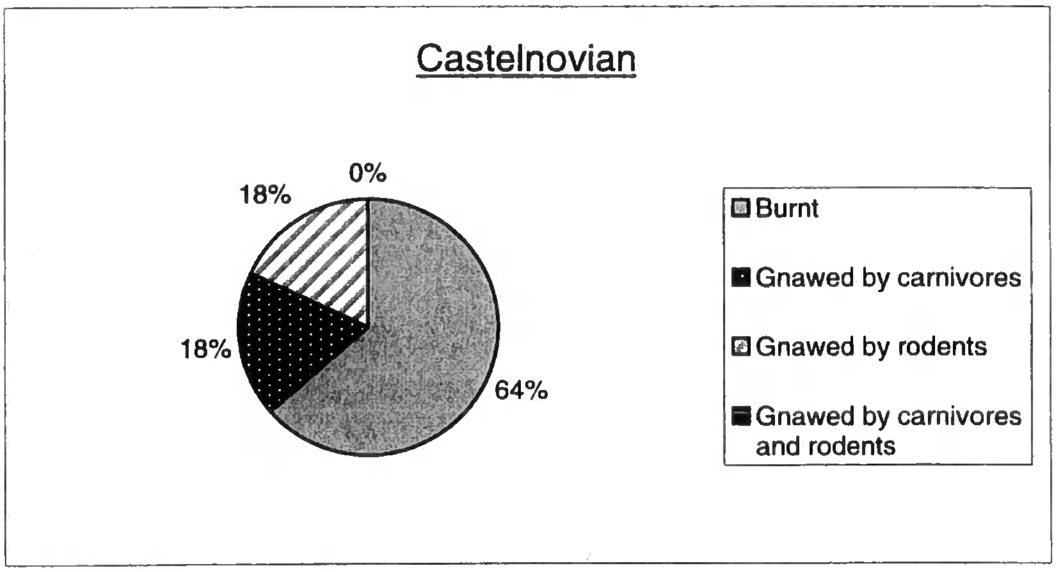
7.43: Taphonomy

Fragmentation, as has been said, was intense. A typical bag contained highly fragmented material, very little of which was identifiable (see photo, Fig. 7e). The Sauveterrian material is dominated by fragments categorized in the <20 mm size class (Outram, 1998). The levels of fragmentation in the Castelnovian deposits are just as severe (ibid.). Preservation evidence, on the other hand, has not been as dramatic as a preliminary scan of a bag's contents would have predicted. The breakdown of the little evidence of modification that was found is shown in Fig. 7f. Only 4 % of identifiable fragments have clear signs of gnawing even though domestic dogs are likely to have been present in this period, and wild carnivores were certainly in the area. Even more surprising was the discovery that very few of the identifiable specimens have been burnt (only 25, 2.7 %). In the smallest size class of indeterminate fragments (< 20 mm) burning was quite frequent – up to 20% in

Fig 7e: A typical sample from Mondeval de Sora.

Fig 7f: Breakdown of taphonomic factors affecting the Mondeval de Sora identifiable specimens.





Sauveterrian *n* = 67, Castelnovian *n* = 11. All other specimens showed no visible evidence of these modifications.

context 8 (Outram, 1998). Huge quantities of bone have been stained black due to their presence in a matrix of dark-brown/black soil, with high levels of charcoal (Alciati *et al*, 1994). This makes sense as most of the burnt specimens are likely to have been the result of 'back-ground burning' around the hearths which were used to heat 'pot-boilers' for the grease production process (Outram, 1998). Fire-cracked rocks are found in Sauveterrian contexts (Fontana, pers. comm. to Outram).

Butchery evidence supports the theory that grease exploitation was the major activity at Mondeval de Sora, probably taking place after marrow had already been extracted. Very few cut marks were found on the identifiable specimens, though there are some indications that bones were chopped:

Layer	*N* Chopped	*N* Dismembered	*N* Filleted
8	4	2	1
25	1	0	1
4	1	0	0
100	1	0	0

As Outram (1998) says:

"If only marrow was being exploited, then only the shaft should have been broken. If grease was being exploited, some or all (depending on the total need for grease) of the cancellous bone would be comminuted for rendering. In extreme cases of bone grease exploitation, shaft bone is also processed (Binford, 1978). This would result in nothing but very small pulverised fragments." (p179).

Thus this is a very likely scenario for what was happening in the early Mesolithic at Mondeval. It is proposed that the Sauveterrian pavement would have made a suitably hard surface for breaking the bones upon (ibid.).

7.44: Ageing and seasonality.

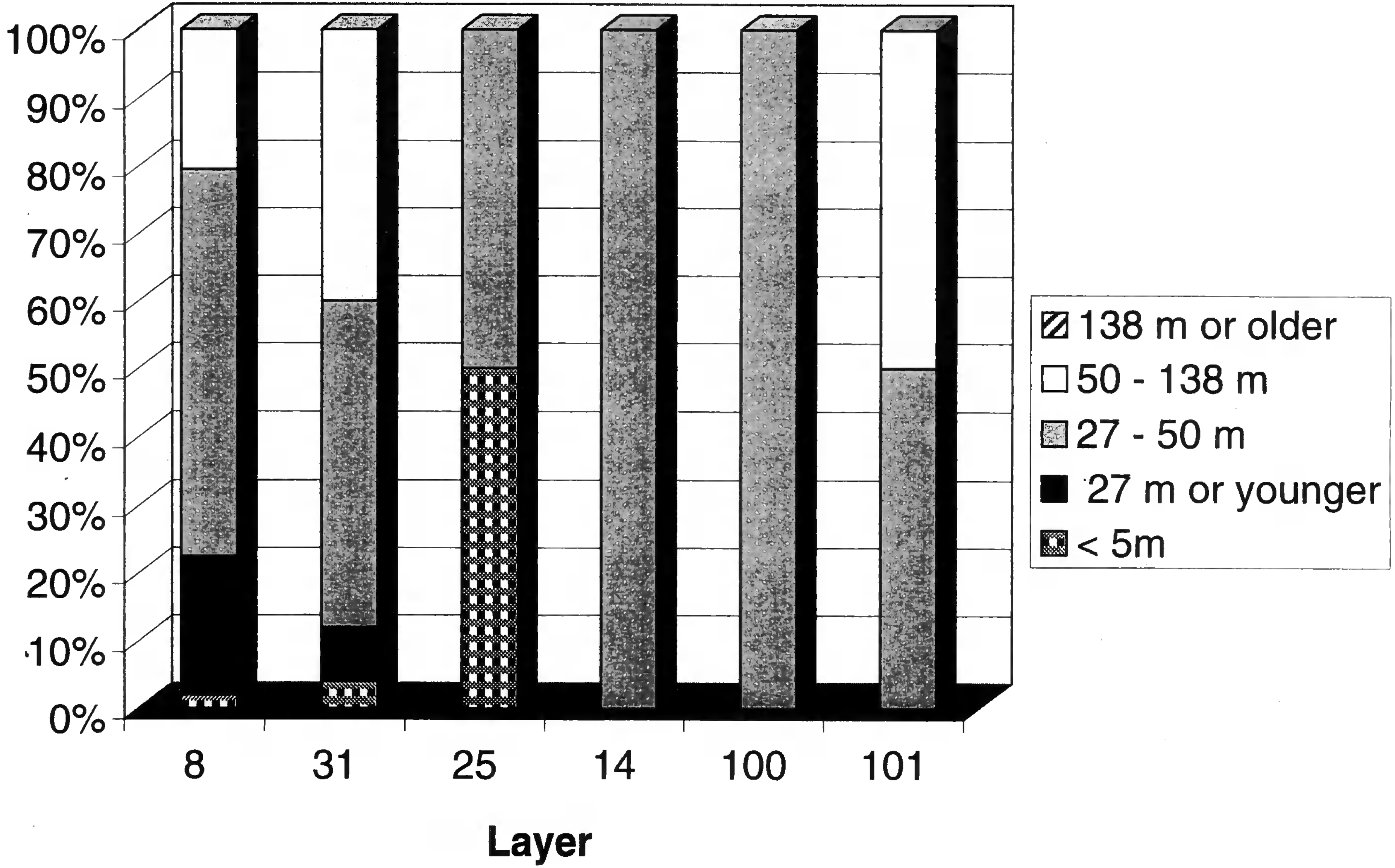
Analysis of red deer ages was made rather problematic by the dearth of complete or partially complete mandibles, but even loose teeth do give us some indication of age distribution. It appears that the vast majority of the red deer were killed when they were 27 months old or more (see Figs. 7g and 7h). If one bears in mind that tooth development is completed at about this time (Chapman and Brown, 1991a) and that

Fig. 7g: Mondeval de Sora red deer age profile by context.

	Layer	**< 5m**	**27 m or younger**	**27 - 50 m**	**50 - 138 m**	**138 m or older**
Sauveterrian	***8***	1	9	25	9	0
	31	1	2	12	10	0
	25	1	0	1	0	0
	14	0	0	1	0	0
Castelnovian	***100***	0	0	1	0	0
	101	0	0	1	1	0
Total		**3**	**11**	**41**	**20**	**0**

Several contexts did not provide any red deer teeth that could be confidently aged.

Fig 7h: Mondeval de Sora: Approximate Age of the Red Deer.



Red deer age categories based on eruption and wear (Brown and Chapman, 1991a, p529; Brown and Chapman, 1991b, p89). Some layers layers did not provide any mandibular teeth that could be aged.

hinds reach sexual maturity from about 36 months (Fraser-Darling, 1946), we can speculate that most of them were killed when fully grown. None of the teeth came from very old individuals (i.e. over 11 years). This does make sense in terms of nutritional quality, but is somewhat mysterious in that Riparo Tagliente has a comparatively large sample of these very old deer. Did they avoid hunting senile animals?[23] Or was hunting pressure so severe that red deer did not live to be this old?

Several neonatal red deer specimens have also been recorded in the larger samples of Contexts 8 and 31. Red deer calving occurs at variable times but peaks in late spring and early summer (Fraser-Darling, 1946), giving us a good idea of when human foragers were active at the site. As can be seen in Fig 7g, some calves were killed before they were five months old, and thus did not even make it through their first summer. Mortality among young calves is naturally very high (Fraser-Darling, 1937), so it is possible the foragers scavenged carcases of young deer that had died from other causes. Broken pieces of very young red deer teeth are relatively common in the indeterminate fraction of the Sauveterrian assemblage. It is no surprise that these teeth are highly fragmented, since their texture is soft and fragile. These 'neonatal' deer teeth may in fact be from foetuses in late pregnancy, since the first molar has already developed (though not necessarily erupted) *in utero* (Chapman and Brown, 1991b). It is possible, therefore, that the early Mesolithic foragers of Mondeval were not hunting the calves but their mothers. Neither scheme may make ecological sense, but the latter results in more food for probably the same amount of effort.

7.5: Riparo Tagliente Results.

The sample is quite small – just 656 specimens in total – but this is partially because only dental evidence was recorded. Context 10 provided the most identifiable specimens. As at Mondeval de Sora, red deer dominate the assemblage, contributing over 58% of the total specimens. The details of species representation at Riparo Tagliente can be found at Fig 7i. MNI values have not been calculated, as the full

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[23] Fraser-Darling (1937) makes the point that preferentially hunting mature stags has a stark ecological effect. The older stags rut first, so their calves are born in June. The calves born in late summer and early autumn, sired by the young stags, are more likely to die in the winter. Therefore, if the Riparo Tagliente hunters avoided the very old animals they may – possibly - have known of this. On the other hand, deer as old as eleven years old and more are potentially too out of condition to breed.

Fig. 7i: Riparo Tagliente NISP values.

	LAYER	**Red deer**	**Roe deer**	**Wild boar**	**Ibex**	**Chamois**	**Large bovid**	**Elk**	**Marmot**	**Hare**
NISP	**6**	14	4	0	1	0	0	0	0	0
	7	40	16	3	1	0	0	0	1	0
	8	57	15	10	2	0	0	0	0	0
	9	28	6	4	2	1	1	0	1	0
	10	208	29	36	9	2	9	0	2	2
	11	4	1	2	3	0	5	4	4	0
	12	18	6	7	2	0	1	0	5	0
	13	14	9	4	17	1	1	2	42	0
	LAYER	***Red deer***	***Roe deer***	***Wild boar***	***Ibex***	***Chamois***	***Large bovid***	***Elk***	***Marmot***	***Hare***
%	***6***	*73.7*	*21.1*		*5.3*					
	7	*65.6*	*26.2*	*4.9*	*1.6*				*1.6*	
	8	*67.9*	*17.9*	*11.9*	*2.4*					
	9	*65.1*	*14*	*9.3*	*4.7*	*2.3*	*2.3*	*2.3*	*2.3*	
	10	*70*	*9.8*	*12.1*	*3*	*0.7*	*3*	*3*	*0.7*	*0.7*
	11	*17.4*	*4.3*	*8.7*	*13*		*21.7*	*21.7*	*17.4*	
	12	*46.2*	*15.4*	*17.9*	*5.1*		*2.6*	*2.6*	*12.8*	
	13	*15.6*	*10*	*4.4*	*18.9*	*1.1*	*1.1*	*1.1*	*46.7*	

Riparo Tagliente NISP counts are based on teeth and mandibles only, therefore MNI values have not been calculated.

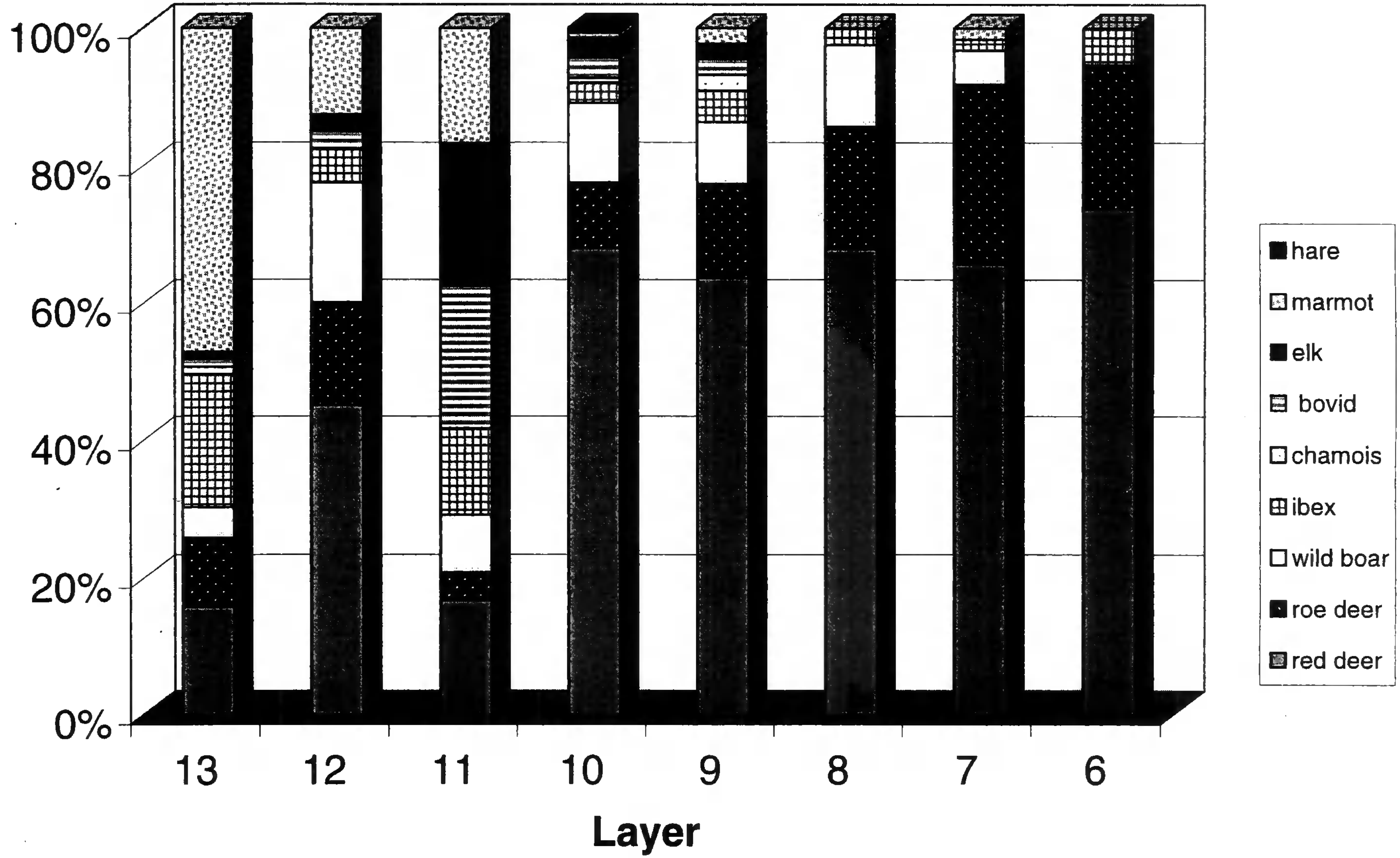
assemblage has not been examined, but even the dental fraction alone gives us an idea of the changing utilisation of the species over time. In the earlier periods it appears that a variety of species are hunted, in fluctuating quantities, while from context 10 upwards the domination of red deer becomes consistent and stable (Fig 7j). This stable proportion of red deer over time is also observed when Layer 10 is divided into sublayers, though there does appear to be a gradual creeping down of red deer numbers until a resurgence in layer 6 (Fig 7k).

7.51: Taphonomy.

The Riparo Tagliente research did not involve detailed recording of taphonomic features as the work at Mondeval de Sora and other sites. However, it can be said that although much of the indeterminate fraction at Riparo Tagliente was in a similar state as that of MdS (broken into small pieces, often less that 2cm wide) the fragmentation does appear to have been less intense. For example, at Riparo Tagliente 25 whole mandibles were found, and 178 mandible fragments, while at MdS only 6 mandibles were discovered, despite the abundance of loose teeth. Here is the full break down of dental elements found at Riparo Tagliente:

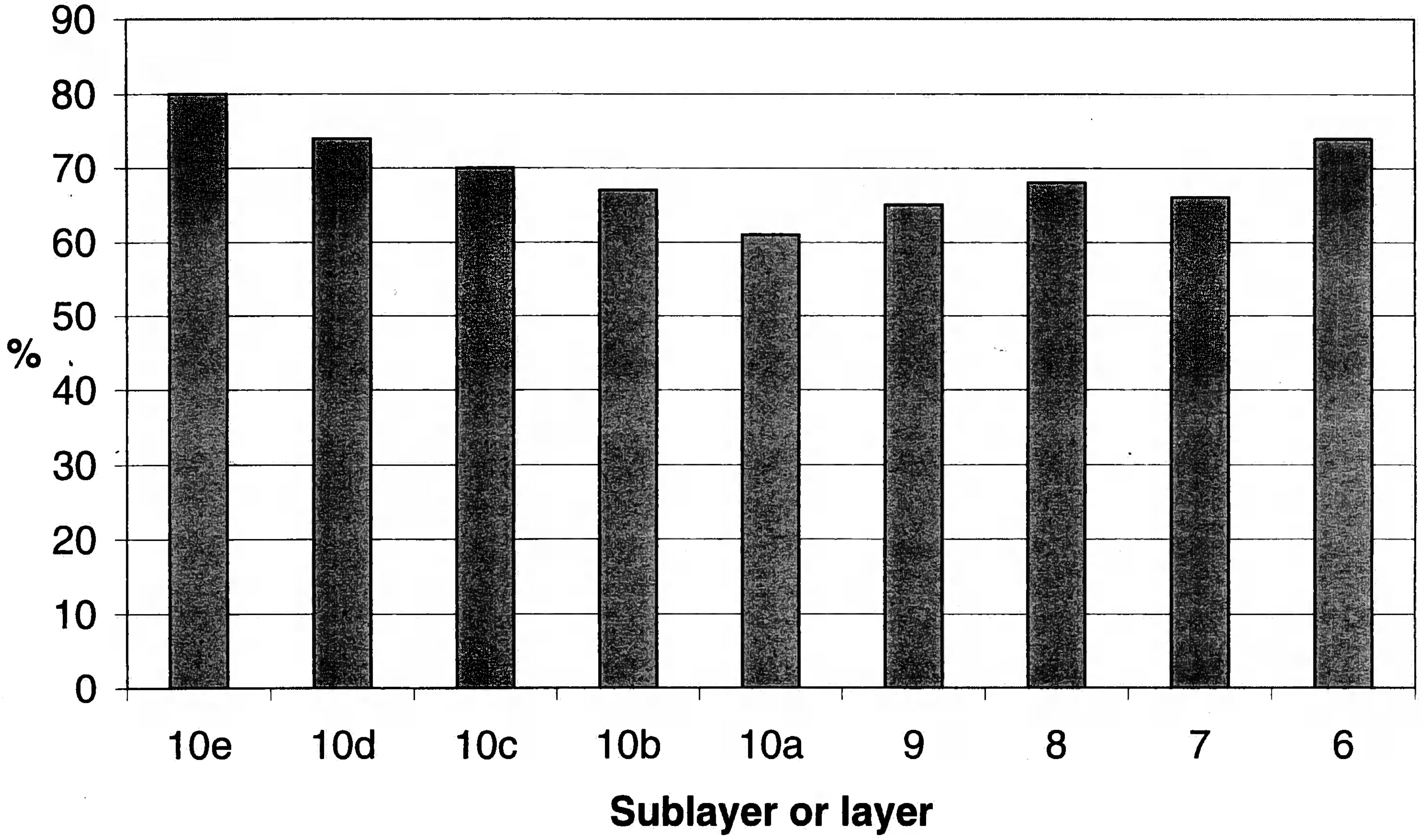
Layer	Mandible	Mand. Frag	D2	D3	D4	P2	P3	P4	M1	M2	M3	Marmot incisor
13	11	26	0	0	1	3	0	6	7	13	16	6
12	0	12	0	0	0	1	3	2	5	14	0	2
11	1	7	0	0	0	1	3	1	5	1	3	1
10	10	73	0	1	14	21	32	29	34	46	37	0
9	1	14	0	0	1	1	3	4	3	7	8	1
8	2	30	0	0	1	5	8	12	6	9	11	0
7	0	11	1	1	1	7	5	3	7	11	14	0
6	0	5	0	0	1	3	0	2	2	2	4	0
Total n specimens	**25**	**178**	**1**	**2**	**19**	**41**	**56**	**59**	**69**	**103**	**93**	**10**

Fig 7j: Proportions of species present at Riparo Tagliente.



The mixed selection of species hunted in the lower levels appears to turn to more specialized red deer hunting from Layer 10 upwards.

Fig 7k: Changing proportion of red deer to Riparo Tagliente overall NISP by context.



The indeterminate fraction had often been labelled 'ossa bruciate' (burnt bone) by the excavators, and was indeed blackened – either by direct burning or association within cinder-rich deposits. Some identifiable specimens were also burnt, and these were noted although most do not form a part of the overall sample:

Layer	Specimen
10	P3, red deer. Slightly burnt
10	Maxillary M1, ibex. Burnt patch and stomach acid erosion.
12	Ulna, marmot. Burnt black.
13	2nd phalange, marmot. Burnt black.
13	Mandible fragment, marmot. Burnt black at incisor end.
13	Antler tip, probably red deer. Burnt.

Thus it appears that even the marmots were probably the prey of humans, and the marmot mandible burnt at the incisor end may suggest that marmots were roasted whole.

7.52: Butchery.

No detailed analysis of butchery patterns took place during the Riparo Tagliente research, as this will be included in the final report, but cut and chop marks were noted when observed. In layers 10 a-e, particularly, many red deer phalanges and metapodials were observed which had been chopped or split for marrow extraction. In layer 13 the rib of a small animal – c.f. badger – was found with multiple fine cut marks.

7.53: Ageing and seasonality.

One of the primary reasons for concentrating on teeth and mandible evidence was the information they could provide about age at death. As the mandibles at Riparo Tagliente were more often at least partially complete than at Mondeval de Sora, several species could be assessed.

7.531: Red deer.

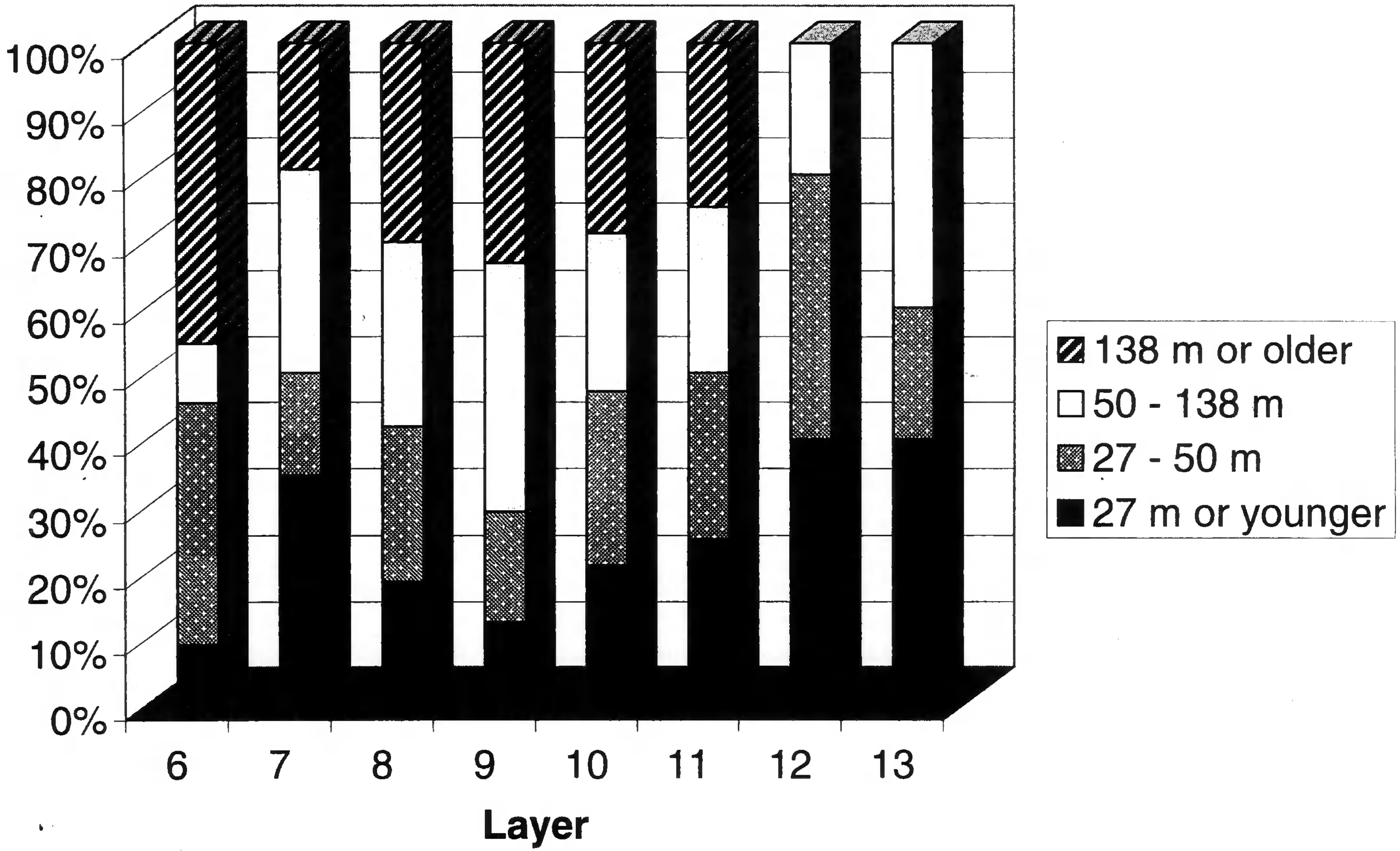
265 of the red deer specimens could be aged within broad time bands, and these reveal an interesting trend through time (fig 71). It appears that in layers 12 and 13, older red deer – 138 months or more, i.e. over 11 years – were caught rarely, if at all. In these layers the proportion of red deer specimens aged 27 months or younger is over 30%. As at Mondeval, there could be several reasons for this: possibly the hunters preferentially targeted younger animals, perhaps because of their better nutritional quality. Alternatively, it is possible that hunting pressure on the red deer was so great that few individuals lived beyond eleven years. Certainly, from Layer 11 upwards the picture is quite different. All age groups are killed in approximately equal measure in layers 10 and 11. It appears that the hunters had no great preference for a certain age group. As at Mondeval, most of the specimens in the youngest age group were aged around 27 months rather than significantly younger, but there are some that have been killed before they are a year old and thus would certainly not have had a chance to breed, nor been fully grown. This may imply that either the hunters did not know or care about the long-term effects of this strategy, or that they were desperate. Of course, younger animals are usually more vulnerable to predation because they are inexperienced, but these would still have been with their mothers, and thus protected to a certain extent.

Although several of the red deer mandibles could be aged confidently, these generally fell within such wide parameters that they are of little use when assessing seasonality. Therefore this evidence will be looked at with the corresponding wild boar mandibles to attain a more accurate picture of season at death.

7.532: Wild boar.

Though there are fewer wild boar specimens at Riparo Tagliente than red deer, they can be aged more precisely. This is primarily because almost 90% of the wild boar mandibles which could be aged were two years old or less when they died, and generally the younger the animal the more accurately its age can be pinpointed. Wild boar can live up to 25 years (300 months), but I found only one specimen that was over 30 months old. Also, there are no wild boar mandible specimens younger than

Fig. 7l: Riparo Tagliente, Approximate Age of The Red Deer.



Red deer age categories based on eruption and wear (Brown and Chapman,1991a, p529; Brown and Chapman, 1991b, p89). Layer 10 had far more specimens than the other layers.

seven months. This could be explained by preservation factors, but neonatal and foetal bones – generally of other species – have survived intermittently in the Tagliente record. It may mean that wild boar were considered better prey when they had gained weight, and strayed from the protection of their potentially aggressive mothers. Given the seasonality evidence (below), however, it is probable that generally the Tagliente hunters were not in the area during the time of the year when wild boar are born and are in their infancy. Wild boar do not reach sexual maturity until they are two years old (Burton, 1976), so the vast majority of the wild boar individuals killed would not have had a chance to breed. As wild boar sows can have a litter of up to twelve piglets, though, hunting of immature animals is unlikely to have had a drastic ecological effect. Even discounting human predation, young piglets are very vulnerable.

Most of the layers provided at least one wild boar mandible that could be aged precisely enough to provide seasonal information. Wild boar are usually born in March or April, therefore April 1st is used as the nominal birth date. Fig 7m shows the most likely months of death for each wild boar mandible. A summary is provided below:

Layer	Most likely months of occupation
7	March, April
8	March, April
9	May, June
10a	Two visits? August and December
10b	January, February
10c	September, October, November
10d	August, September, October, November, December, January
12	November, December
13	August

Thus from layer 13 until layer 10a we appear to have a late summer through to mid winter occupation of the site, becoming a spring/early summer occupation from Layer

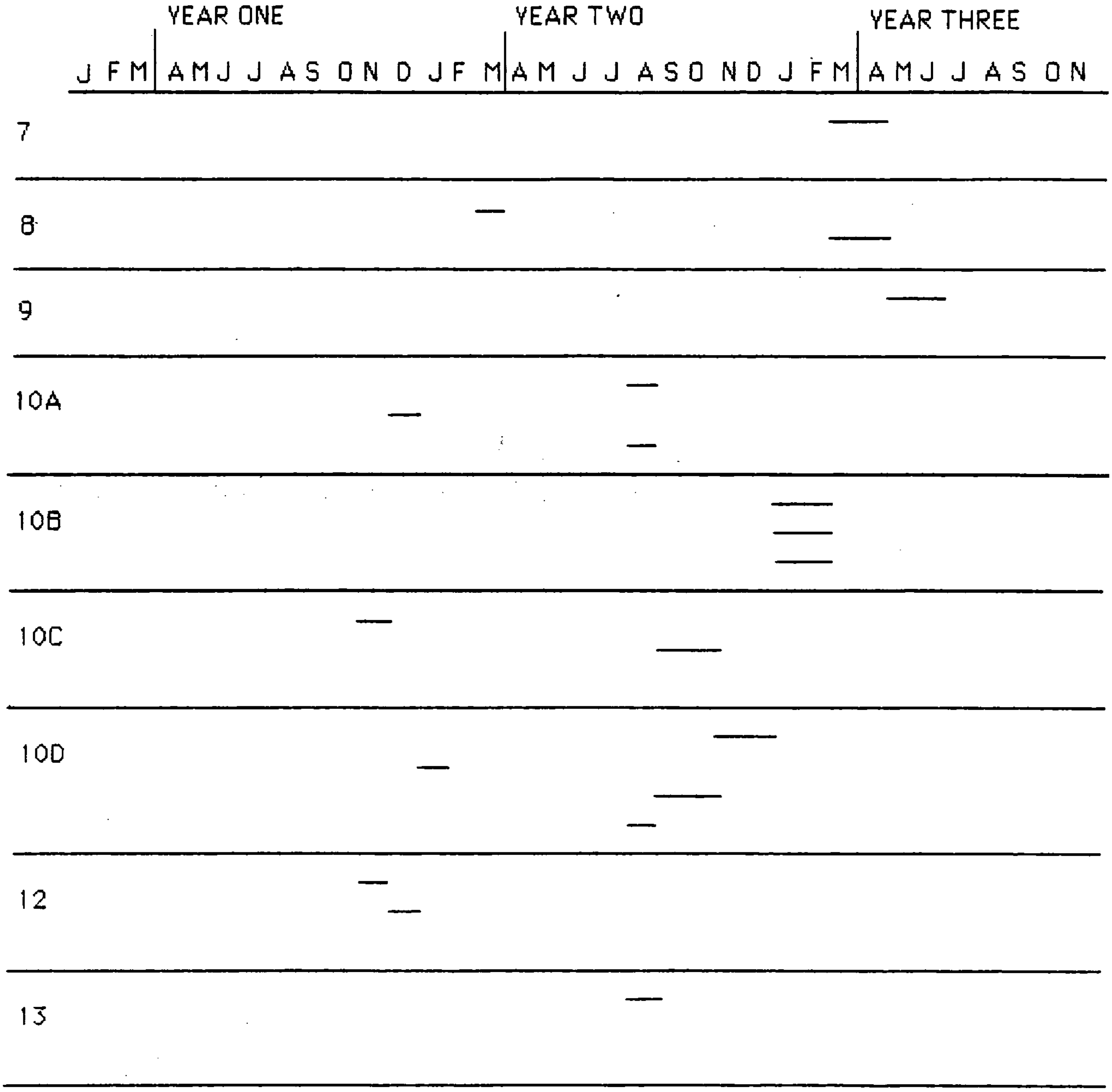


Fig 7m: Seasonal evidence from wild boar mandibles.

Each line represents a single mandible.

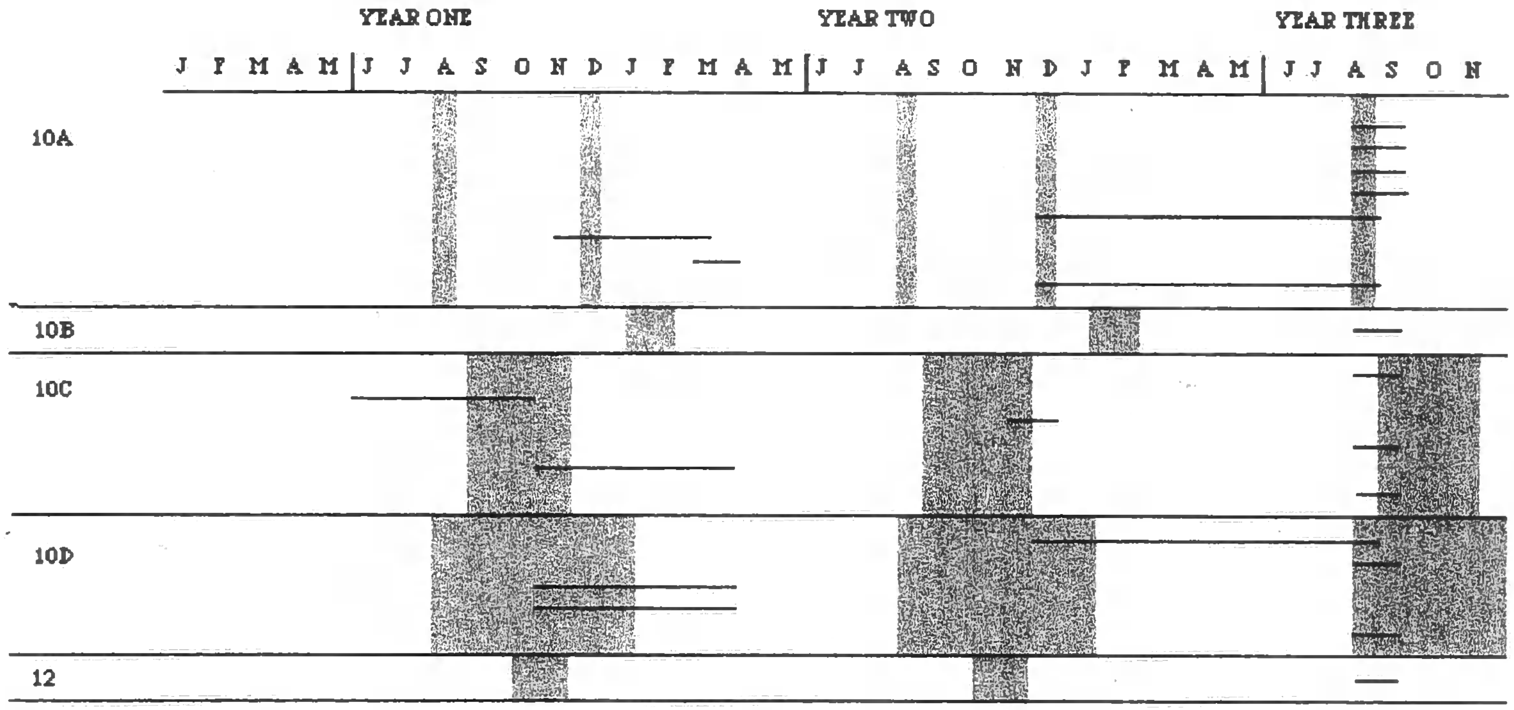


Fig 7n: Seasonal evidence from red deer and wild boar teeth.

Each horizontal line represents a red deer mandible that could be aged. Vertical shading represents the corresponding wild boar mandible evidence.

9 upwards. The addition of the red deer mandible evidence generally confuses rather than reinforces this deduction (Fig 7n), but at least the two lines of evidence correspond for layers 10a, 10c and 10d.

This general pattern for activity at Tagliente during the autumn and winter is interesting in that red deer are breeding during the months of September and October, while the wild boar rut lasts from November to February (Burton, 1976). Therefore it is possible that the human hunters were preying upon these species while they were relatively concentrated in predictable locations, and less cautious than they would normally be. After the stress and aggression of the rut the *Cervus* stags are exhausted and out of condition, and wander off to recuperate (Fraser Darling, 1937). So, although it may be easier to kill them, one would have to stalk these individuals, and they have probably lost weight and thus would provide less meat and fat. Also, red deer are known to enjoy wallowing in muddy pools before and during the rut, and this is an activity also frequently observed in wild boar (Burton, 1976), so it is possible the two species were encountered in the same localities. Even if red deer were the preferred prey, perhaps the hunters opportunistically targeted boar when encountered. We have no archaeological evidence for the use of hides, but it is not inconceivable that the hunters waited for the prey to come to them.

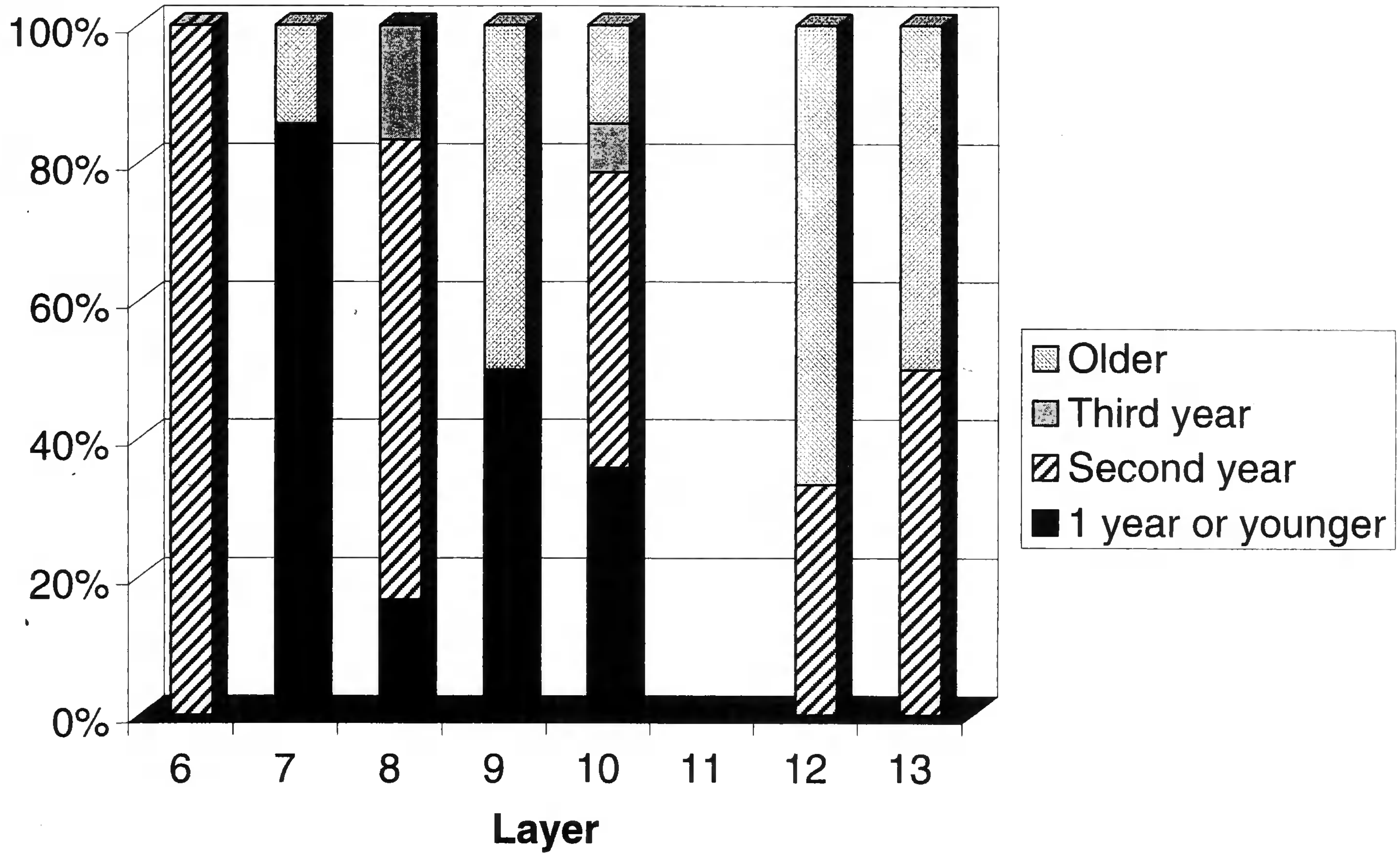
7.533: Roe deer.

Only thirty roe deer specimens could be aged, and not to a very precise degree, but even this evidence does show the age profile of roe deer predation. The proportions of age groups among the roe deer hunted can be found in Fig 7o. Thus, in layer 10 – the only layer with a sample of more than 10 specimens – it appears the full range of roe deer age groups were victims of human predation. Again, this could be the result of killing any roe deer that was encountered if the hunter believed it worthwhile.

7.534: Marmots.

Unfortunately, all of the marmot mandibles and incisors found at Riparo Tagliente were well beyond the age where they could be used for assessing seasonality. Also, marmot teeth fall quite easily from the mandible when the flesh has decomposed.

Fig. 7o: Riparo Tagliente: Roe deer age at death by layer.



The sample of roe deer teeth and mandibles which could be aged was rather small.
Layer 6 n=1, 7 n=7, 8 n=6, 9 n=4, 10 n=14, 11 n=0, 12 n=3, 13 n=4.

However there was a neonatal marmot pelvis fragment (see below). Of course, if the autumn/winter occupation suggested for much of the sequence is accurate, neonatal marmots would not have been encountered, as Alpine marmots are all born at approximately the same time, in April. The neonatal marmot pelvis therefore supports a late spring visit to the site in Layer 9.

7.535: Foetal and neonatal bones.

Foetal and neonatal specimens were observed, noted and drawn when found. The reference collection at the department of anatomy in Torino does include examples of foetal skeletons of many of the species found in the region, but it is nevertheless difficult to distinguish foetal bones from each other, and virtually impossible to tell how many months into pregnancy the foetus died. I suspect bone development occurs quite late into the pregnancy, but in the absence of this information the estimates below are based simply on the duration of the breeding season, when females are most likely to be pregnant. However, here are descriptions of the specimens observed at Riparo Tagliente:

Layer	Element	Species	Stage of pregnancy	Estimated month of death
7	Scapula	Roe deer	Unknown	Nov. - June
8	Humerus	c.f. Roe deer	Unknown	Nov. - June
9	Pelvis	c.f. Marmot	New born	April, May
10b	Femur	Deer	Unknown	
10c	Tibia	Red deer?	Unknown	Sept. - June
10c	Femur	Red deer	Unknown	Sept. - June
10d	Radius	c.f. Red deer	Unknown	Sept. - June
10d	Femur	c.f. Wild boar	Unknown	Nov. - May
11	Femur	Red deer	Unknown	Sept. - June
11	Tibia	Red deer	Unknown	Sept. - June
12	Humerus	Wild boar	New born	March-May
11	Femur	Ibex	New born	May - June
13	Scapula	c.f. Ibex	New born	May - June

13	Tibia	Roe/chamois	Unknown	

7.6: Discussion.

In summary, therefore, the evidence from Riparo Tagliente suggests that the successive groups over time were hunting in an environment that was probably wooded and quite productive. They may also have benefited from the natural inclinations of their prey species to group in the autumn, thus being able to find prey more easily. It probably made sense to hunt these animals while they were healthy and robust from a summer spent feeding. I do not have any hard evidence from Riparo Tagliente for food storage, but the products of the intense autumn hunt may have been stored for the winter in the form of dried meat and grease.

It has been known for some time that ibex diminish in numbers at Riparo Tagliente in the later Pleistocene, and this is interpreted as the result of retreating open habitats and thicker vegetation (Broglio and Lanzinger, 1990). Ibex are more important at other Late Pleistocene north Italian sites such as Villabruna, where ibex and red deer were found (ibid.), and Armo della Stefanin in Liguria, where ibex make up 82.9% of the fauna (Barker *et al*, 1990). However, red deer are the main game animal at low-altitude Arene Candide, supplemented by roe deer, ibex, cattle, waterfowl and the gathering of shellfish, with a very similar subsistence regime at Stefanin's sister site of Nasino (ibid.). In general, it appears that the Late Upper Palaeolithic foragers of northern Italy concentrated on the same suite of resources, but varying their subsistence slightly according to altitude and season.

The animal bone from Mondeval de Sora provides us with an interesting vignette of life at an early Mesolithic Alpine site. The animal-derived part of their diet appears to have been based largely on red deer meat and products, but with some diversity provided by the hunting of other mammals. It is unclear whether the black grouse bones found occasionally in the assemblage (n=2, plus six indeterminate bird fragments, and one specimen that may be a black grouse-capercaillie hybrid) are the result of human predation. They may have been caught primarily for their feathers, in any case, since these are believed to have been valued for arrow flights in prehistory

(Bahn, 1983). Fish bones are very rare indeed, although sieving at this site has been thorough. Thus it appears that, like their Upper Palaeolithic counterparts, the foragers concentrated on hunting larger mammals, and processing them so intensively that little went to waste. It will be interesting to see, by comparing the faunal data with the rest of the research, whether the site was visited by the 'whole group', or just work-parties concentrating on specific tasks. The location at high altitude above the tree-line, lack of human remains apart from the single burial, and relatively low MNI counts lead me to believe that this was a short-stay site used for the specific purpose of hunting and processing animals for grease. This raises the possibility that certain individuals of a wider community may have had preferential access to resources. The grease was probably intended for the whole community, and stored, but the 'task-group' would have had the first access to the fresh meat, and mountain resources such as grouse and hare.

The results from Mondeval de Sora have parallels with other sites in the region, though the faunal evidence – fragmented though it is – is still better at Mondeval than other contemporary sites. The Castelnovian site of Laghetti del Crestoso in the south-central Alps, with a fireplace C14 dated to 6790 ± 120 BP (HAR-8871) is also believed to have been a short stay hunting camp, with a group moving up into the highlands seasonally, though unfortunately no bones are mentioned (Baroni *et al*, 1990). This group brought their raw materials with them, as the tools - though manufactured locally - are made from non-local flints (ibid.). The site of Colbricon, not far from Mondeval, is interpreted as an intercept hunting site where large numbers of deer were killed in the summer and early autumn and the grease and marrow were extracted for the coming winter (Clark, 2000). This sounds very similar to Mondeval, but since animal bone was not preserved at Colbricon due to acidic soils, the interpretation remains tenuous.

There are also parallels between Mondeval and other sites, even those at lower altitudes. For example the Sauveterrian at Romagnano (9100 – 8220 bp, approximately) has the remains of red deer, roe deer, ibex, chamois and boar. Most of the red deer bones from this site were split open for marrow, and even the phalanges of small herbivores such as roe deer and chamois were processed in this way (Clark, 2000). Therefore a need to maximise the nutritional potential of every carcase can be surmised here too. A similar strategy, with red deer the principal species, and extensive marrow extraction, occurred at Pradestel and Riparo Gaban (ibid.).

7.7: Conclusion.

In conclusion, the difference between Upper Palaeolithic and Mesolithic subsistence in northern Italy appears to be more a matter of intensification of existing resources rather than large-scale inclusion of more novel resources. The broad base foraging clear in the Sicilian record (see chapter 6) is certainly not as clear in this region. A more clearly defined transition probably exists between the Sauveterrian and Castelnovian than between the Final Epi-Gravettian and Sauveterrian, due to the increasing density of trees and shrubs in the Atlantic period and its subsequent effect upon game (Clark, 1990). Certainly there is nothing within the Riparo Tagliente and Mondeval de Sora evidence to suggest a drastic change in lifeways between the two sites, separated as they are by several thousand years. What differences exist are more a product of season, as MdS is a summer camp while Tagliente is primarily an autumn-winter site with visits at other times of the year. Tagliente is also likely to have been the home of a more diverse group. On the whole, their diet appears to have been very similar.

Chapter 8: Late Palaeolithic to Early Mesolithic Iberia: The State of Our Knowledge.

8.1: Introduction.

In this chapter the data amassed thus far on the Solutrean, Magdalenian and early Postglacial periods in Iberia shall be reviewed, along with many of the associated problems. Some comparisons with the corresponding record from France may also help to put the Iberian evidence into context, though it is hoped that by doing this I will not perpetuate the geographical biases which are rife in the study of these regions. Throughout the chapter, emphasis will be given to the faunal evidence, but art, tools and social evidence (where available) will also be touched upon, especially where these factors appear to be intimately connected with human-animal interactions.

8.2: The problems.

Though the Southwest European Palaeolithic has been subject to intensive study for many decades, it is still a minefield of practical and ideological difficulties, and one suspects that the early Holocene is unlikely to fare any better. Indeed, the antiquity of some of the excavations provides one of the methodological problems. The site of El Castillo, for example, was excavated before World War One, and still has the most complete culture-stratigraphic sequence in Cantabria, but unfortunately it was never fully published, a fate shared by El Pendo, until it was salvaged in recent years (Straus, 1992). There is also a definite international and political agenda at work, but this is not always overt or - one suspects - intentional. The fact that most research into the Palaeolithic of Spain has followed the English or French schools of thought (de Quiros, 1980) may be changing, but it was formerly a tangible problem. The wider world still appears to know more about the French Palaeolithic than the equally rich Iberian equivalent, a sad situation exacerbated by language barriers rooted in the distant past and perpetuated in schools even today. Unintentional French domination is also evident in that Spanish prehistorians have persistently tried to fit local tool assemblages into the categories invented for Southwest France (Straus, 1992). The caves of Les Mallaetes and Parpallo in the Levante region of Spain are a case in point. It is alleged that Les Mallaetes has earlier and later deposits than those of Parpallo, though this is based somewhat tenuously on tool assemblages and 'contemporary' sites in southern France (Davidson, 1976). Despite their neat labels, there is actually considerable overlap between all the time periods discussed here (Clark, 1987, Fig 3, p311, is convincing). A level lacking Solutrean foliate points, or Magdalenian harpoons, may be labelled 'Early Upper Palaeolithic' when it is in fact later (Straus, 1992). There is the whole issue of the 'Tardiglacial Paradigm' - a fitting label coined by Morales *et al.*, 1998 - which may draw us into discovering precisely the broad-based subsistence strategy, and no doubt its associated life-ways, which we have come to expect. The relationship between art and the environment is also a characteristic clichė of the period, some even believing that they have found a direct relationship between art and food (e.g. Hayden *et al.*, 1987, p279). On a broad scale this may work, but any proposed links are difficult to substantiate when all wooden artefacts, textiles, tattoos, cuisine, oral folklore etc.– and a large part of the resource base – have been irretrievably lost.

In addition to the difficulties in relying on tool typologies, there are other methodological problems that occur in, but are not necessarily restricted to, the Iberian research. Even when dating does not rely on artefacts there are still pitfalls. Radiocarbon dating is only as good as the samples used. For example, at the open-air site of Vale Almoinha charcoal samples were in long storage, and - when the collagen in the macrofauna proved unusable – rabbit collagen was used instead (Zilhao, 1988). Burrowing animals do not make ideal dating samples. The bone assemblages themselves may be difficult to analyse, particularly those from the early Holocene, where intrusive domesticates from Neolithic levels may be confused with the young of their wild relatives (Davidson, 1989). Given that the early prehistory of Europe is such a popular and contentious topic, there is also the potential danger that expensive techniques may be thrown at it and common sense sidelined. For example carbon isotope ratios in human bones were examined at Les Eyzies (Hayden *et al.*, 1987). The disappointingly low presence of marine resources until the very end of the Magdalenian does not mean the resource base was narrow - remember that Les Eyzies is 150 km inland even today – and a varied diet does not consist of meat + fish.

Bearing all of these potential problems and inconsistencies in mind, let us now turn to the record as it stands. It may be useful to consider the evidence for Portugal and

Spain separately for the moment, and divided into three manageable time periods. Portugal tends to get less archaeological coverage than Spain, which in turn is in the shadow of France, as discussed above, but it does have an intriguing prehistoric record that deserves greater recognition. Largely thanks to a dedicated few, it seems, this is now happening.

8.3: Portugal.

8.31: Animal resources: The problematic Solutrean.

The Solutrean period, characterised by the beautiful leaf-like points of the Solutrean tradition, appears to have begun and developed during the Last Glacial Maximum, i.e. around 16000-20000 BP., in Portugal as in the rest of western Europe (Zilhao, 1990). As noted above, however, the archaeological time periods we employ are not always as neat as our concepts of them. The borders of the Solutrean period are fuzzy in Portugal. In 1985, at least, the cave of Salemas was the only Portuguese site with evidence of Gravettian industries, but there is typological and even stratigraphical overlap with the Solutrean (Zilhao, 1985). As far as is known at the moment, the Solutrean also appears to have been an enduring tradition. The C14 dates derived from the top 'Solutrean' layer (Eb) at Gruta do Caldeirao, for example, range 14450 ± 890 BP. at the base, to 10700 ± 380 BP. at the top, when the 'Magdalenian' would have been advanced elsewhere (Zilhao, 1988). This is a splendid example, among several, of how the Palaeolithic of Portugal differs from the record in south-west France. Environmentally, the 'Solutrean' period was therefore likely to have been quite variable in Portugal. At the LGM, vegetation species which would now inhabit different latitudes and altitudes were compressed, resulting in a mixture of species such as pine, oaks, birch and some Mediterranean species that were tolerant of the cold, dry conditions (Zilhao, 1990). This unusual situation is reflected in the *melànge* of fauna found at Caldeirao, which includes fairly tolerant species such as red deer and horse, with alpine ibex and chamois and forest-dwelling species such as boar and roe deer (Zilhao, 1990). Some small-medium mammalian carnivores, birds and - of course - lagomorphs were also found in the Solutrean of Caldeirao (See Zilhao, 1990, table 6.1, page 113) but there are no fish or molluscs. Red deer and ibex, including young animals, appear to dominate the sample (Straus, 1996).

8.32: Animal resources: The 'Magdalenian'.

Given the apparent length of the Portuguese Solutrean, noted above, the Magdalenian here is probably better described as the epi-palaeolithic in order to avoid delusions that it was contemporaneous with the Magdalenian period of south-west France. Sites from this period in Portugal are generally quite poor in artefacts, making their precise association in space and time even more fraught with difficulty (Zilhao, 1988). For example, the site of Magoito, found beneath a consolidated dune and radiocarbon dated to 9580 ± 100 BP. is rich in shell fragments and also flint and quartzite debris (Zilhao, 1988), but this is about as good as it gets. Unfortunately, the discovery of open-air sites such as Vascas-Mina on the Rio Major, and Vale da Mata (Cambelas) do little to help us as the acidity of the soil makes preservation of bones and bone tools unlikely (Zilhao, 1985). More recent excavations, such as the upper layers at Caldeirao, will undoubtedly help. In environmental terms the period after the LGM had ended appears to have been quite warm and hospitable in Portugal. Cryoclastic erosion ends, sea temperatures rise and forestation occurs, and this is reflected in the fauna, which do not generally consist of cold-adapted species, even among the micromammals (Zilhao, 1995). The faunal remains in the 'Magdalenian' levels of Caldeirao are dominated by red deer and rabbits, with some wild boar and roe deer (Zilhao, 1995). There is a decrease in ibex and chamois, which possibly moved to the mountains in the north, but a further increase in rabbit remains (Straus, 1996). Other resources were being utilised in the epi-palaeolithic samples of Suao cave, which included fish remains, marine and estuarine molluscs in addition to the bones of *Cervus*, ibex, horse and boar (Straus, 1996), probably reflecting its position close to the sea.

8.33: Animal resources: The early Postglacial.

As became clear in the latter section, the climate of Portugal had already ameliorated before the Postglacial, *per se*, began. There appears to have been a continuation of this improvement and its associated environmental effects. For example, during the Preboreal (10200 BP. to 8700 BP.) in southern Spain and southern and central Portugal, mixed forest conditions were spreading (Straus, 1996). Species included pine, oak, ash, olive, pistachio and woodland taxa such as strawberry (Straus, 1996). Animal species which appear to have been exploited (or at least present) in this period along the Sado and Mira valleys, and the northern Alentejo coast, are varied: limpets, cockles, clams, scallops, oysters, top shells, mussels, crabs, fish, marine and land birds, red deer, roe deer, aurochs,, horse, boar, hedgehog, rabbit, hare, rodents and small carnivores (Straus, 1996). Relatively little appears to be known about actual subsistence in the period 13000-8000 BP. in Portugal, however (Straus, 1996). We may deduce from these lists that plentiful food was available in the area, if in small individual quantities, but knowledge of the resource *base* does not equal an understanding of the subsistence strategy. It seems possible that marine and estuarine resources took on a particular importance at this time, as hinted by the presence of Ponta da Vigia, an open-air, coastal/estuarine site, C14 dated to 8730 ± 110 BP. (Zilhao, 1988). Whatever else the people were doing at this time, their lifestyle appears to have been deemed adequately successful to resist, or ignore, change. The dating evidence supports a gradual transition from the Mesolithic to eventual 'Neolithisation' at least 1500 years after this had occurred in Spain and France - indeed the peak of the Mesolithic cultures in Portugal is quite late, at around 6500 BP. (Zilhao, 1988). The successful broad-based foraging strategies continued for several centuries in Allentejo and Ribatejo after Neolithic life-ways appear to have become readily available within the region (Straus, 1996).

8.34: Art.

Portugal is hardly famed for its Palaeolithic art, probably because the art that exists does not fit easily within the stereotypes. For example, there is only one known cave art site in Portugal, Escoural, which appears to have been decorated during Solutrean times (Straus, 1996). The discovery and recognition of the Coa valley engravings prove that there is plenty of Palaeolithic art in Portugal, but even these are quite different. Though similar to contemporary art in content and style, the extent of these engravings along the valley - 15 kilometres - and their position in the open air, is revolutionary to the current paradigms about Palaeolithic art (Zilhao, 1995). We may have to think more seriously about hunter-gatherer ritual landscapes, and even monumentalism. Mobiliary art, including a pebble with an unclear engraving of an 'anthropomorphic' figure, has been discovered in Solutrean levels at the Gruta do

Caldeirão (Zilhao, 1990). There appears to be an abrupt end to parietal and even mobile art in the 'Magdalenian' style as soon as the gregarious herbivores diminish and are replaced by smaller, more solitary forest-dwelling animals (Straus, 1996). It is difficult to know for certain whether this is a true disappearance, in that the ideology behind the art changes as well as the media for producing it, or whether the nature of our record falsely highlights transitions.

8.35: Lithics.

We may expect the Portuguese tools to follow the pattern observed in the rest of the region. In short, the first evidence for spear throwers emerges in the Solutrean; microliths, and hence probable bow and arrow technology, are first recorded in the Magdalenian, shortly followed by fishing technology in the Upper Magdalenian, contemporary with the decrease in big game hunting (Jochim, 1987). The Portuguese tool/lithic assemblages observe this pattern to a certain extent. However, it has been suggested for quite some time that the industries of Estremadura were influenced more by those of the Levante than those of northern Portugal (Roche, 1975, p80), so it is difficult to generalise over the whole area. There is also a problem of bias within the tool assemblages, in that the Solutrean may appear the 'richest' period, but one has to take into account the easily identifiable appearance of Solutrean artefacts, especially within scanty assemblages (Zilhao, 1985). There also appears to be a distinct disparity between contemporary assemblages according to their location. The Solutrean open-air sites are more likely to contain lithic products and by-products at all stages than the cave sites, suggesting - intriguingly - that the open-air sites were the long-term residences, and that caves were occasional resting places (Zilhao, 1990). Caldeirão and Salemas fit this pattern. It was indicated earlier that Portugal seems to have had a rich environment, and this corresponds with the local availability of raw materials. The people of the Muge valley appear to have procured flint in Estremadura (Roche, 1975).

8.36: What do we actually know about these people?

We have, therefore, a reasonable amount of evidence concerning the material aspects of life for the peoples of late Pleistocene and early Holocene. There appears, however, to be very little direct evidence about the people themselves. As mentioned above, the lithic evidence gives us a clue towards reconstructing settlement patterns, at least in the Solutrean. On the temporal border between the Pleistocene and Holocene, there is tenuous evidence for sedentism of a sort. It has been suggested that the sites of the Muge and Sado regions may have been semi-sedentary, as the Sado has large cemeteries but, since there are no dug-out structures, sedentism cannot be directly inferred (Straus, 1996). As to the people themselves, there is - or was - some debate as to the origins of the southern Portuguese Mesolithic peoples. Some believed that the Muge peoples were an incoming group from north Africa via the Straits of Gibraltar rather than an indigenous population, but this is not convincingly supported by any available evidence (Roche, 1975).

8.4: Spain.

There is, unsurprisingly, rather more evidence on the nature of the late Palaeolithic and early Mesolithic of Spain, as befits its size and the history of research, discussed above. Even within the one present-day country, however, there is a distinction between Cantabria, which gets a great deal of attention, and the rest of Spain. This situation will become clear as we progress through the same categories of evidence as employed above.

8.41: Animal resources : The Solutrean.

Radiocarbon dating on levels with Solutrean points tends to indicate that 'the Solutrean' in Cantabria occurred from c.21000 to 16000 BP. (Straus, 1992). Though there were glaciers upon the Cantabrian Cordillera and the Picos de Europa, and much more snowfall than at present, the period was not unremittingly cold even in the north of the country - indeed, the Solutrean industry appeared during a humid stage (Straus, 1992). Cold, dry conditions are suggested in the faunal material however, with bison, horse and red deer present, and even a small percentage of reindeer (Straus, 1992). There is some variation from this fauna at the other extreme of the country; at Les Mallaetes, close to the Mediterranean coast of Spain, the Solutrean fauna includes rabbit, ovi-caprids, red deer, horse, aurochs and wild boar in that order of abundance (Davidson, 1976). Nevertheless, cold, steppe-like conditions are ventured for the south-eastern region of Spain as well, on the strength that many of the species that inhabit the area even today are cold-tolerant (Davidson, 1976). I, for one, remain unconvinced. In any case, big game appear to have been the (archaeologically visible) staple for Solutrean Spain. MNI data from sites such as Altamira and La Pasiega show that, even where red deer are numerically dominant, bovines and equids still surpass them in terms of usable meat weight from the individuals available (Clark, 1987). Rabbits are a similar case. Though they are abundant at Les Mallaetes, there is potential bias in that their bones tend to preserve well. Also rabbits are small and lean, and their population density may have been lower in the past (Davidson, 1975). This could make them unattractive as a staple (though c.f. the evidence in chapter 9), but says nothing about their importance to the diet in terms of occasional, but desired, consumption. After all, it is conjectured that the hunting of elusive, difficult creatures such as ibex, chamois and boar, and the extensive use of aquatic resources shows that, by Solutrean times, humans had diversified their subsistence and improved procurement techniques - or at least were putting in more effort (Straus, 1992). Whether this was a deliberate decision, or spurred on by desperation, it was a sensible thing to do. Limpets seem to have been gathered in Cantabrian Spain since Solutrean times, eventually leading to a reduction in size during later periods (Straus, 1996), but they did not actually die out. As to plant resources, unfortunately very little appears to be known.

8.42: Animal resources: The Magdalenian.

The Magdalenian period appears to be less problematic in Spain, especially in the Cantabrian region where most research is based. Environmentally speaking it is not a uniform period. Sedimentological and palynological analysis at La Riera suggests that the Early Magdalenian (17-16000 BP.) was cold and generally dry, whilst an abundance of pine pollen and fern spores suggests cold but humid conditions in the Upper Magdalenian (Straus, 1986). The faunal remains of this period are diverse, and differ, to a certain extent, from site to site. At the end of the Palaeolithic at Parpallo there appear to be five principal species: mountain goat, red deer, horse, rabbit and ox, in that order of abundance (Davidson, 1989). These relative abundances do not necessarily reflect the perceived importance of these species at the site, as red deer appear in the art more than mountain goats (Davidson, 1989). Caprids are also numerous at Ermittia, outnumbering *Cervus* by 84.7% to 7.2% in the Magdalenian, the remainder is composed of other species (de Quiros, 1980, table on page 36), probably reflecting the site's hillside location. Specialisation appears to be a definite feature of the Magdalenian period in Spain. At Cueva Morin, for instance, red deer become the principal meat source of a faunal assemblage that includes more and more woodland species (de Quiros, 1980), though it must be remembered that red deer can live in other environments. Though the period in Cantabrian Spain is marked by an overall diversification of subsistence resources such as molluscs, fish, and some birds, there are anomalies that could hint towards subsistence stress. For example there is an increase in the killing of young ibex and red deer, and their mothers (Straus, 1996). There could be a cultural reason for this, however, and there is always the possibility that resources were so plentiful that the people could afford to be wasteful. There is the intriguing lack of caprid cranial elements at the Cueva del Juyo (Cantabria), suggesting that the hunters did not go to the effort of bringing back the heads of animals killed far from the site (Klein and Cruz-Uribe, 1985) to support this suggestion. The fact that reindeer had never been a staple of Cantabrian Spain also led to a marked continuity of mammal resources even as the climate improved (Straus, 1996). Non-mammal elements of the resource base do achieve a certain prominence by the Magdalenian in other regions of Spain. Some molluscs, for example *Pecten* and *Cardium*, were plentiful enough at Parpallo and Les Mallaetes to have been used as foodstuffs, while less numerous species may have had other cultural uses (Davidson, 1989). Molluscs were certainly abundant at the Cueva de Nerja where - in terms of NISP - molluscs actually outnumber mammals (Morales, *et al*, 1998). Obviously one has to take their small size into account. Nerja, in Malaga, is interesting in that there is little evidence for fishing or collection of sea molluscs prior to the Magdalenian period at this cave site, then a veritable explosion. Fish remains include pollack, haddock, sturgeon, and other species that are present today off the coast of Malaga (Morales, *et al*, 1998). Monk seals, and the remains of 59 different bird species - including marine birds with signs of butchery - were also recovered from the site (Morales, *et al*, 1998). I have not discovered any allusion to use of plant remains in Magdalenian Spain in any of the literature so far. If, however, there were similarities with Portugal, it would appear that - in terms of diet - late Pleistocene Spain was a reasonably comfortable place to live.

8.43: Animal resources: The early Postglacial.

The Mesolithic is known by other names in this part of the world. The Asturian of northern Spain, for example, lasts from around 8700 BP. until 7000 BP. and is the period which precedes domesticates (Clark, 1983). The general amelioration of the climate and environment discussed above continued into the Postglacial period. By the early Postglacial the Arboreal pollen count, for example, had risen to 50%, with hazel the dominant species (Straus, 1986). The coastal waters, even off the coast of northern Spain, warmed, and weather conditions became as good as they are today (Straus, 1986). The sea rose with the end of the last glacial, and many of the final Palaeolithic sites off the Levantine coast have probably been lost due to the broad continental shelf in this area (Straus, 1996). This is a misfortune, as the increase in the exploitation of marine resources discussed above was probably even more extensive than the archaeological record we are left with would allow us to believe. There are signs that the diversification begun in the Magdalenian becomes entrenched in the Postglacial, e.g. by the Azilian at the Cueva Morin it becomes clear that the inhabitants are using all the available environments (de Quiros, 1980). La Riera can claim to have one of the best shell middens of this period, including the remains of *Patella vulgata*, and *Monodonta lineata*, plus sea urchins, crabs, other molluscs, probable mammal bones (these were discussed elsewhere in the original publication) as well as cultural artefacts (Straus and Clark, 1986). Whilst bison disappeared in Cantabrian Spain shortly after the last of the reindeer, horse continued to be hunted into Postglacial times (Straus, 1996). There is an increase in the hunting of other mammals, however, such as roe deer and boar, due to the increase in woodland and the (inferred) invention of the bow and arrow, which made hunting easier and safer (Straus, 1996). Rabbit and hare continue to be frequent in Levantine Spain (Straus, 1996). There is some evidence for the plant component of the diet in this period, though it is mostly inferred from what the climax vegetation would be like later in the Holocene - under essentially similar conditions - if it had not been decimated. Of the trees present (oak, beech, chestnut, birch, elm, alder, lime, willow (Straus and Clark, 1986), and the aforementioned hazel) all could have provided useful materials, and some foodstuffs. Many of these nuts provide excellent nutrition - and Cantabria would have been awash with them in the Middle Holocene, if not earlier - but can be gathered and eaten leaving few archaeological traces (Clark, 1987).

8.44: Art.

A great variety of art has been discovered from late Pleistocene and early Holocene Spain. There are, of course, the amazing cave paintings of realistic animals, such as the bulls of Altamira (reviewed in Straus, 1992, among others). An abstract form of cave art has been discovered at La Riera: reddish-brown dots, probably applied with a thumb, have been used to outline and partially infill a concave feature on the north wall of the cave's interior (Straus and Clark, 1986). Indirect evidence of painting, in the form of shells with unmistakable traces of paint in them, have been found at Parpallo and Les Mallaetes (Davidson, 1989). There is a small site, El Buxu, described as a 'cave art sanctuary', in the Solutrean layer of which - more extraordinary still - was found a perforated cave bear canine carved into the likeness of a bird (Menendez, 1984, cited in Straus, 1992). As well as the Portuguese Coa Valley engravings, open-air Palaeolithic art can be found at a few Spanish sites (see Bahn, 1995). 6000 pieces of portable art were discovered at Parpallo, a unique wealth of finds for Mediterranean Spain, leading to some interesting observations. The vast majority of the artefacts were plaquettes of carved stone, but there is one example of an engraved bone from the site, depicting a horse, and possibly also a red deer, among stripes (Davidson, 1989). The mystique of this piece does not stem from the engraving itself, but rather the question - why was bone used so rarely? If there was some sort of cultural taboo against using bone for art works, then it is unlikely we would be left with this exception. On the other hand, since faunal remains have generally preserved well at the site, it seems likely that we would have other examples of engraved bone, even if they were broken pieces, unless this plaquette was truly exceptional. There are other artistic anomalies at Parpallo. For example, rabbits are common in the bone assemblage but non-existent in the artistic representations, leading some to believe that rabbits were considered unworthy subjects, though - as Davidson points out - a great deal of effort may have been put into hunting them (Davidson, 1989). This would not necessarily be the case, however, if the foragers of Parpallo were using some form of snare. Fierceness and hunting prowess are hardly good indices of artistic incentive in any case. There is only one plaquette at Parpallo depicting a boar, found at the 13000-13500 BP. level that also contained the site's single boar bone, and individuals of the species *Sus scrofa* are certainly dangerous prey (Davidson, 1989, citing Hainard, 1948).

8.45: Lithics.

Some interesting changes occur to the Spanish tool kit of the final Pleistocene and early Holocene. During the Solutrean of Cantabria, for example, an intriguing and very functional explanation is inferred for two different types of stone tool. Straus suggests that the heavy, concave-base points may have been hafted onto thrusting spears, whilst the lighter shouldered points could have been projectile points for use with a spear-thrower or even a bow and arrow (Straus, 1992). The nature of the raw materials used (strong and shock-proof versus light and sharp) supports this theory (Straus, 1992). If true, this seems to suggest a very planned, organised hunting strategy, with determined hunters using all their wits to capture the elusive prey. A certain amount of wiliness is also evidenced in the discovery of baited weirs (for trapping sea birds) found at Palaeolithic sites, including Nerja (Morales, *et al*, 1998).

8.46: What do we actually know about these people?

As before, it is necessary to pose this question. We can speculate that they were well-fed, crafty and produced art in a variety of media, and the diversification and intensification of food procurement itself may suggest a rising population (Straus and Clark, 1986), but there is little direct evidence about their lives and living conditions. Evidence for human remains is very scant in Palaeolithic Iberia generally. Even in the Solutrean and Magdalenian periods, which have many sites attributed to them, there are no complete skeletons (Straus, 1992). There are the 'pseudomorphs' at Cueva Morin: one of which is supposedly the sediment mould of a man with his head and legs cut off for ease of burial (Straus, 1992), leading one to envisage a series of nondescript lumps, and even these highly dubious specimens pre-date the period discussed here. Odd bones and loose, often deciduous, teeth from this period do turn up in south-west Europe (Straus, 1992). Some teeth exhibiting enamel hypoplasia were discovered at Parpallo, believed to be derived from the woman's cranium also found at the site (Davidson, 1989). Garralda (1975) argues - convincingly - that the sample size is very small, and probably features short-lived, sickly individuals who are unrepresentative of the general population. Anomalies in settlement patterns provoke intriguing explanations. Bahn (1983) suggests that hearths may have appeared outside caves, and cave occupations become short and sporadic, due to an excess of humidity within caves during the Mesolithic. This is similar to the argument that early hut-building was instigated by the constant dripping within caves (de Quiros, 1980). The lithic evidence for longer-term open-air settlements in Portugal (discussed above) gives credence to the notion that cave-dwelling was becoming increasingly unpopular. Seasonality studies for the period can be overly simplistic. For example there is antler at Parpallo, shed and unshed, indicating occupation before and during spring (Davidson, 1976). In association with ibex teeth and the warmth aspects of both caves, Davidson postulates winter occupation of Parpallo and summer occupation of Les Mallaetes (Davidson, 1976). There is no reason to suspect a direct swap, however, since the two caves are part of a wider cave system.

8.5: The contrast with south-west France.

Though southern France can, to a degree, be seen as the bordering country with the region under study, it must be remembered that during the LGM south-west France was connected to Cantabria - and the Mediterranean generally - only via a narrow corridor (Jochim, 1987). This is suggested in the art of Franco-Cantabria, which is locally distinct during the Solutrean, and perhaps reflects territoriality that breaks down towards the middle of the Magdalenian (Jochim, 1987). There are, unsurprisingly, a number of similarities and differences between the final Pleistocene and early Holocene of the two areas. Some diversification of resources occurs at this time in France, as in Iberia. There is an inferred rise in fishing in the Pyreneen Solutrean, though this is based upon artefacts rather than the discovery of remains (Bahn, 1983). Lagomorphs are known to have been used in the Early Upper Palaeolithic, but only really achieve a numerical importance comparable to Iberia in the final Magdalenian of La Vache (Bahn, 1983). Even the recognition of this use of lagomorphs may rest upon the fact that Bahn's work has concentrated upon the Pyrenees - the proliferation of Magdalenian 'reindeer hunters' may result from the trend of directing research primarily towards the valley bottoms in south-west France (Hayden *et al*, 1987). There is an interesting suggestion that people were hunting for raw materials as well as for food at some of the Pyreneen sites. The occurrence of abundant lagoped bones (willow grouse and rock ptarmigan) at sites in the mountains which also yield many ibex remains may suggest that the bird's feathers were being used as arrow flights (Bahn, 1983). Reliance on one or two herbivore species rather than diversification of resources characterises some French sites in the Magdalenian, however - an actual reversal of earlier trends (Bahn, 1983). The presence of young and neonatal horses at the site of Isturitz may suggest either wasteful, irresponsible hunting (as conjectured above for the similar Iberian examples) or, as Bahn would prefer, some form of management (Bahn, 1983). I remain sceptical. After all, the rarity of irresponsible hunting in ethnographic examples today is not a plausible argument to refute its possible existence in the distant past. One of the reasons why hunter-gatherers still exist in some parts of the world today is that their lifestyle has, over generations, been made to work. The continued use of reindeer as a resource is something which definitely appears to separate the life-ways of south-west France and Iberia. Despite the warmer conditions of the Allerod, a herd of reindeer appear to have survived in the Pyrenees - the record of the Paston Cliff sites suggests that people managed to continue subsisting on reindeer meat by traditional means of ambushing them at bottle neck points (Straus, 1996). This was not necessarily to their advantage. Unlike Iberia, which suffered no extinctions of major food sources (Straus, 1996), the communities of southern France appear to have doggedly continued to hunt large game under stress rather than whole-heartedly embracing a broad foraging routine. To be fair, the conditions in south-west France during the last glaciation had been harsher than in Iberia, so reindeer were more common (Klein and Cruz-Uribe, 1985) making the changeover to other resources such as red deer more of an ordeal. The proliferation of fishing technology, such as harpoons and hooks, at the very end of the Magdalenian in France, also has interesting connotations - the harpoon is described as a spear adapted for big game fishing (Hayden *et al*, 1987). In other words, it is a direct descendent of the large mammal hunting tradition. Once the practice of fishing becomes established, however, it soon develops into the successful varied foraging of the Mesolithic (Hayden *et al*, 1987).

8.6: Conclusion.

This chapter has, I hope, provided an overview of developments in south-west Europe at the end of the Palaeolithic and the beginning of the Mesolithic, as well as outlining the problems involved and the unfortunate gaps in our knowledge. There is also, it appears, adequate proof that the region cannot be considered to develop uniformly, and that the more neglected areas often hold evidence of immense value.

9. Gruta do Caldeirão: Results and Implications.

9.1 Introduction.

This chapter does not consider the entire faunal assemblage of Caldeirão, since this task has been spread across several specialists. Rowley-Conwy (1992) investigated the Neolithic large mammal remains, and the rodents were published in Povoas *et* al. (1992). The small collection of large mammal and bird remains from the site has been studied by Simon Davis and colleagues, and is about to be published (Davis *et al.*, forthcoming). This work concentrates upon the large number of lagormorph bones found at the site. Rabbits are native to Iberia, and their remains are abundant at several Palaeolithic sites in the region, for example Parpallo and Mallaetes (Davidson, 1976), Cueva de Nerja (Morales *et al*, 1998) and Tosal de la Roca (Ripoll, 1993) in Spain. In the Portuguese Estremadura the cave of Picareiro has an Upper Palaeolithic rabbit assemblage, which was recently analysed and published (Hockett and Ferreira-Bicho, 2000). This site has several similarities with the Caldeirão evidence, and will be a useful comparative sample. Despite this wealth of remains in Iberia, rabbits rarely appear in the abundant rock art of the region, and their 'importance' both as a consumable and more widely in Palaeolithic culture is unclear. The aims of the research were to-:

1. Establish what proportion of the rabbit remains were the result of human predation and consumption.
2. Assess how the rabbit component of the diet compares with meat from other sources.
3. Measure selected bones and investigate the possibility of variation in rabbit size over time and climatic oscillation.
4. Contribute to the investigation of use of space within the cave.
5. Look at cooking and butchery methods.
6. Think about how the rabbits were hunted via evidence such as age profiling, ethnography and available technologies.

The overall aim, in keeping with the project as a whole, was to test how applicable the Broad Spectrum Revolution argument is to this site and locality. Rabbits are notoriously prolific breeders, r-selecting, and definitely 'small package' food sources. Is there evidence for an increase in their importance at this site towards the end of the Pleistocene?

9.2: The Site.

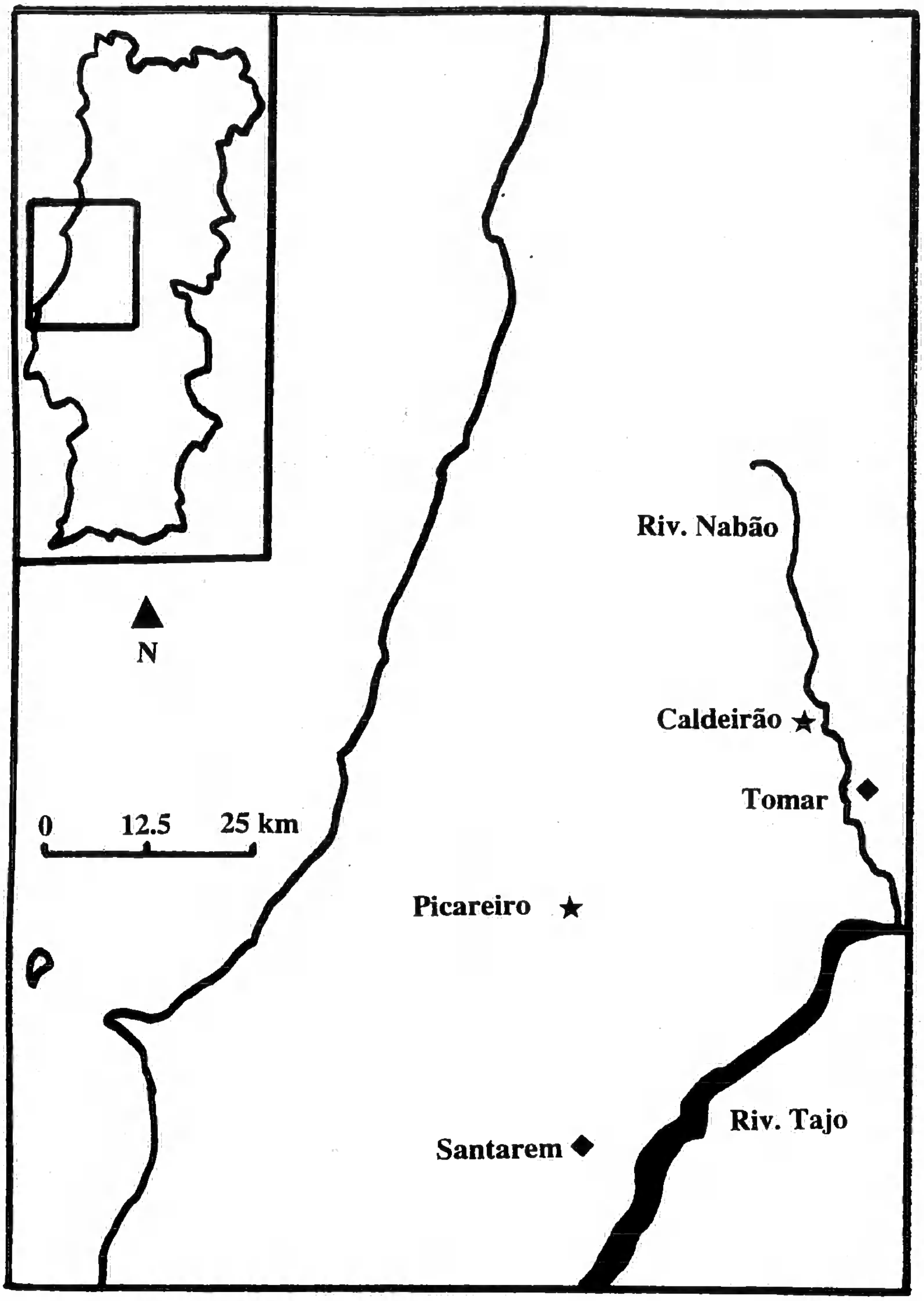
Caldeirão is situated 140 kilometres north-east of Lisbon (Portugal), near the village of Pedreira and town of Tomar, district of Santarem (see Fig. 9a). The altitude of the site is 120 metres asl. The cave is on the right bank of the river Nabão, which feeds into the Tajo, and within a surrounding geology consisting of calcareous dolomites set down in the Lower Jurassic period. Vegetation in the area today is 'Atlantic-Mediterranean', including several species of oak trees, while fig and olive are cultivated on the overlying plateau.

The cave has a south facing entrance, with a narrow corridor 20 metres long that bends sharply round before opening out to form a chamber with an area of about 14 metres squared. Excavations began in 1979 and continued until 1988 under the direction of Joao Zilhao (Institute of Archaeology, Lisbon). These investigations have revealed deposits dating from the Middle Palaeolithic until recent times. In this report the layers have been grouped in the same way as those in Davis *et al.* (forthcoming), for ease of comparability with the larger mammal and bird data. Here are the cultural units used:

LAYERS	PERIOD	DATE BP
Eb	Magdalenian	16-10,000
Fa, Fb, Fc, H, I	Solutrean	18,000
Ja, Jb	Early Upper Palaeolithic	30,000
K, L	Mousterian	pre-30,000

As was mentioned in chapter 4, lithics and mobiliary art have been found at Caldeirão, including the pebble plaquette from Magdalenian layer Eb, engraved with an anthropomorphic figure (Zilhão, 1990). A schematic of the stratigraphy can be

Fig 9a: The Location of Caldeirão Cave, Portugal.



seen in Fig. 9b. Dry sieving of all earth through a sieve was routinely carried out, and thus even the smallest rabbit bones are represented.

9.3. Methods.

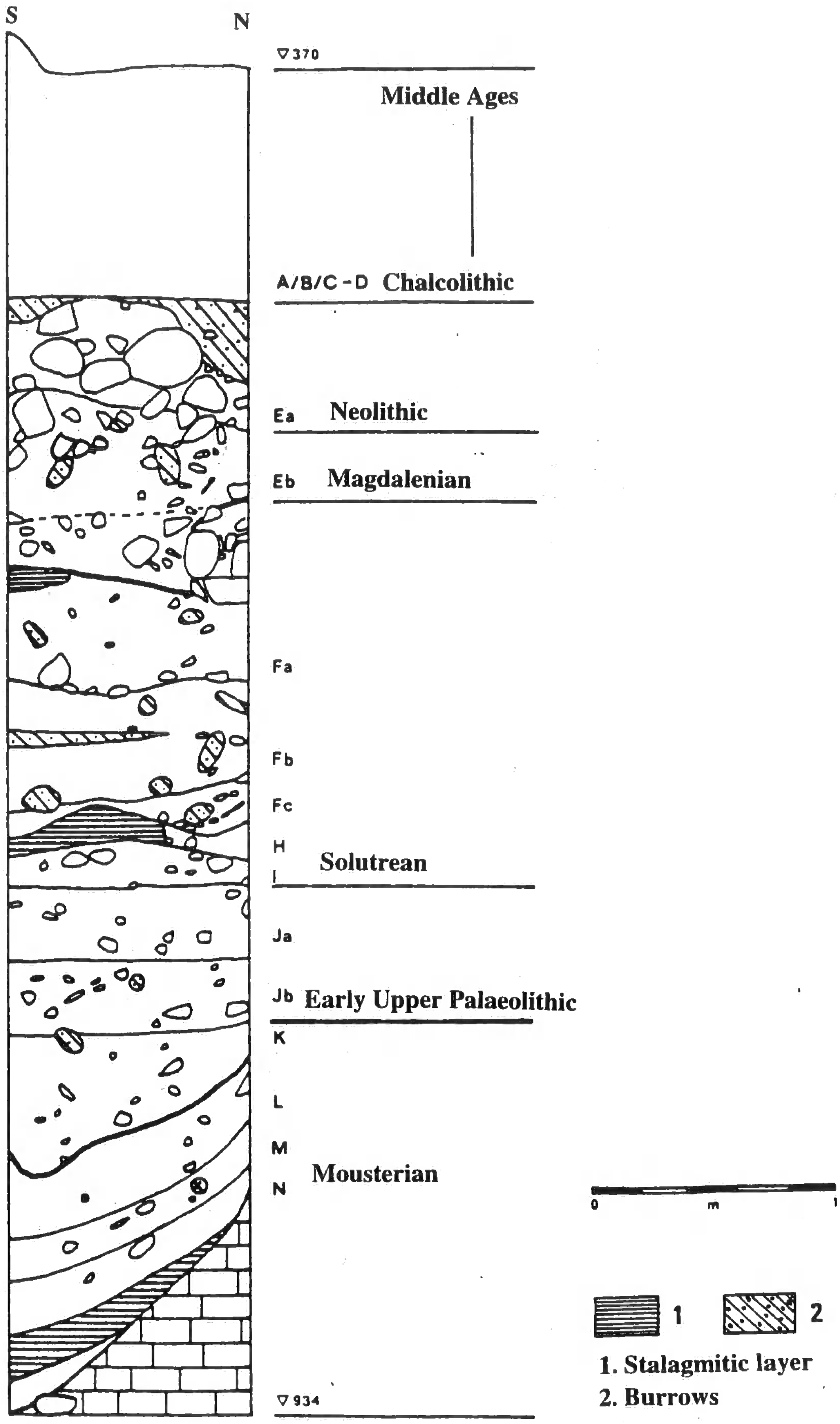
The methodology was based on that devised for the entire project (see Chapter 1) with slight modifications. The assemblage had been pre-sorted on site, so only the lagomorph remains and a few accidental inclusions reached Durham. This made species identification rapid and, as the assemblage filled just four boxes, it was decided to record all the identifiable fragments of the following elements:

Scapula
Humerus
Radius
Ulna
Metacarpal
Pelvis
Femur
Tibia
Metatarsal
Phalanges 1,2,3
Calcaneus
Astragalus
Maxilla
Mandible
Max. Teeth
Mand. Teeth

Scapulae and pelves were only recorded if the fragments included at least some of the articular surface. Rib ends, vertebrae and unidentifiable fragments were counted. Bags where the labelling was partial or unclear were left out, but this nevertheless left a large sample to work with.

Two measurements were taken – Greatest Length of Calcaneus and Width of Distal Tibia (GL, pp90-91, and Bd, pp86-87, in von den Driesch, 1976). These elements were frequently found in the assemblage, and usually in good condition. As with other measurements, only specimens from adults, without burning, gnawing or other damage to the necessary points, were measured in order to retain consistency.

Fig 9b: Stratigraphy of Caldeirão Cave.



As there was a possibility that the rabbits were the prey of birds such as owls, and other carnivores, taphonomic features such as polishing, pitting and corrosion via stomach acids were looked for, and the SPSS recording code was adjusted accordingly. Evidence of burning, butchery and pathologies were also searched for, with a hand lens if necessary, and recorded when found.

9.4: Results.

Though only filling four medium-sized boxes, the assemblage nevertheless provided 17,016 identifiable lagomorph specimens, far more than the larger mammal sample. In addition, there were approximately 39,185 indeterminate fragments, and thus an overall identification rate of 30.3%. This is quite high for a Palaeolithic cave assemblage, probably because rabbit bones preserve well and are relatively easy to identify – especially with so much practice. The identification rate did vary a little from period to period:

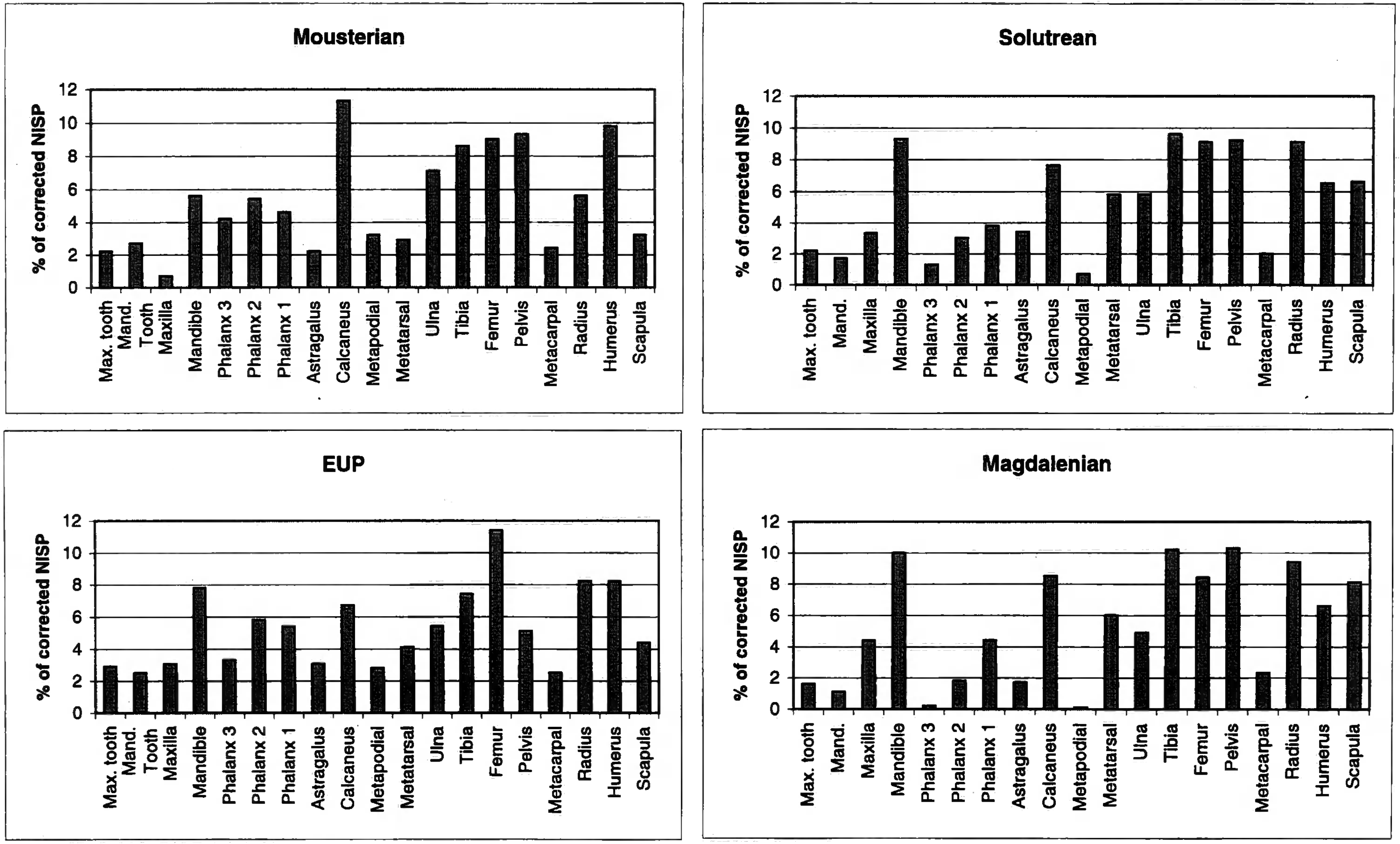
Period	NISP	Total indet. Frags	Total frags.	ID Rate (%)
Mousterian	806	1393	2199	36.6
EUP	1551	4652	6203	25.0
Solutrean	9411	25111	34522	37.5
Magdalenian	5248	8029	13277	39.5
Total	17016	39185	56201	30.3

The Solutrean and Magdalenian contexts provided more identifiable specimens than the Mousterian and Early Upper Palaeolithic, and thus evidence for more individual rabbits, as can be seen from the MNI counts below:

Period	*NISP*	*MNI*	*Based on which element?*
Mousterian	806	30	Left calcaneus
EUP	1551	38	Left calcaneus
Solutrean	9411	265	Left tibia
Magdalenian	5248	180	Left tibia

The breakdown of skeletal elements found can be seen in Fig. 9c. None of the body parts were found to be missing, though third phalanges were considerably less numerous in the Magdalenian period than in other times, despite the ubiquitous sieving. We shall return to this anomaly later. This anomaly did not occur at Picareiro

Fig 9c: Breakdown of Skeletal Elements.



'Corrected' counts are used to smooth out the numbers of elements occurring in the body, in order to make long bones comparable to numerous elements such as phalanges and teeth.

(Hockett, pers. comm.). In general, it appears that entire rabbit carcases were brought to the site, as at Picaeiro (Hockett and Ferreira-Bicho, 2000). If humans or other mammal predators were the main 'collectors' of the rabbits then the discovery of all body parts is understandable, as rabbits are light enough to carry back to the site. Also, the skins may have been just as important to human hunters as the rabbit meat.

Many of the rabbit bones were fragmented, but the patterns of fragmentation remained surprisingly similar throughout the stratigraphy:

% in italics	Mousterian	EUP	Solutrean	Magdalenian
Complete	231 *(28.7)*	460 *(29.7)*	2582 *(27.4)*	1585 *(30.2)*
Some bone missing	211 *(26.2)*	401 *(25.9)*	2625 *(27.9)*	1230 *(23.4)*
End + shaft	131 *(16.3)*	175 *(11.3)*	891 *(9.5)*	504 *(9.6)*
End splinter	42 *(5.2)*	89 *(5.7)*	548 *(5.8)*	351 *(6.7)*
Shaft splinter	15 *(1.9)*	38 *(2.5)*	186 *(2.0)*	226 *(4.3)*
Cylinder	12 *(1.5)*	51 *(3.3)*	414 *(4.4)*	315 *(6.0)*
End only	98 *(12.2)*	162 *(10.4)*	1277 *(13.6)*	685 *(13.1)*
Shaft+end splinter		4 *(0.3)*	24 *(0.3)*	6 *(0.1)*
New break	66 *(8.2)*	171 *(11.0)*	865 *(9.2)*	346 *(6.6)*

9.41: Evidence of animal predation on rabbits.

Rabbits have a number of predators besides humans. Young rabbits are particularly vulnerable to carnivores such as foxes and badgers, who will even dig them out from shallow burrows (Lockley, 1964). Adult rabbits are in less danger but mustelids can and do kill them, as do eagles, buzzards and harriers, though the adult rabbit carcase is rather heavy for birds of prey to lift. Hawks and smaller owls only prey on the very young (ibid.). The European Eagle Owl (*Bubo bubo*), however, is more than capable of killing an adult rabbit, and even larger prey such as juvenile roe deer (Andrews, 1990). In mainland Europe buzzards (*Buteo buteo*) prefer microtines as prey, and do not turn to rabbits extensively if there is a population crash in microtines[24] (ibid.). Pitting, crushing and acid etching on lagomorph bones are characteristic signs of carnivore consumption (Quirt-Booth and Cruz-Uribe, 1997). Hockett's (1996) work on golden eagle predation of leporids has shown that the bone remains are extensively corroded and thinned. Eagles also often decapitate their prey before bringing them to

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[24] In Britain, for some reason, the pattern is opposite, with rabbits the preferred prey.

the nest (ibid.) – a pattern which would presumably leave a tell-tale dearth of cranial elements in an eagle accumulated assemblage. Rowley-Conwy has conducted experiments feeding rabbit carcases to lynx, eagle owl and fox. Photographs of the resulting bone debris can be seen in figs 9d, e and f.

In Pleistocene Europe there were also larger carnivores for the rabbits to avoid. At Caldeirão itself Davis *et al* (forthcoming) have found good evidence for hyaena dens in the Mousterian and Early Upper Palaeolithic contexts, both from hyaena bones and probable hyaena coprolites. They have also found the remains of hibernating cave bears, though this species is believed to have been largely vegetarian (Kurten, 1976). Other predator species found in the Caldeirão fauna are badger, lion, leopard, lynx, wild cat, wolf, fox, eagle owl, griffon vulture and black vulture. In addition to these carnivore bones and the coprolites Davis *et al.* also found 14 semi-digested (acid corroded) bone specimens in the Mousterian and EUP levels.

Given this array of potential predators, the rabbit bones from Caldeirão exhibited surprisingly little evidence of animal consumption. In the sample as a whole, 16,797 specimens (98.7 %) had no visible evidence of gnawing or corrosive damage at all. Proportionately, the Mousterian period does have slightly more gnawing evidence than other levels, which corresponds with the conclusion that the cave may have been a hyaena den throughout much of this period, but the variation is not drastic:

Period	*Total Gnawed (n)*	*Percentage of period NISP*
Mousterian	31	3.85
EUP	25	1.61
Solutrean	137	1.46
Magdalenian	26	0.5

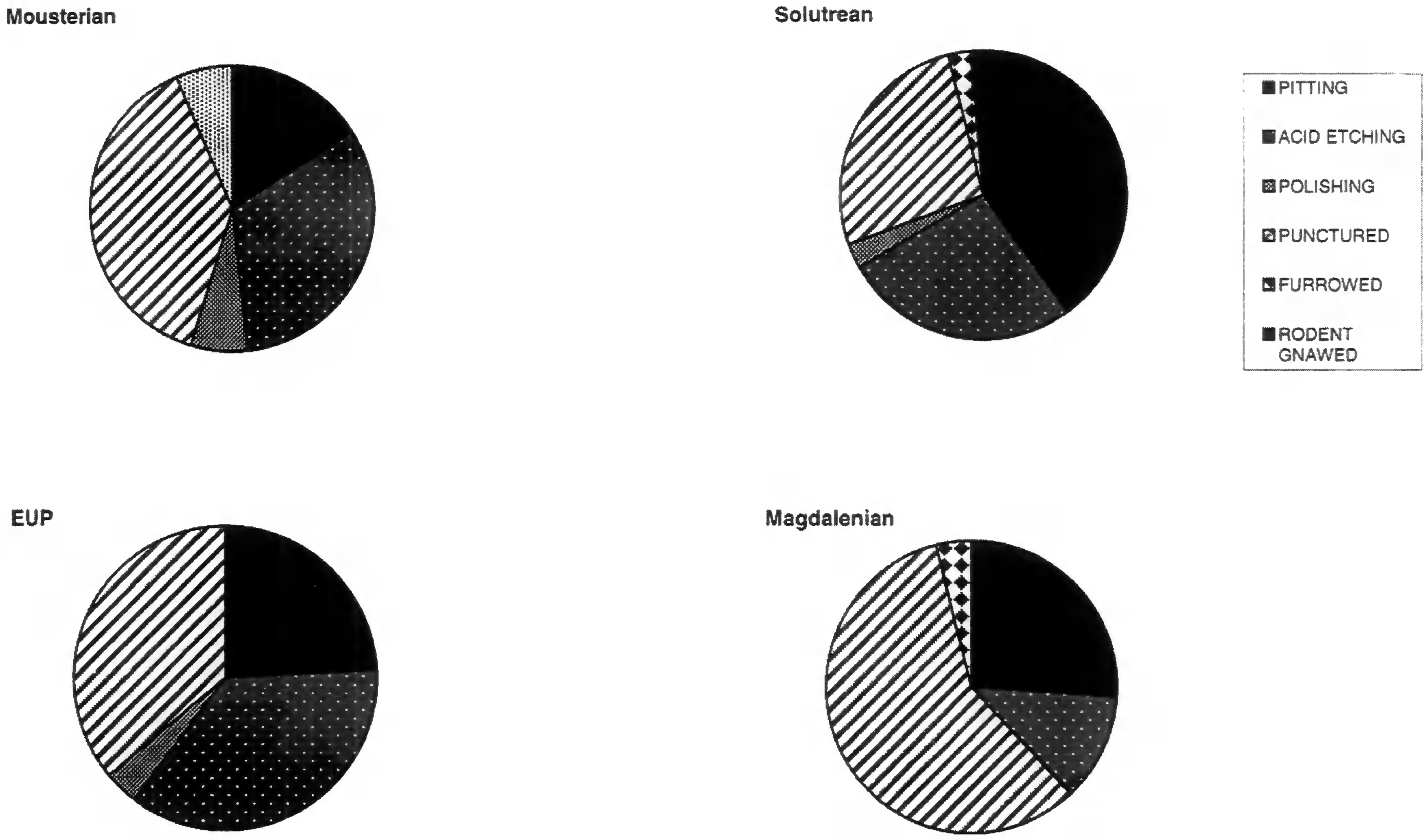
There are several possible reasons for this lack of gnawing evidence. First, most of the rabbit remains were found deep within the cave, beyond the bend in the corridor (see section 9.5 'Distribution of rabbit remains on site'), where birds of prey are unlikely to venture. Secondly, hyaenas have some of the most effective bone-destroying abilities in the natural world, and a rabbit carcase consumed by a hyena is unlikely to survive in the archaeological record. Also, Davis *et al.* believe that larger mammals

Fig 9d: Rabbit bones consumed and digested by a lynx.

Fig 9e: Rabbit bones consumed and digested by an eagle owl.

Fig 9f: Rabbit bones consumed and digested by a fox.

Fig 9g: Proportions of animal induced damage on Caldeirao rabbit bones over time.



A variety of animal induced damage was found, as can be seen above, but the majority of specimens displayed no evidence of gnawing or digestive corrosion.

formed the bulk of the Caldeirão hyaenas' diet, and that food may have been so abundant that some large mammal bones were left relatively untouched. If this is so it would make sense, therefore, if trivial prey such as rabbits were ignored by the hyaena group, except perhaps by the young and inexpert members.

A break down of the predator damage types for each period is given in Fig 9g.

9.42: Burning damage.

The evidence for burning on the Caldeirão animal bones was more consistent with the results from the larger fauna, though Davis *et al.* did not find any burn marks in the Mousterian and EUP levels, while burn marks on rabbit bones were found in small quantities throughout the stratigraphy. Only 5.6% of all specimens were burnt or partially burnt, but these specimens were often found associated together, especially in the Magdalenian sample (Fig. 9h). The counts and percentages for burning evidence can be found below:

Period	Total burnt fragments (n)	*Percentage of period NISP*
Mousterian	6	0.7
EUP	109	7.0
Solutrean	441	4.7
Magdalenian	325	6.2

As can be seen, the Mousterian period exhibits less evidence of burning that the other periods, but it is nonetheless present. Combined with the relatively high incidence of gnawing damage, and the small number of lithics at Caldeirão in the Mousterian period, I would tend to agree with Davis *et al.* that hominids were making occasional visits to the cave at this time, and it was also used by hyaenas and other animals.

Several different degrees of burning damage were recorded: black patches, black all over, white, other colour (e.g. grey, blue-grey, orange, brown) in patches (O.C.P), and other colour all over (O.C.A.O). All periods contained specimens covering the spectrum of these burning types apart from the small Mousterian sample:

Period	Black patches	Black all over	White	O.C.P	O.C.A.O
Mousterian	2 (0.2%)	0	0	2 (0.2%)	2 (0.2%)
EUP	68 (4.4%)	10 (0.6%)	1 (0.1%)	17 (1.1%)	13 (0.8%)
Solutrean	132 (1.4%)	142 (1.5%)	28 (0.3%)	64 (0.7%)	75 (0.8%)
Magdalenian	114 (4.4%)	81 (1.5%)	9 (0.2%)	56 (1.1%)	65 (1.2%)

The colour of scorching is, of course, indicative of the temperature of the flame or heat source (Shipman, 1988; David, 1990) with whitened bone representing higher temperatures than black. We may infer, therefore, that the majority of the burnt rabbit bones were exposed to fairly low, "campfire" temperatures.

The 'black patches' were often observed towards the ends of long bones (Fig. 9i), a pattern also observed at Araguina-Sennola on Corsica (Vigne and Marinval-Vigne, 1983, fig 1, p240). At Picareiro cave, in the Late Upper Palaeolithic hearth features of Strata F and G/I, the burned fragments suggest that the rabbits were roasted whole (Hockett and Ferreira Bicho, 2000). When directly compared with Caldeirão the results are similar (Fig. 9j). Thus, roasting is a likely cause of the burning on rabbit bones at this site also, rather than the incidental scorching of debris round a camp-fire. One potential problem is that the counts are 'uncorrected' – i.e, there are more phalanges, metapodials and teeth occurring in the body and therefore these counts are naturally higher than those of the long bones.

9.43: Cutmarks.

Very, very few of the identifiable rabbit bones from Caldeirão exhibited cutmarks – just three out of 17016 specimens. This does not rule out humans as major predators of rabbits. Everyone I have spoken to who has experience of skinning rabbits says that the skin peels off easily once the initial incisions are made. Also, whilst jointing and defleshing two rabbit carcases to look at their bones, I used a straight knife, a serrated knife and kitchen scissors, and was not particularly careful (nor an experienced butcher!) but there was still not a single resulting cutmark on any of the long bones. One can only imagine that Palaeolithic foragers, who had much practice of animal butchery and sharp flint tools, and who may have been cooking the rabbits whole, would leave few cutmarks for the archaeozoologist to find. The rabbits from Picareiro cave also lacked cutmarks (Hockett and Ferriera-Bicho, 2000).

Fig 9h: Burnt bones from the Magdalenian sample.

Fig 9i: Burnt patches on rabbit long bones from Caldairão.

Fig 9i: Breakdown of Late Upper Palaeolithic burnt elements.

	Solutrean	Magdalenian	*Picareiro cave*
Feet			
Phalanges	107	70	*67*
Calcaneus	21	16	*29*
Metapodial	74	55	*21*
Astragalus	11	8	*11*
Carpal/Tarsal	not rec.	not rec.	*9*
Limbs			
Prox. Humerus	1	0	*0*
Humerus mid-shaft	2	2	*0*
Distal humerus	20	32	*5*
Prox. Radius	24	19	*14*
Radius midshaft	9	9	*4*
Distal radius	4	1	*2*
Prox. Ulna	21	10	*4*
Ulna midshaft	6	4	*0*
Distal ulna	0	0	*0*
Prox. Femur	21	13	*2*
Femur midshaft	4	4	*2*
Distal femur	8	3	*0*
Prox. Tibia	3	1	*0*
Tibia midshaft	7	14	*7*
Distal tibia	17	12	*3*
Other			
Scapula (prox.)	17	17	*7*
Mid scapula	not rec.	not rec.	*2*
Scapula border	not rec.	not rec.	*1*
Innominate	not rec.	not rec.	*3*
Teeth	23	12	*9*
Skull frags	15	10	*3*
Pelvis	26	14	*0*
Total	441	326	*205*

not rec. = not recorded

The results for Picareiro Cave, where roasting is inferred (Hockett and Ferriero-Bicho, 2000), are included for comparison. The assemblages are very similar, though there is perhaps more evidence for roasting joints at Caldeirao.

Of the cutmarks found, two were recorded in the Solutrean period, both on calcanea. One calcaneus had been chopped, the other had finer cutmarks towards the proximal end of the bone. Possibly these cuts to the calcaneus were the result of attempts to remove the foot, but a blow with a sharp, heavy stone tool would have achieved that end more easily, as a cleaver would be used today. The only other cutmark is a possible chop cut to a pelvis in the Early Upper Palaeolithic period.

9.44: Other evidence for cooking and consumption.

There are ethnographic reports of people snapping or biting the ends off of rabbit long bones in order to suck out the marrow (Jones, 1983). Therefore assemblages rich in humeri, femora and tibiae cylinders, and epithyses, are interpreted as evidence for human use of rabbit marrow. Such patterns have already been found at Nerja and Tosal de la Roca in Spain (Ripoll, 1993) and Picareiro Cave (Hockett and Ferreira-Bicho, 2000). The results for Caldeirão can be found in Fig. 9k.

How important may this marrow have been to the diet? It is said that the six marrow-filled long bones of the rabbit skeleton yield 3.0g of marrow:

> "Thus, simply by extracting marrow from the long bones of the majority of the approximately 190 rabbits consumed in Picareiro Cave, Upper Palaeolithic and Epipalaeolithic hunters could have added nearly 5000 additional calories to their diet." (Hockett and Ferriera-Bicho, 2000).

There are two problems with this. First, 5000 calories is really not very much – it suggests that, alone, the rabbit marrow could have kept two or three people active for a day, or one person for a few days. Granted, the marrow probably would have been eaten within the context of a whole meal – the rest of the rabbit, perhaps – but it still does not constitute a massive contribution considering the hearth deposits may represent an occupation of several weeks, by a dozen people. Secondly, multiplying the number of calories per rabbit from marrow alone (5000 calories divided by 190 = 26.3 calories per rabbit) by the MNI, gives the *potential* calorie yield from marrow. It does not mean that all rabbit skeletons were processed for marrow. However, for the sake of comparability, here is the same exercise done for the Late Upper Palaeolithic deposits at Caldeirão:

Period	MNI	Potential marrow yield (cal.)	'Actual' marrow yield (cal.) *
Solutrean	265	6969.5	1222.95
Magdalenian	180	4734.0	1003.78

*calories per long bone (26.3 cals per rabbit divided by six marrow yielding long bones) multiplied by n. cylinders.

These results do not suggest a massive contribution of rabbit marrow to the diet either – indeed the situation is even more marked because the Caldeirão deposits may represent occupations interspersed through hundreds or thousands of years. Of course, if the Palaeolithic foragers of Caldeirão were only making occasional use of rabbit marrow it could mean that they were not usually desperate for the calories, and/or it was not a preferred foodstuff.

9.45: Pathology.

Four specimens were found with visible pathologies:

- Second phalange, Solutrean period. Bone projection from the side of the phalange, proximal end.
- Metacarpal, Solutrean period. Spongy lump of new bone growth on the side of the distal shaft.
- First phalange, Magdalenian period. Spongy lump of new bone growth at the side of the distal epythysis.
- Second phalange, Magdalenian period. Widened, with new bone growth at distal end.

Reactive bone growth can have many causes, such as external injury to the soft tissues spreading down onto the bone, injury to the bone itself, or disease (B. Schaffer, pers. comm.). Whatever the cause, a rabbit with a diseased foot would be at a major disadvantage when avoiding danger (Y. Lignereaux pers. comm.).

9.46: Ageing.

February to July appears to be the peak breeding season for rabbits, but Thompson and Worden (1956) found pregnant does in every month of the year, even in the sub-optimal climate of Britain, and it is believed that mating has a social role as well as a reproductive one in rabbit communities (ibid.). Under optimum rabbit conditions, for example the Mediterranean rim and New Zealand, dominant females may bear five litters in just one year (Lockley, 1964). Quirt-Booth and Cruz-Uribe (1997) have not

Fig 9k: Did the people eat rabbit marrow?

		Complete	Cylinder	End only	Conclusion - is marrow extraction likely?
Mousterian					
	Humerus	3	2	14	no
	Tibia	0	2	13	no
	Femur	1	4	14	no
EUP					
	Humerus	3	1	21	no
	Tibia	7	9	17	no
	Femur	4	15	12	yes?
Solutrean					
	Humerus	12	31	155	yes?
	Tibia	31	126	183	yes
	Femur	50	122	70	yes
Magdalenian					
	Humerus	19	38	94	yes?
	Tibia	14	112	112	yes
	Femur	28	79	43	yes

Apparently, in a rabbit assemblage where humans have extracted marrow, long bone cylinders will "vastly outnumber" complete to nearly complete limb bones, while a carnivore assemblage is opposite (Hockett and Ferreira-Bicho, 2000, p720). Therefore the conclusion is based on the number of cylinders being at least double the number of complete long bones, and there being associated broken off epiphyses.

found any unambiguous evidence of leporid bones being useful in seasonality studies. Even the presence of neonates in a rabbit assemblage is of little use in assessing seasonality. The age profile of an assemblage *can*, however, provide clues as to who killed the rabbits, and - possibly - how it was done.

Little is known about the ages at which the bones of *Oryctolagus cuniculus* fuse, but there is some information regarding the fusion ages of the proximal humerus, proximal tibia and distal tibia of the American cottontail rabbit:

Proximal humerus epithysis unfused = < 9 mths.
Proximal tibia epithysis unfused = < 9 mths.
Distal tibia epithysis unfused = < 7 mths.
(Hale, 1949).

These elements have, therefore, been used to give us a rough idea of the proportion of juveniles in the Caldeirão assemblage (Fig. 91). As can be seen, adults are in the majority throughout the assemblage, but with considerable numbers of young rabbits. Considering all three bone zones together gives us a mean average of circa 19.5% non-adults in the sample as a whole.

Only 170 bones, 1% of the total NISP, came from neonatal specimens, with the majority (55% of the total neonatal specimens found) concentrated in the Magdalenian layer:

	Mousterian	EUP	Solutrean	Magdalenian
Neonate specimens (n)	3	11	62	94
% of period NISP	0.4	0.7	0.7	1.8

Given that animals were probably using the cave more in the Mousterian period than in the Magdalenian this result is somewhat anomalous. There are several possible explanations:

1. There are more burrows in the Magdalenian layer, and some – though not all – of these neonatal specimens came from burrow samples, and therefore could represent individuals who died young in the nest. However, these samples also contained large numbers of adult bones in no better state of preservation than

Fig 9I: Juveniles and neonates in the Caldeirão rabbits.

Proximal Humerus

	Fused	Fusing	Unfused Shaft	Unfused Epithysis	Neonatal Shaft	Neonatal Epithysis	Young	Indeterminate	Total Prox. Humerus	% Non-adult
Mousterian	13	0	2	3	0	0	0	3	21	24
EUP	12	0	2	2	0	0	0	4	20	20
Solutrean	46	0	3	8	5	0	0	41	103	15.5
Magdalenian	6	0	5	4	22	0	1	40	78	41

Proximal Tibia

	Fused	Fusing	Unfused Shaft	Unfused Epithysis	Neonatal Shaft	Neonatal Epithysis	Young	Indeterminate	Total Prox. Tibia	% Non-adult
Mousterian	5	0	1	0	0	0	0	4	10	10
EUP	6	0	3	2	0	0	0	9	20	25
Solutrean	54	0	12	11	4	0	0	115	196	14
Magdalenian	35	0	10	7	3	0	0	96	151	13

Distal Tibia

	Fused	Fusing	Unfused Shaft	Unfused Epithysis	Neonatal Shaft	Neonatal Epithysis	Young	Indeterminate	Total Dist. Tibia	% Non-adult
Mousterian	20	0	3	0	0	0	0	5	28	11
EUP	22	0	8	5	0	0	0	7	42	31
Solutrean	201	0	37	23	3	0	0	139	403	16
Magdalenian	116	0	23	6	5	1	0	108	259	13.5

References to the timing of epiphysial fusion in European rabbits are scanty, however the proximal humerus and proximal tibia of American cotton tails fuse at 9 mths and the distal tibia at 7 mths (Hale, 1949).

non-burrow samples, and the neonatal bones in the burrows certainly do not represent whole skeletons (e.g in the burrow sample from E1, there are eight mandibles but only one scapula). The burrow samples are likely to be derived from the rabbit bone debris of the surrounding matrix.

2. It is known that neonatal bones are more fragile than those of adults. Therefore it is possible that more of the neonatal bones from deeper layers have disappeared. On the other hand, bone preservation was consistently good throughout the contexts.
3. The neonatal rabbits of the Magdalenian layer may have been the prey of carnivores, but this would contradict the macrofaunal and cultural evidence from the site, as well as the patterns already established in this report.
4. If humans were the key predator of rabbits in the Magdalenian, then perhaps they were using 'catastrophic' techniques, such as netting, or flushing out whole warrens with smoke or beating, and thus killing proportionately more infant rabbits. There are ethnographic accounts of mass rabbit killings using primitive technology, both in the Native cultures of the United States and by poachers in 19th Century Britain (Ingram, 1978, and Shaffer and Gardner, 1995; see also section 9.5), but this explanation requires more detailed knowledge of the Magdalenian technologies available.

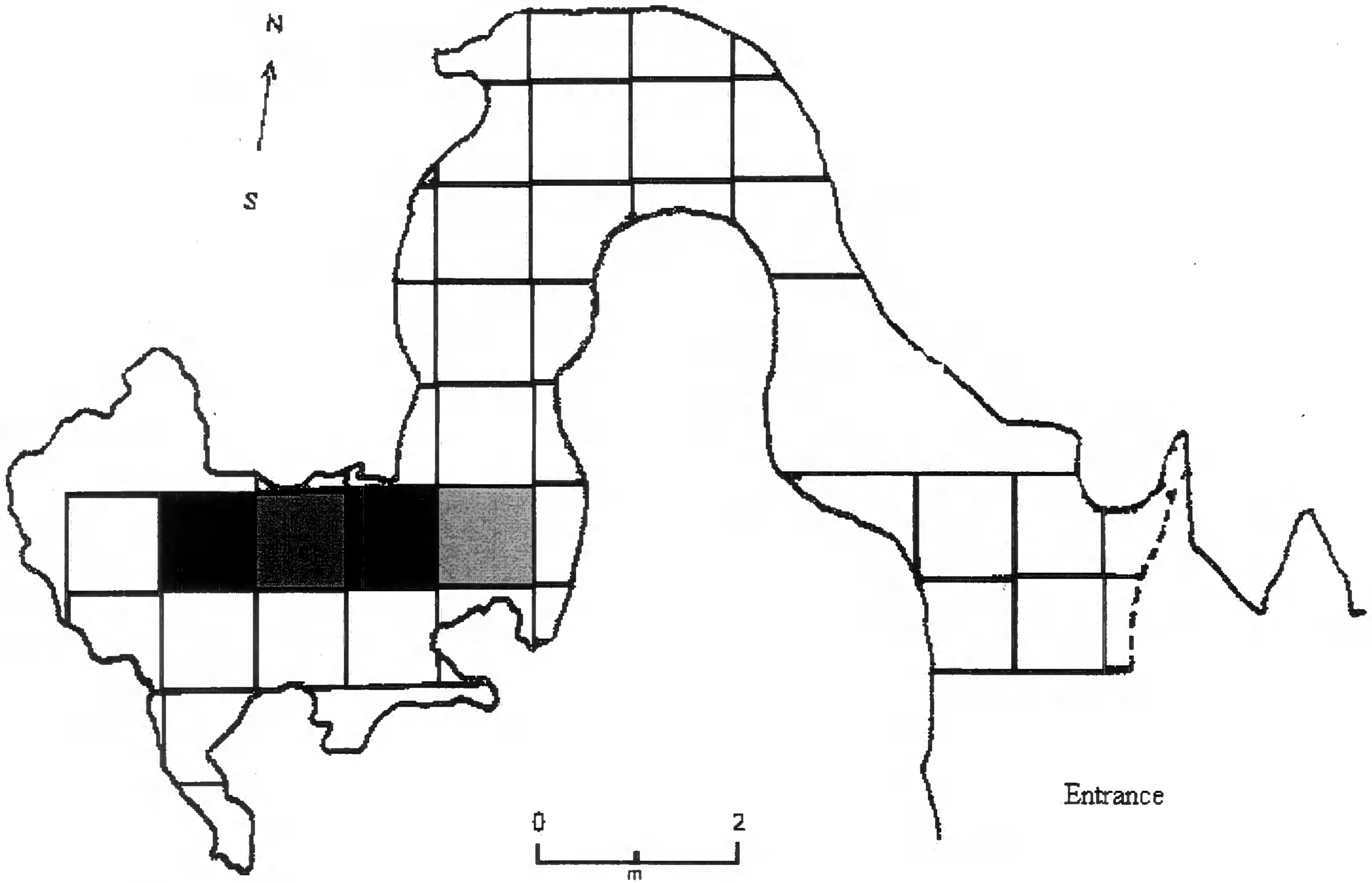
9.5: Distribution of rabbit remains on site.

As all of the identifiable rabbit bones were recorded onto an SPSS database, including their layer, cultural period and location in the trench grid, it was possible to assess the position of rabbit bone clusters over time. The results can be examined in Figs. 9m, n, o and p. Unfortunately no hearths or other anthropic features were discovered at Caldeirão, and the distribution of artefacts has yet to be mapped (João Zilhão, pers. comm.). It will be interesting to see how these results compare with the rabbit bone distributions when the calculations are finished. In the Mousterian period, the majority of the rabbit bones were found in the chamber at the rearmost of the cave, towards the north wall, and the result for the Early Upper Palaeolithic is very similar. Whether the collectors of the rabbit bones are human or animal (or, most likely, both), this pattern suggests the rear of the cave was the centre of activity, or the preferred

Fig 9m: Plan of Caldeirão cave, Mousterian period.

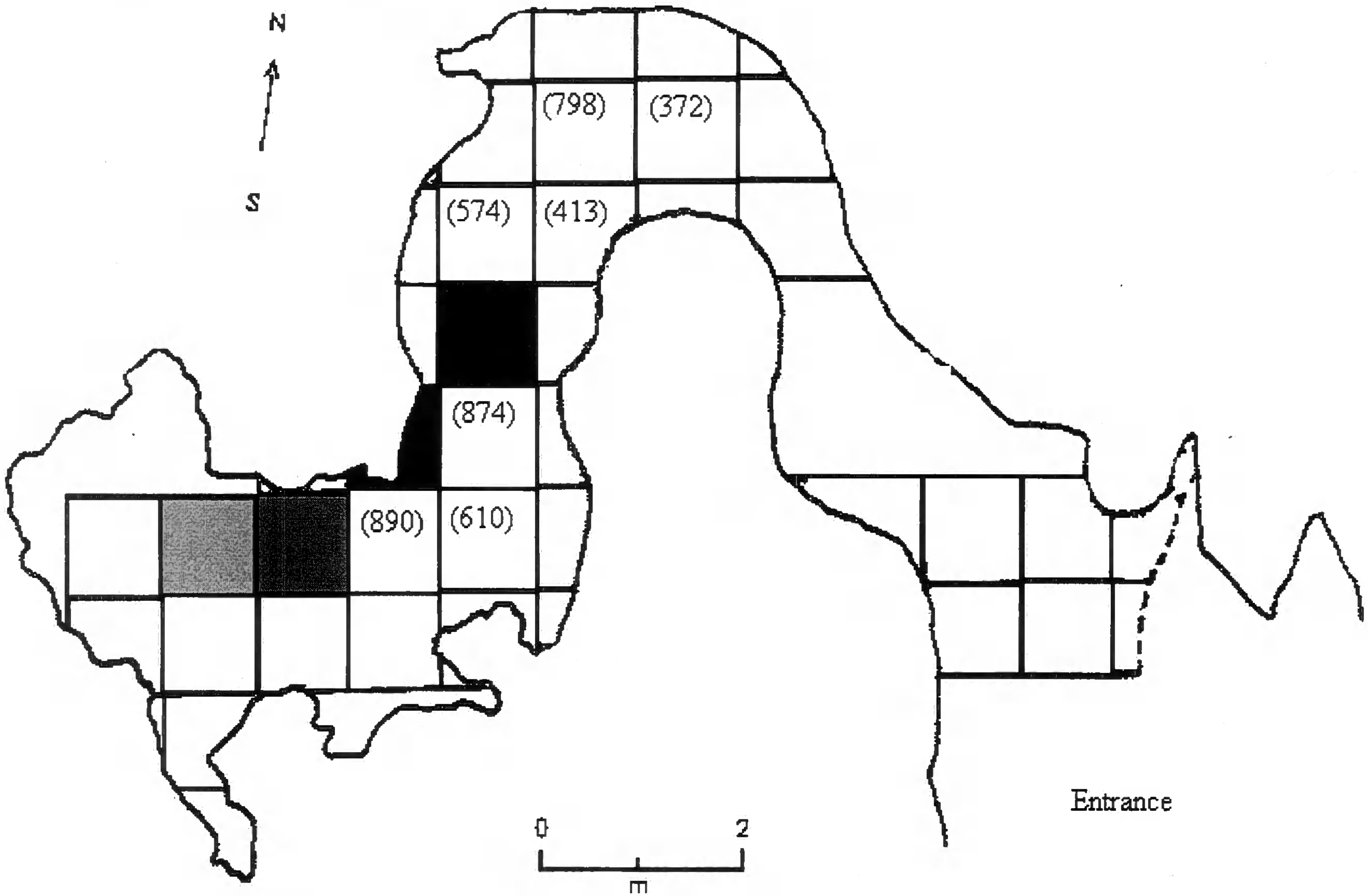
Showing the trenches with the highest concentrations of rabbit bones. Darkest shading = highest concentration. n = 542, 202, 34 and 12 respectively.

Fig 9n: Plan of Caldeirão Cave, EUP period.



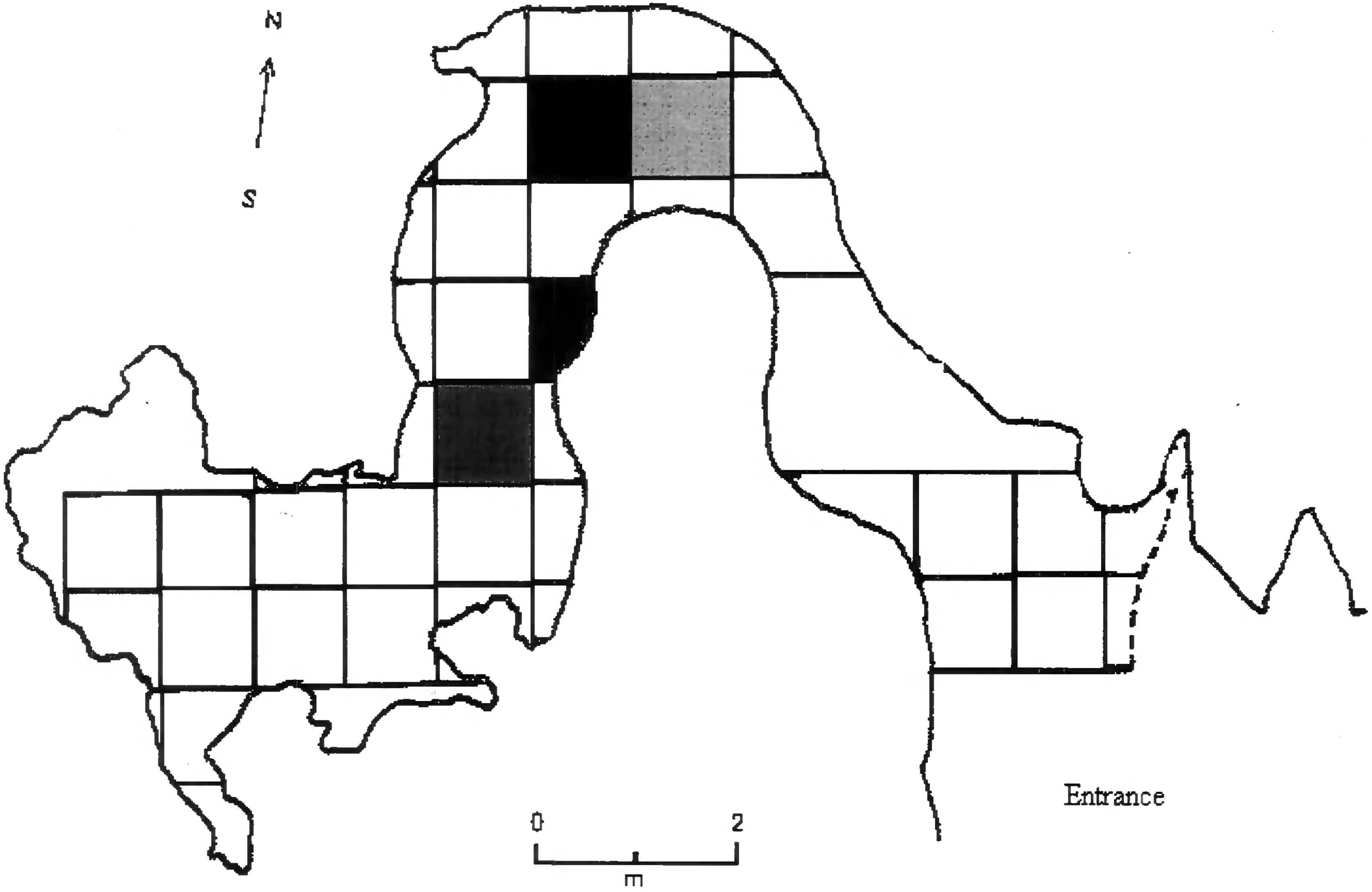
Showing the trenches with the highest concentrations of rabbit bones. Darkest shading = highest concentration.
n = 517, 415; 217 and 137 respectively.

Fig 9o: Plan of Caldeirão Cave, Solutrean period.



Showing the trenches with the highest concentrations of rabbit bones. Darkest shading = highest concentration. n = 1269, 1077, 948 and 943 respectively. However, the Solutrean bones were more numerous and more spread out than other samples, so figures for other high yielding trenches are given (in brackets).

Fig 9p: Plan of Caldeirão Cave, Magdalenian period.



Showing the trenches with the highest concentrations of rabbit bones. Darkest shading = highest concentration. n = 1472, 1158, 562 and 353 respectively.

area for dumping rubbish. In the Solutrean the larger sample is spread more widely, though abundant bones are again found in the rear chamber, next to the north wall. Even more, however were found in the corridor. By the Magdalenian, the highest concentrations of rabbit bone are all in the corridor. Is this because large quantities of the rabbit bones have slipped down into burrows at these locations? Or does it correlate with centres of human activity? Until the flint concentrations from the cave are examined, it is difficult to assess.

9.6: How do the rabbit data relate to the other fauna?

The rabbit remains form the greater portion of the bone material from the Gruta do Caldeirão, as is clear in Fig. 9q. Though there is a great deal of variety among the other species found on the whole their numbers are very low. After rabbits, the most abundant species at every level is *Cervus elaphus*. Davis *et al.* (forthcoming) argue that the increasing reliance on red deer during the Magdalenian is due to over intensive hunting pressure on other large ungulate species, while red deer could reproduce quickly. If the rabbit component of the Caldeirão fauna is ignored, then red deer do indeed comprise 32% of the sample, dominating the ungulate fraction, but then the same proportions are visible in the Solutrean fauna, and personally I find the 'ecological disaster' theory unconvincing. Red deer are not particularly rapid breeders. The trend, albeit slight, towards more roe deer, wild boar, badger and fox in the Magdalenian compared with the earlier periods could perhaps imply a shift towards a more woody and moist environment, as is commonly inferred for the terminal Pleistocene. Davis *et al.* also suggest that the increasing frequency of small carnivores in the Magdalenian, whilst undoubtedly related to the demise of large predators such as hyaenas, may reflect an increased use of the skins of these animals. The rabbit skins may have been used too, though unfortunately the lack of skinning marks in any period leaves us with few clues. The dearth of third phalanges in the Magdalenian could perhaps be related to the removal of skins for curation elsewhere. However, in the only detailed account of rabbit skinning I have read it is recommended that the feet are removed altogether (Fearnley-Whittingstall, 2000), and this was certainly the case with the rabbit carcases I purchased locally.

Fig 9q: Rabbit NISP compared with other fauna.

	Mousterian	EUP	Solutrean	Magdalenian
Rabbit	**806**	**1551**	**9412**	**5248**
Aurochs/cattle	1	0	1	3
Goat	12	21.5	21	2
Coat/chamois/sheep	3	8	14	3
Chamois	5	3	11	1
Sheep	0	0	0	0
Red deer	50	40.5	150.5	65
Roe deer	0	0	0	2.5
Wild boar/pig	3	0	0.5	10
Equids	24	17	25	6
Hare	0	2	0	17
Beaver	?	0	0	1
Hyaena	6	4	0	0
Bear	1	9	1	0
Badger	0	0	5	19
Lion	0	2	1*	0
Leopards	1	0	3	3
Lynx	11	4	22	30
Wildcat	0	0	2	5
Wolf	3	0	1	0
Fox	1	1	1	9
BIRDS	9	10	36	28
FISH	0	0	0	1
TOTAL	936	1673	9706	5453.5

In every period, rabbits vastly outnumber other species.
Non-rabbit data taken from Davis *et al.* (forthcoming).

One of the attractions of the rabbits to the human hunters may have been their warm fur, but they are also likely to have been used for food. Rabbits are, of course, significantly smaller than red deer and other ungulates, and they appear very lean, but their meat is surprisingly nutritious, worthy of comparison with other species when assessed directly, weight for weight:

	Rabbit	Deer	Pork (loin)	Pork (ribs)
Calories	168	134	232	338
Protein (g.)	25	26	28	25
Fat (g.)	7	3	12	26
Iron (mg.)	1.9	3.8	1.2	1.6
Niacin (mg.)	7.2	5.7	5.9	4.7
Phosphorus (mg.)	224	192	203	217
Potassium (mg.)	326	284	356	272

(Data from Anderson and Deskins, 1995. Comparisons based on 3 oz. of rabbit, pig and deer meat.

Thus, rabbits are more nutritious on a weight for weight basis than deer – the other significant meat source at the site - on five out of the seven counts. Also, the average live weight of an adult rabbit is c. 1300g (Thompson and Worden, 1956), and the rabbit skeleton only weighs around 60g, so about 95% of the rabbit carcase consists of usable products, compared to about 60% of the red deer carcase (Legge and Rowley-Conwy, 1988). If one excludes the viscera, which forms a relatively large proportion of the rabbit's weight, then only 41% of the rabbit is edible (Thompson and Worden, 1956). However the viscera, particularly the heart, liver and kidneys, are not inedible. Rabbits have other advantages as a resource – they are numerous, reproduce quickly, easy to find without necessarily going far, easy to process, and not dangerous to hunt. With the right knowledge and equipment, they are also quite easy to catch, certainly when compared with big game hunting. In the Great Basin communities of the United States jack rabbits were netted in large numbers, and their skins used to make valuable winter blankets[25] (Shaffer and Gardner, 1995). Rabbit drives on this scale required a lot of people to fan out with the nets, so it tended to be a communal activity undertaken when several families came together for a season (ibid.). The jack rabbit of North America is more similar to the European hare than the European rabbit, as it inhabits open country and relies on its speed to evade predators rather than bolting down a burrow, but a similar netting technique has been applied to European rabbits. Poachers of recent times had a number of cunning ways to catch rabbits using minimal technology, including this net technique which required as few as one or two people to implement:

> "Nets were often used to catch rabbits . . .*Long nets* could be as long as the poacher wanted but were normally around 100 feet (30m) in length and 3 feet (0.9m) in height; they were made of twisted hemp or flax . . . This net was placed across the face of a rabbit warren on a night when the rabbits were out feeding upwind. A night when moonlight was periodically blackened by clouds was considered ideal for long-netting. The poacher would remain concealed, planning the laying of his net, until a cloud darkened the sky; then he would stealthily creep out and lay a few yards of net, carefully pegging it upright on light wooden poles and ensuring there was plenty of slack to entangle the rabbits. [When the net was fully laid] The poacher then sent out his dog in a wide arc to come in behind the rabbits. Their headlong flight was sharply arrested as they became enmeshed in the net. The poacher then needed to hurry along the length of the net dispatching the rabbits with a cudgel before they broke away." (Ingram, 1978, p6).

The only element of this scenario definitely missing in Palaeolithic Iberia is the dog, but presumably one or two humans, perhaps using sticks or noise of some sort, would work just as well, as in the American example. In place of dogs, it has been known for a long line, known as a 'dead dog' to be trailed across the feeding field by two people (Thompson and Worden, 1956). This has the same effect of herding the rabbits towards the net. Plant fibres were available, and the evidence for sewn clothing and plaited hairstyles in Late Upper Palaeolithic cultures indicates that the people may have had the necessary knowledge and skills to make nets. The Native American long nets were even made of human hair (Shaffer and Gardner, 1995).

Snaring is another way of catching rabbits, not inconceivable for Late Upper Palaeolithic hunters. Snares have an added advantage in that they work while the hunter does something else. Modern snares use metal wires. One would assume that rabbits could chew through natural fibre snares, but the snare traps found preserved in North American dry caves are made of perishable materials (Shaffer *et al.* 1996). Snares worldwide have been made out of horsehair, rawhide, dried animal sinews, sealskin and plant fibres (Bateman, 1973). Young saplings can also be used to catapult the snared rabbit into the air (Ingram, 1978).

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[25] One hundred rabbits were needed to make just one adult's blanket.

The pattern to all these methods is that they require brains and a certain amount of preparation, rather than strength or endurance. Snares and nets could be laid by 'weaker' members of the community, ensuring useful additions of rabbit to the diet. This would be more of a 'gathering' activity, and would not infringe upon the efforts accorded to large mammal hunting, even if big game was the priority.

Finally, there is another possible reason why rabbits were killed in such large numbers – rabbits are widely believed to be a nuisance. There are many accounts, both recent and historical, of rabbits destroying crops, killing fruit trees by chewing through the bark, and even undermining buildings (Thompson and Worden, 1956). Rabbits are also selective feeders, choosing the best plants to eat and leaving the tough and woody plants to flourish (Lockley, 1964). After the terrible mixymatosis epidemic which occurred in Britain during the 1950s, agricultural output soared (Thompson and Worden, 1956). Naturally, the Palaeolithic inhabitants of Caldeirão did not have domesticated crops, and rabbits are said to be less of an ecological problem in their original habitats, but the people may have observed how much a large population of rabbits can degrade grassland. It is probably impossible to test this theory, but I suspect that routinely decimating the rabbit population may have been partially an effort to raise the quality of grassland, much as controlled burning is believed to be, in addition to providing a nutritious resource.

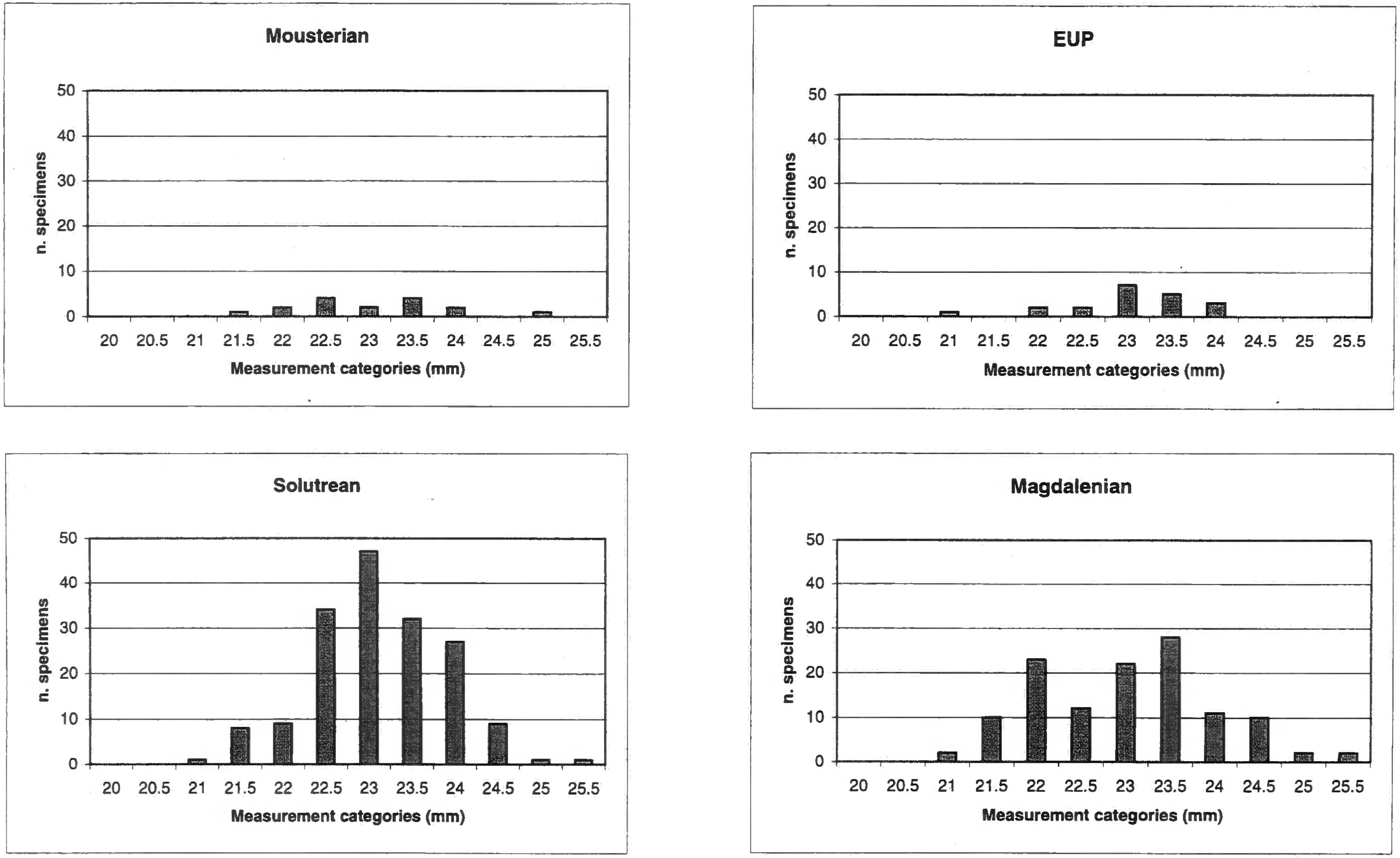
9.7: Measurements.

Lastly, is there any change in rabbit size through time? In total, 526 measurements were taken of the Greatest Length of Calcaneus, and Greatest Breadth of the Distal Tibia. The postglacial rabbits from Caldeirão are not available for study, so dramatic size diminution within the sample was not expected. However there appears to have been very little change in size generally:

Greatest Length of Calcaneus (mm).

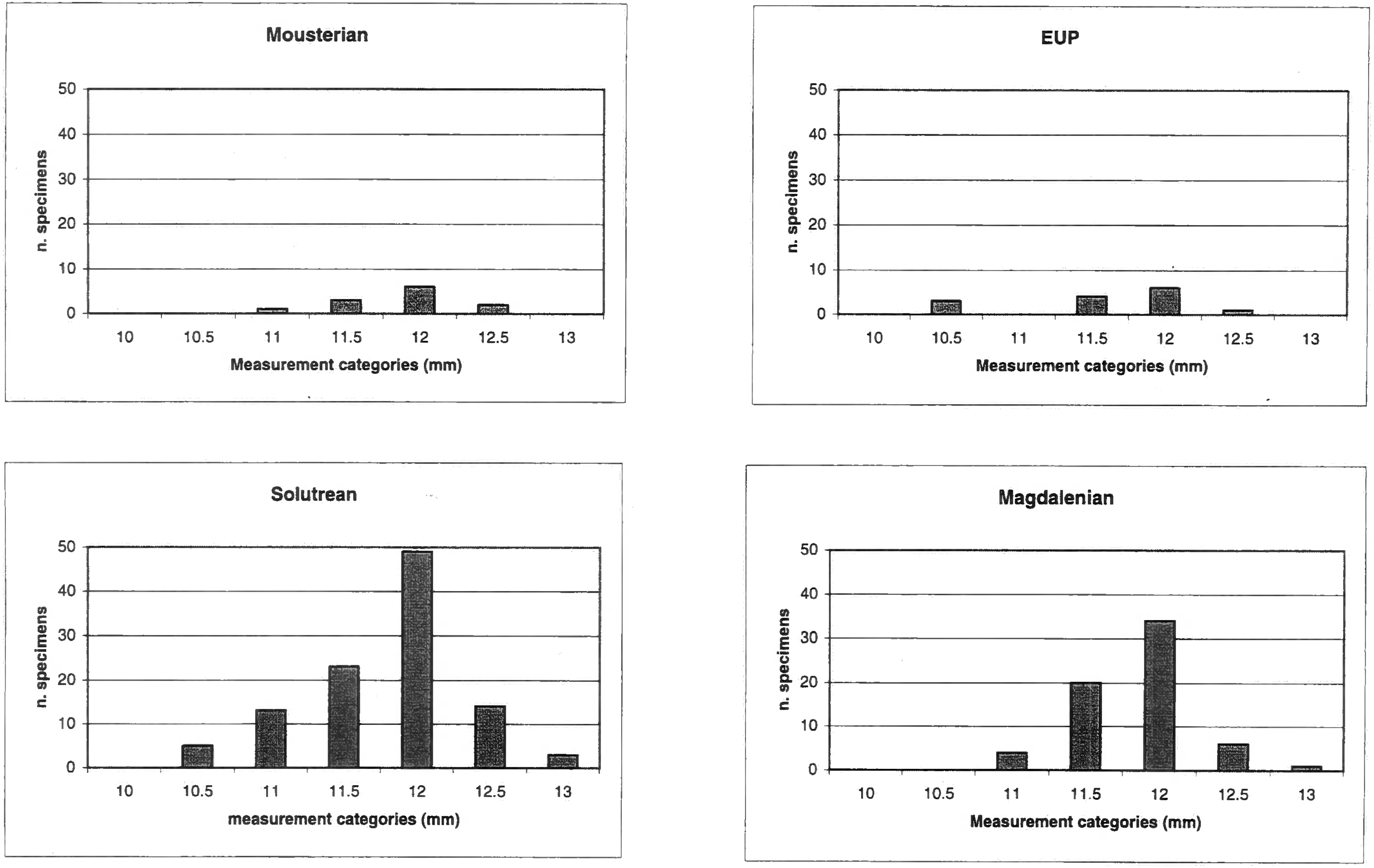
Period	n	Maximum	Minimum	Mean	Std. Deviation
Mousterian	16	24.92	21.47	22.8113	.8521
EUP	20	23.90	20.75	22.7780	.7604
Solutrean	169	25.26	20.59	22.8788	.7669
Magdalenian	122	25.11	20.51	22.7718	.9559

Fig 9r: Greatest Length of Calcaneus.



Mean average length: Mousterian 22.81 mm; EUP 22.78 mm; Solutrean 22.88 mm; Magdalenian 22.77 mm.
The apparent bimodal distribution in the Magdalenian group is smoothed out when converted to a runninq mean.

Fig 9s: Greatest Breadth of Distal Tibia.



Mean average breadth: Mousterian 11.54 mm; EUP 11.34 mm; Solutrean 11.53 mm; Magdalenian 11.61 mm.
Therefore, on average, the Magdalenian rabbits may have been slightly more robust, but the differences are tiny.

Greatest Breadth of Distal Tibia (mm).

Period	n	Maximum	Minimum	Mean	Std. Deviation
Mousterian	12	12.21	10.90	11.5383	.3855
EUP	14	12.16	10.29	11.3443	.5970
Solutrean	107	12.63	10.12	11.5307	.5264
Magdalenian	65	12.66	10.82	11.6112	.3777

Histograms of the distribution of measurements can be found in Figs. 9r and 9s.

9.8: Conclusions.

In conclusion, is there a broadening of the resource base at Caldeirão at the end of the Pleistocene? Small resources, predominantly rabbits, are certainly being used, but not in any greater quantity than in the Solutrean, and rabbits form the majority of the fauna throughout the assemblage. It is possible that many of the rabbits in the Mousterian sample were the victims of animal predators, but the presence of burn marks suggests that at least some of them were caught and cooked by hominids. The numbers of rabbits found in the Mousterian and Early Upper Palaeolithic samples are not high, but they still vastly outnumber the other species. Species diversity is quite broad throughout the Caldeirão sequence, becoming only slightly higher in the Magdalenian:

Period	N TAXA (all mammals)	N TAXA (non-carnivorous mammals)
Mousterian	14	8
EUP	11	6
Solutrean	15	7
Magdalenian	15	10

Birds are also present in every period, and fish never gain a NISP higher than one, even in the Magdalenian. The possible increase in the exploitation of fur bearing animals, and the possibility that rabbit skins were taken away from the site, are indications of slightly different behaviours in the terminal Pleistocene. There is also the evidence of increasing numbers of neonates in the Magdalenian layers, which may suggest more catastrophic hunting techniques employed in the exploitation of rabbits.

In general, however, there is nothing in the exploitation of rabbits in the Magdalenian of Caldeirão that does not have a firm grounding in the Solutrean period and probably before. The inhabitants of Caldeirão are certainly using small mammal resources, and they may be intensifying their means of exploitation, but it is hardly a revolution. The rabbit exploitation of the Portuguese Estremadura is based upon local *savoir-faire*, built up over millennia, about a locally abundant resource.

Chapter 10: Conclusions.

10.1: Introduction.

At the outset of this thesis the intention was to compare and contrast the animal bones from four sites. All of them came from southern Europe, therefore they could be said to have regional or geographical aspects in common. All of them had occupations dating around the Pleistocene/Holocene transition, and all of them were believed to stem from a hunting and gathering tradition of subsistence. Thus it may have been reasonable to conclude that they would have a great deal else in common, and perhaps fit into a broad cultural unit which covered that part of Europe at that time. It was necessary to test whether each assemblage could demonstrate signs of the 'Broad Spectrum Revolution' (Flannery, 1969) that supposedly spread out from the Near East and 'set the scene' for the origins of agriculture in Eurasia. However Edwards (1989) had already questioned the existence of the Broad Spectrum Revolution a long time before I began this thesis, and reservations about the likelihood of a sweeping 'revolutionary' adaptation were always present during the research. It is known that some sections of society are more resistant to dietary change than others, in hunter-gatherer groups just as in any other, as we saw in Chapter 2. What follows is a summary of the findings from each geographical area, with an analysis of the similarities and differences between their subsistence regimes.

10.2: The Near East.

As was examined in more detail in chapter three, the Kebarans *appear* to have exploited a narrower range of resources than the successive Natufians but, as Edwards (1989) has pointed out, the concentration of refuse dumps associated with Natufian sedentary living sites may artificially elevate taxonomic diversity. 'Broad Spectrum' subsistence is fairly definite for the Late Upper Palaeolithic site of Wadi Kubbaniya in North Africa (Hillman, 1989) and at Ohalo II on the shores of Lake Galilee (Kislev *et al*, 1992). Large mammal hunting continues to form a staple part of the diet, however broad the range of extras consumed, even in the later period. The 'Mushabians', contemporaneous with the Natufian groups whose way of life is supposed to have been a precursor to agriculture, continued to lead a small-scale mobile hunting and gathering life. They concentrated, as far as we can tell, on large mammals with some smaller resources, but the dispersed refuse = lower taxonomic diversity argument may also be relevant here. The presence of the 'Harifian' sites towards the end of the Natufian period suggests that the sedentary broad spectrum existence was not suitable for all, not even in the Near East.

10.3: Theopetra and Greece.

The early postglacial period in Greece is problematic, to say the least, and thanks to acid erosion the small sample from Theopetra has done little to elucidate us further, as was detailed in chapter 5. Nothing at Theopetra suggests a Broad Spectrum regime comparable to the Near Eastern Natufian sites. Franchthi *is* more comparable in that there is evidence for a wide range of resources, but as at Sidari and Cyclops the focus of this small resource exploitation appears to have been the sea, and this is not the case for most of the Near East. Given the topographical differences between the two regions this dichotomy is hardly surprising. The plant contribution to the diet is clear in the Upper Palaeolithic of Greece, with an apparent intensification in the later period, and this is similar to the Near eastern discoveries.

10.4: Riparo Tagliente, Mondeval de Sora and Italy.

There is very little evidence at Riparo Tagliente or Mondeval de Sora to suggest that they fit into a Broad Spectrum subsistence regime at all, as was demonstrated in chapter 6. There is a trivial use of marmots at Riparo Tagliente, especially when compared to the rabbits of Iberia which are their near equivalent in terms of size and habits (marmots are actually rather heavier, so should – arguably – be more desirable). Instead, the human foragers at Riparo Tagliente mainly ate larger mammals, particularly red deer, and processed them intensely, moving around on a seasonal basis. This situation appears to have been the *status quo* at the site for hundreds of years. At the postglacial site of Mondeval de Sora the resource base appears to be almost exclusively red deer, processed even more intensively, and again the hunters were seasonally mobile. This one-species specialization appears to have more in common with the Epirus site of Klithi than the Near Eastern BSR, though the intense gazelle exploitation of sites such as Tell Abu Hureyra is perhaps vaguely comparable. The hunting of red deer at Riparo Tagliente and Mondeval de Sora seems to have involved more precise and less catastrophic methods than the desert kites, however, and the waste-conscious processing strategy probably helped to prolong this way of life.

Broad based foraging is apparent at the Sicilian postglacial site of Grotta dell'Uzzo, and at the Grotta Continenza and others. All are comparable with Franchthi and the Natufian in that the people were utilizing a large variety of small resources, but that is probably all they have in common with these non-Italian sites or with each other. There is nothing in the Italian postglacial evidence to suggest contact with the Natufians, so what Broad Spectrum intensification does exist is almost certainly an independent development and, as Riparo Tagliente and Mondeval de Sora demonstrate, it is not embraced smoothly across the region. One gets the impression that individual groups are utilizing whatever they find around them in the way they see fit, either because it is the way they have always fed themselves or the resources are all there is there is around to eat. Why would they do otherwise?

10.5: Caldeirão and Portugal.

Caldeirão is the only one of the four sites which formed the basis of this research project where small resources constitute an undeniable importance to the diet, as detailed in chapter 9. Even at this site, however, it is a case of concentration on the benefits of one particular small resource (rabbits) rather than a broad foraging regime *per se*. The rabbit consumption at Caldeirão has little in common with the more plant focused subsistence of the Near East. Whilst the rabbits were probably caught local to the site, and I inferred that their regular harvesting may have been partially intended to reduce the impoverishment of grassland, this does not imply that they were *managed* in any way that leads to a psychology of domestication and hence agriculture.

The rabbit exploitation of Caldeirão is also a more extreme example of focus upon a small resource than, say, the trout fishing of the Grotta Continenza (Wilkins, 1987) or the tunny fishing of later Mesolithic Franchthi, since no other small resource at

Caldeirão is even remotely close to rabbits in dietary contribution. Even if one could call the rabbit hunting of Caldeirão 'Broad Spectrum' foraging it is hardly revolutionary – rabbits are important throughout the site's history. If the later foragers are more successful at catching large numbers of them than their forebears then this appears to be the result of centuries of practice. This situation reflects the general picture of the Pleistocene/Holocene transitionary period in Portugal, where climatic and environmental change occur early, but the subsistence regime changes little, presumably because the people were surviving adequately well as they were.

10.6: Conclusion.

In conclusion there is little uniformity about the subsistence regimes over the Pleistocene/Holocene boundary in southern Europe. If one looks for classic 'Broad Spectrum' sites Franchthi, Grotta dell'Uzzo and Cueva de Nerja are all excellent examples. Riparo Tagliente and Mondeval de Sora, on the other hand, are examples of intense specialisation on big game, while Caldeirão might be described as a big game hunting site with an enthusiastic specialisation of one particular small supplementary resource. They are all, it might be argued, localized adaptations to the opportunities of their surrounding habitats, and any similarities are parallel developments.

Is there any connection in the many and varied subsistence strategies of the Pleistocene/Holocene transition that undeniably lays the foundation for agriculture? I think not. After all, Broad Spectrum foragers were and still are found around the world but these lifeways hardly ever 'turned into agriculture'. I suppose the die-hard progressivist enthusiast would argue that it is only a matter of time, but the fable of the monkeys with the typewriters producing the works of Shakespeare comes to mind. Progressivist notions of one set of circumstances inevitably leading to a leap forward in the history of human civilization abound in archaeology, from the naïve pseudo-Darwinist theories of the 19th and early 20th centuries right up until the apparently well thought out 'Domestication of Europe' (Hodder, 1990) closer to today. The 'Broad Spectrum Revolution' is one such postulated leap, like the 'Neolithic Revolution' and the 'Secondary Products Revolution' (Sherratt, 1981). Even Hodder, in 'The Domestication of Europe' (1990) has a hypothesis that one could describe as progressivist, despite his attention to the small details of life. In the introduction to his book Hodder asks the question –

"Is there a widespread transformation of symbolic structure which goes hand in hand with the economic domestication of plants and animals? How widely relevant is Catal Hüyük?" (p 16)

Just like those who seek for an environmental or population stimulus to the origins of domestication, Hodder looks for sweeping cross-cultural change. He asserts this point several times before going on to the case-studies: for example "I want to follow the unfolding of long-term structures" (p20) and "[M]y overall concern is to move beyond localized contextual variation to produce historical generalizations of considerable scale and duration" (p21). Whilst there is much to admire in Hodder's book a sceptic may surmise that he simply found what he sought to find. My own experience is that it is virtually impossible to move beyond 'localized contextual variation' unless one is to ignore all the details of an assemblage.

If we reject ideas of inevitable progress there is one alternative left to us: accident. Zeuner (1963) and more recently Uerpmann (1996) have put forward the idea that animal domestication came about more or less unintentionally. Uerpmann argues that if prehistoric groups kept a few young sheep or goats as pets (and we know that hunter-gatherer groups do keep all sorts of animals as pets) then these individual animals would mature early. If food supplies were sufficiently good that these pets were not eaten, then they might breed with each other. The result, with no human intention necessarily behind it, is a flock wandering around the campsite. As Uerpmann says:

"Human ingenuity is only needed in this hypothesis to the extent that someone had to realize the potential of what was going on among the animals raised in the settlements – probably by the women and children – and had to transform it into an economic practice." (Uerpmann, 1996, p234)

Such prehistoric entrepreneural activity may seem far-fetched when related to sheep and goats but we readily accept that dogs and other commensal animals may have 'domesticated themselves' to an extent before humans got involved. Sheep are not violent upon adulthood, their breeding range is restricted even in the wild, and as they shelter in caves Uerpmann points out that houses aren't a huge psychological leap for them to adapt to. The simplicity of this hypothesis is seductive – it does not require the psychological reasoning of an entire culture or a change in climate which had had no such effect before. Rather, it requires one peculiar set of localised circumstances. This fits with Uerpmann's insistence that as sheep domestication occurred spontaneously only once in South-West Asia and then spread, the statistical probability of such an event occurring must have been low (Uerpmann, 1996).

It is understandable that we archaeologists, just as historians, tend to be more interested in the changes and developments that have occurred through time, but it must be remembered that there are many instances of life (in so far as it is archaeologically visible) continuing virtually unchanged for centuries, or even millennia. It is "the essential continuity of prehistory" as Clark says (1980, p1) and is no less worthwhile than the 'revolutions'. Great theories of the march of human progress are all very exciting and stimulating in their way, but focus in too sharply and what do we see? Human lifeways are patchy, reversible, inconsistent, unconnected, and chaotic. For years scientists have believed that simple systems behave in simple ways and complex behaviour implies complex causes, until chaos theory provided a new standpoint (Gleick, 1998). Perhaps archaeology too should not dismiss minor factors so lightly. My suggestion to the reader is this – beware of grand schemes that attempt to encompass millennia of human culture over vast geographical areas. The devil is in the details.

10.7: Further work.

The main focus of further work that stems from this project inevitably centres upon Greece. It is hoped that the archaeological community will not give up looking for Mesolithic sites in Greece, however barren and frustrating the majority of previous discoveries have been. It is tempting to think that where there are a few sites, there must be a hundred, albeit hidden, awaiting discovery somewhere. Perhaps developments in sub-aquatic archaeology could help, though given that most Mesolithic sites in Europe tend towards the ephemeral it may be a futile hope. Underwater Mesolithic archaeology in Scandinavia is well ahead of the rest of Europe (Fischer, 1995) so there is some hope that Greece could employ researchers and techniques developed in the north. As regards Theopetra in particular, the anomalous sheep bones still await resolution. Radio carbon dating and possible DNA testing should establish for once and for all the date and the species of these problematic bones.

As for Italy, the Copper Age and Medieval bones from Mondeval de Sora await analysis. It will be interesting to see the results, as it is highly probable that species utilized and processing methods remain similar well into the Copper Age and beyond.

In Portugal and Spain I suspect that more Upper Palaeolithic sites rich in lagomorph remains will be discovered, and a detailed zoological study of extant rabbits living in this region may be helpful to future researchers faced with thousands of specimens. The spatial analysis of artefacts within Caldeirão, when completed, should help to flesh out the analysis of rabbit bone distribution within the cave that I have done. Future discoveries of netting fibres and other artefacts could help to support theories of rabbit capture methods.

On a more general note, further work into the attitudes of extant hunter-gatherers to new foodstuffs and ways of subsistence would be interesting, as would a detailed anthropology of the way that ‘exotics’ become embedded into any culture and are made familiar over time.

Appendix One: The Recording Methodology.

The Master Key to the SPSS recording code gives the full list of codes and what they mean. Each piece of evidence (e.g element or species) is recorded in a separate column in the SPSS database, and therefore it does not matter that scapula and horse, for example, both have the code '01'. The key is essentially based upon that used by Paul Halstead but, as the assemblages studied in this project date from further back in time than those the code was originally written for, certain necessary codes did not exist. Halstead's scheme, for example, had all of the domesticates and many wild species, but otter, beaver and hyena had to be added. As the code is numeric the possibilities for expansion are essentially limitless, however, so this was not a problem.

Each assemblage was recorded upon it's own database, partly for ease and clarity of recording, but also so that the analysis could be designed to fit the questions being asked. Assessing the sex of an animal bone, for example, is rarely possible in any assemblage, but in the Gruta do Caldeirão rabbit bone assemblage it was neither possible nor a priority of the research. Therefore in this part of the analysis the 'sex' column was left out, but the preservation evidence was expanded upon. Three separate columns of preservation evidence were used: gnaw, burn and cut. The codes for these new columns were as follows:

GNAW:
0 not gnawed
1 pitting
2 acid etching
3 polishing
4 punctured
5 furrowed
6 rodent gnawed

BURN:
0 not burnt
1 black patches

2 black all over

3 white

4 other colour (patches)

5 other colour (all over)

CUT

0 uncut

1 chopped

2 dismembering

3 filleting

4 other

5 skinning

This more detailed approach suited the last assemblage very well, as the assertation of the species of the bones took a fraction of the normal analysis time.

Appendix One: Master Key to the SPSS Recording Code.

Elements:
01 scapula
02 humerus
03 radius
04 metacarpal
05 pelvis
06 femur
07 tibia
08 metatarsal
09 ulna
10 metapodial
11 calcaneus
12 astragalus
13 phalanx one
14 phalanx two
15 phalanx three
31 atlas
32 axis
40 horn
41 antler
91 mandible
92 maxilla
93 mandibular tooth
94 maxillary tooth

Species:
01 horse
02 cow
03 pig
04 sheep/goat
05 sheep
06 goat
07 deer (indet.sp)
08 dog
09 hare
10 fox
11 wild boar
12 big cat
13 marten
14 badger
15 rabbit
16 seal
17 bear
18 aurochs
19 donkey
20 wolf
30 red deer
31 fallow deer
32 roe deer
33 otter
34 hyena
35 beaver
90 tortoise
93 wild cat
94 hedgehog
95 small caprid (cf: chamois)
96 large caprid (cf: ibex)

Proximal Fusion:
0 absent
1 fused
2 fusing
3 unfused shaft
4 new-born shaft
5 unfused epithysis
6 new-born epithysis
7 indeterminate
8 young
9 not counted

Distal Fusion:
As above, but
separate column.

Side:
0 indeterminate
1 left
2 right

Fragmentation:
0 complete
1 some shaft missing
2 end + shaft
3 end splinter
4 shaft splinter
5 cylinder
6 end only
7 shaft + end splinter
8 new break

Preservation:
0 no modification
1 gnawed by carnivores
2 gnawed by rodents
3 burnt
4 1+2
5 1+3
6 2+3
7 1+2+3

Butchery:
0 uncut
1 chopped
2 dismembering
3 filleting
4 other
5 skinning

Sex:
0 indeterminate
1 female
2 male

Appendix Two: Old Food, New Food. Indigenous perceptions of diet and dietary change.

How do we perceive a change in diet? Everyone's diet can change, but in this appendix the views of hunter-gatherer peoples, and those whose recent ancestors lived in this way, will be put forward in their own words. Direct quotations from members of indigenous groups are rare, even in the most detailed anthropological literature, so the following comments and opinions come from one text: 'In the words of the elders: Aboriginal cultures in transition.' (Kulchyski et al *eds.). This was something of a pioneering study, and covers many different indigenous groups, but all are based in North America. They are certainly not 'pristine' hunter-gatherers, and some have also practised farming and horticulture, but their experiences are all the more interesting because of this variety. The interviewees were sometimes asked directly about food, but often the most interesting comments came out of questions about other areas of life such as time, responsibilities, and parenting, showing how crucial subsistence can be to literally and metaphorically give 'flavour' to life. You will find in their comments a wealth of practical information but also their memories of childhood, their perceptions of how diet has changed and the consequences. It is striking how similar the comments are, in general, to those of old people any where, with the mix of hostility – particularly towards narcotics and over-processsed foods – with enthusiasm and neutrality towards the introduced.*

Traditional foods.

[On traditional food]: "They ate deer, moose, muskrat, rabbits, and what they fished from the river was mostly bass. They used to spear bass down here. That was before they built the dam. And from the land, we got fiddleheads in May. Fiddleheads are from here . . . . When they first come, the lilacs are starting to bloom, and when the lilacs are done, the fiddleheads are done too. And in the spring, they get muskrats. And in the fall, they hunt deer and moose. We get ducks, pheasants, partridge."p23. **Margaret Paul (Passmoquady). St. Mary's First nation, Nova Scotia.**

"Fish, agriculture, corn, beans, pumpkins, squash, tobacco, sunflower, I think that was the old-time traditional food, and they ate fish, and deer, too, some raccoons, and down east of here in the marshy areas, there's muskrats and of course there's rabbits around there. They preserved food to last them the winter, in their traditional ways, mostly dried and smoked."p131. **Ernest Benedict (Mohawk). Akwesasne, Ontario.**

"I will tell you about the animals people lived on, for those young people who want to know, I will tell you about everything . . . . those animals in the water, fish, and those who hibernate in the ground during this time [January, February], those we trap, like weasel, muskrat, beaver, they all stay in one place . . . Those big animals, moose, caribou, these animals don't get cold very easy. They don't get cold and don't hibernate."pp218-19. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

"They did everything to keep themselves from starving. There was so much food at that time, there was no such thing as begging. There was so much animal food and fish food and berry food, which was all theirs. That is how they survived and later on they had gardens."p297. **Eva McKay (Dakota Sioux). Dakota Tipi, Manitoba.**

"The food preparation was berries mixed with the meat, pemmican . . . And people can start running from here and go south and there are shrubs, the plants, the little nuts they can eat, they are real nourishing and have a lot of nourishment."p306. **Wilf Tootoosis (Salteau). Poundmaker First Nation, Saskatchewan.**

"The only thing that people lived on was wildlife and they killed that with bow and arrows [Martha was born in 1911]. Long time ago people made their living by wildlife . . . My dad taught me all kinds of survival skills that people needed to survive out on the land." p373. **Martha Rabeskey (Slavey). Fort Good Hope. Northwest territories.**

"The main food was animal meat, they uses fat too. They save the blood, they cook it and make soup. They do not boil it but keep it hot. They sometimes put caribou fat in it, boy, the Elders like that. They use the bones, they use the grease out of the joints. They pound the bones with a rock. They cook that [bone] too for hours. All the grease comes out of the bone, they cool it off and take all the grease out and they drink the broth. They save the grease in a caribou stomach . . . They pound the meat, dry meat.

They also dry fish, they get lots of dried fish. They take a lot of this food to the sacred places."p409. **George Blondin (Slavey/Dogrib) Rae Edzo, Northwest Territories.**

Introduced foods.

"And then sometimes a dinner we will eat, we'll cook up something, hot dog, coffee, cake, ice cream, or whatever."p17. **Margaret Paul (Passmoquady). St. Mary's First nation, Nova Scotia.**

"We share, and sometimes I'll cook up something, macaroni and hamburger and tomatoes or whatever, while they're drumming and we devour it after."p17-18. **Margaret Paul (Passmoquady). St. Mary's First nation, Nova Scotia.**

"Just the way I was raised we never had candy at home and I am still never one for candy. Because what we had was mostly dried fruit, my mother would dry apples. They would be hanging above the stove, and that's what we had. Dried apples and figs . . . I was never one for candy, chocolate bars or anything. I don't recall ever, I never liked pop."p143. **Liza Mosher (Odawa). Manitoulin Island, Ontario.**

". . . . [M]y mother used to say, 'One woman would say let's have some tea.' They used to drink tea, but there was no sugar. . My mother used to say, 'But I didn't know what it was, I tasted it once. It was so good and sweet, but there was no sugar at that time."p181. **Alex Skead (Ojibwe). Rat Portage First Nation, Ontario.**

"There was no hospital, there was no doctor, I didn't see a doctor. There was no detox centre. There was no jail . . . No sickness, you played, you feel healthy, you feel strong when you don't eat food from cans, tin food. You were very strong."p219. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

"When the boat landed in Attawapiskat, the first product was ninety pounds of flour and sugar, even the sugar bags was pretty big. That's the way people's lives were before they ate the products such as today. We are poisoned now."p219. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

“ . . . [T]hey were eating fish and moose and caribou, no more of that. Instead of that they get chicken shipped in and pork chops and all good stuff from Alberta shipped in and they eat that. They are not eating muskrat and beaver and caribou. They are not eating that no more. They get me in the habit to eat that, so the children don’t like to eat wild meat no more. Instead of that they like to eat all the fancy food from the store. Ready-cooked chicken and stuff like that.”p393. **George Blondin (Slavey/Dogrib) Rae Edzo, Northwest Territories.**

[On homosexuality] “Even before . . . there was no talk of anybody, lesbians or homosexuals. I say ‘My, it’s just like what we have today. You guys live on noodles or TV dinners or things that you just microwave. It’s new so this must be new.”p431. **Mary Anne Mason (Shayshas). Klemtu, British Columbia.**

<u>Food and cooking methods that have been lost.</u>

“A man’s responsibility is hunting, getting food, bringing the food to homes and after they bring the food home the woman comes in there. The woman divides the food and cuts it up and whatever has to do. I remember that time many years ago that my father used to hunt. And deer and moose and beaver and muskrat and all kinds of different things I used to see when I was a boy. I remember one time a White man tried to starve us, telling us we can’t hunt any more. You can’t have this and you can’t have that. But what my father done is he had plenty of deer and he hid it in the snow and the game wardens will find out about it and they come with their sticks and they start poking in the snow looking for deer hiding in the snow. And they never found it and today I understand why the White man wants to do that because they want to starve us because we had a hard time that time. That’s all we do – we had fish, and deer, and moose meat, and stuff like that . . . And I remember the time when the White man’s fishing down the river and the Native people couldn’t fish . . . And my father used to go across the river and buy fish from the White man. At that time I remember you can buy salmon for maybe a dollar.”pp47-48. **Albert Ward (Micmac). Eel Ground First Nation.**

[Whilst on the road with the Travelling College]. “Not a tree on that half mile square, because it had been used long ago for firewood, and fuel for the winter had to be brought in by tank truck . . . They were in the middle of the bush. They were very much detached from the bush, perhaps some of the people there still did a bit of hunting, but had lost very much of their culture and with that much of their spirit."p104. **Ernest Benedict (Mohawk). Akwesasne, Ontario.**

"People lived in teepees, birch bark teepees. Just recently they used to make out of logs. All of it was just logs, and it had a hole in the centre . . . You just make a fire in there and it just heats. My mother used to make bannock in the open fire and it was so delicious."p180. **Alex Skead (Ojibwe). Rat Portage First Nation, Ontario.**

"Berries are also plentiful out on the land, that is good food. We get bluberries, but they do not grow like they used to. When I went out last year, I had to walk for a couple of hours to get to the berries, whereas before, we did not have to go so far."p215. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

"Traditional food food was deer, muskrat, ducks, wild rabbits, after the buffalo was gone. About one hundred years ago all the buffalo was killed off. I never saw wild buffalo [Eva McKay is about seventy years old], but I have seen them fenced in, so it has been a hundred years now, without buffalo. That is when these other animals came in, like muskrats . . . We dried food to preserve it. We got berries, sakatoons, choke cherries, cranberries, pinch cherries, and all that. We had them here. They were dried, too, even the meat, pemmican." p306. **Eva McKay (Dakota Sioux). Dakota Tipi, Manitoba.**

"There is nothing that can be done for people to say I live off the land in this area. There are lots of farms here, no one can trap and hunt for livelihood, so we are in a tight spot here . . . We cannot live off the land any more. The generation today has lost their culture, so they are suffering."p307. **Eva McKay (Dakota Sioux). Dakota Tipi, Manitoba.**

"The Elders today have gone through this rough life and different diet, the change, they don't eat as much meat as they used to and fish, not any more. It has been rough."p348. **Wilf Tootoosis (Salteau). Poundmaker First Nation, Saskatchewan.**

“We have a lot of things that we can’t get now . . . W can’t go out and get Abalone. I don’t know if you ever seen a Abalone. They come on the rocks, it’s a shellfish. This is pink and it has the meat in there and we can take it out and that’s a delicacy here. You have to dive for it or wait for the lowest tide to get it. We can’t even get that today. If you are caught with one you get a heavy fine. Native or not.”p434. **Mary Anne Mason (Shayshas). Klemtu, British Columbia.**

“There’s a big change with our young people because a lot of our food they don’t take, they don’t eat. They don’t know what it is.”p438. **Mary Anne Mason (Shayshas). Klemtu, British Columbia.**

“Right now we are on the outskirts of the city, long ago there was a lot of game. My grandfather used to say people would go to the area where UBC [University of British Columbia] is now and bring home some deer. We did not have to travel far. Now we have to travel for hours to get to the hunting grounds. We got deer, moose, elk, and sometimes mountain goats. But they have to travel a long distance, way up north.”p455. **Vince Stogan (Musqueam). Musqueam First Nation, British Columbia.**

Childhood.

“Today people only hunt caribou for food but before we ate muskrats, and beaver and geese . . . Native people used to eat mink and marten too . . . My mother, out of love and feelings for her grandchildren, would clean and prepare any animal that the grandchildren got. If they killed a squirrel, she would prepare it and skin it so that they would feel proud and useful and that their kill was appreciated.”p201. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

“People had feasts after lots of caribou were killed. The whole camp would get together and feast. When a boy killed his first caribou, there was a lot of happiness in the village . . . The boys would get a lot of praise. They would get advice from everybody.”p207. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

"My father taught me how to set rabbit snares, set fish nets, trap, and even when the time came, how to hunt moose."p218. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

"They took care of the babies very well . . . These children were taken care of and grew up from mother's milk and later with wild food. The children were strong and healthy and big. The children were given gravy from fish and gravy from wild meat. There was never any [animal] milk."p229. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

"There's always been adoption even when there were no bottles. When babies got hungry, we would feed them meat, broken up like banana, broth, and water."p262. **Rachael Uyarasuk (Inuit). Igloolik, Nunavut.**

[When in residential school, run by nuns] "We eat, it was terrible. We eat fish for breakfast, fish for dinner, fish."p380. **George Blondin (Slavey/Dogrib) Rae Edzo, Northwest Territories.**

[After his only son died in the TB epidemic] "If I do that [live in town near the doctor, school etc like the Whites], that means that I have to throw away all of my culture, away in order to do that. Like my grandfather and my dad, they teach me how to survive in the bush. Hunt moose, trap, fish, history, all that."p382. **George Blondin (Slavey/Dogrib) Rae Edzo, Northwest Territories.**

"When babies are small, mothers are a bit weak, so the men would do all the work like cooking, gathering of diaper moss . . . Babies would be fed broth, moose or fish, besides mother's milk."p396. **George Blondin (Slavey/Dogrib) Rae Edzo, Northwest Territories.**

"I know one of the first things that I was taught to do, one of the many things I was taught, because I was a girl, by my aunt in a fish camp, how to fillet fish, so you can put them in a big smokehouse . . . I was also taught to go hunting with my father, to carry the game . . . [because] he lost his hearing and he couldn't hear nothing. That's why I had to go and do things with him because there was nobody else."p424. **Mary Anne Mason (Shayshas). Klemtu, British Columbia.**

Time.

"In between the Maple Festival, the Strawberry, the Green Bean Festival, and green Corn and general, let me see now, the General Harvest and way back in the fall there would be Dead Feasts."p119. **Ernest Benedict (Mohawk). Akwesasne, Ontario.**

"You are supposed to plant your corn on time so your children will have something to eat in the Winter. Now we do not do that."p305. **Eva McKay (Dakota Sioux). Dakota Tipi, Manitoba.**

"They moved around the seasons. They go by animals, eggs of ducks, in the fall the caribou and the moose are fat, it is a good time to get food." p408. **George Blondin (Slavey/Dogrib) Rae Edzo, Northwest Territories.**

Storage.

"My grandfather used to go out on a boat in the summer, as soon as those blue-berries come out. We always had plenty of food, we had blueberries, raspberries, and stawberries, and those that are in seasons, we had dried apples all year round. They were picked and were dried. My grandfather always picked cranberries. He'd be out on a boat all the time. I went out with him . . . . They also dried fish, they smoked fish, smoked meat, we always had smoked meat. We had no freezers so most of the food we had was smoked fish and smoked meat, dry meat, good food."p161 **Liza Mosher (Odawa). Manitoulin Island, Ontario.**

"When a caribou was killed, the meat was dried so it wouldn't be so heavy to transport to the next campsite. People followed the animals, like caribou, partridge, and porcupine. They never stayed in one place long, so animals were not depleted."p204. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

"There were different kinds of fish like trout, salmon, and different kinds of fish and animals. Caribou was the big game. We also got other animals like black bear, and other animals. There were also birds like ducks. There were different kinds of ducks because they ate different kinds of foods. There was this one kind of duck that eats fish and therefore it tastes like fish. The others eat grass. Preparing food involved smoking and drying. They would also pound the meat to make pemmican so that it would not spoil. In the summer food was dried and smoked. In the winter it could be frozen."p212. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

"Caribou was our main food. Rabbits, ptarmigan, these are our food from the land. In the summer we would dry the meat . . . . Also we would cache the meat. Although it would go a bit bad it would still be food."p268 **Rachael Uyarasuk (Inuit). Igloolik, Nunavut.**

"In the spring too we get herring eggs, then we get seaweed, then we get salmon, then we dry it, then we get the different kind of meats that we can get up and preserve. Berries have to be gathered. Today we freeze it or we jar it and get jam. There is also wild berries, but we can also get raspberries or strawberries from the stores . . . We got salmon berries, we got blueberries, we got greyberries, we got wild currants, bunch berries, huckleberries, salalberries, we got crab apples. The grease comes from fish. You have to preserve it for a while. I don't know. We can't get it here."p436 **Mary Anne Mason (Shayshas). Klemtu, British Columbia.**

Alcohol.

"When the Elders came there, there were people coming in that had alcohol, and wanted to bring it in there and keep drinking and participating in whatever was going on. So the Elders told us that each and everyone had to watch the camps and if they wanted to stay they had to get rid of their booze. So we did, and some young folks that had left were laughing and kind of making unpleasant remarks but they came back the next day . . . and they stayed all week too." p8. **Margaret Paul (Passmoquady). St. Mary's First nation, Nova Scotia.**

"They [the young people] follow their friends instead of doing what they wanted to do. We talked about that, when we, our own people, come in drunk, what do we do? . . . They are the same as us, just because they are drinking. He is my son and those are his people sitting there." p13 **Margaret Paul (Passmoquady). St. Mary's First nation, Nova Scotia.**

"But the life that we went through, well, I have to say that my old man was an alcoholic, and I am not ashamed to say that because they gave us a hard time. That is why today I know about alcoholism and people what they went through – about the life."p38 **Albert Ward (Micmac). Eel Ground First Nation.**

"Like once you start doing the drugs and alcohol and he says, 'Okay.' But the main part of it you never deal with it. It is still inside. You feel okay, you look fine outside."p44 **Albert Ward (Micmac). Eel Ground First Nation.**

"And she [Grandmother] said medicines won't heal in the presence of alcohol. And she couldn't understand why, in the stores, the drug stores, you would find some kind of medicine that's supposed to be good for colds and it would have alcohol in it."p121. **Ernest Benedict (Mohawk). Akwesasne, Ontario.**

"I have seen a body that was burnt because of alcohol. I wonder how things would be if alcohol was not here."p228. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

"[A]lcohol seems to take the fun out of everything"p368. **Martha Rabeskey (Slavey). Fort Good Hope. Northwest territories.**

Contact with incomers.

". . . .[T]here was one university person that came to live with us, his name was Michele. He was a White guy. That's what he thought himself, how else am I going to learn about these people if I don't live with them? So he came and lived on the reserve. Things that we ate, he said 'I wouldn't eat that, that's what we feed our dogs.'

All this stuff what we eat, they don't eat at home. He lived with the people."p27. **Margaret Paul (Passmoquady). St. Mary's First nation, Nova Scotia.**

"[Life on the land] is what I am trying to consider with all the technology and chemicals they put into the ground. It's not healthy, it's not . . . He [a White friend] refused to feed any kind of chemical to the cattle. He never buys any meat to this day, in the store. You can't tell whether those cattle were fed with chemicals. What he does is raise his own beef and eats it, the same thing with chickens, he's quite a guy. He's always with Indian people . . . studying the Indian way, and he's doing good."p355. **Wilf Tootoosis (Salteau). Poundmaker First Nation, Saskatchewan.**

" . . . [T]hese people [warriors in the 19th century] were defending their Indian way. This was their way of life and their food was being damaged, medicine being ploughed underground."p358. **Wilf Tootoosis (Salteau). Poundmaker First Nation, Saskatchewan.**

"I went to this one place with my husband where we picked wild crab apples. And him and I went up the flats, and we were picking here and picking there. The very next day, an older couple from here came, and they saw us up there. 'What are you doing up there? That doesn't belong to you, that belongs to a certain family.' There was nobody guarding it and nobody planted it, so we just went ahead and picked, just like bad boys and girls [laughs – they are both at least seventy years old]. But they weren't even there to pick it."p437. **Mary Anne Mason (Shayshas). Klemtu, British Columbia.**

Waste.

"We also respected animals. When a caribou was skinned, my father never left anything to waste, nothing was left around. Nowadays you see caribou skins lying around, it has to do with the younger generation not inderstanding the culture."p200. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

". . . . [Y]ou can store smoked geese that is left in grease. You can also use the good head, wings and feet. You can make gravy from these parts. Nothing was wasted, everything was used . . . From the moose stomach, you can make a bag, and store your food in there."p246. **James Carpenter (Mushkegowuk Cree). Attawapiskat, Ontario.**

Sharing/Co-operation.

"If one man got a caribou, everyone would share the meat. Sometimes, different men go different ways to go hunting. Some would get game, others did not, but for everyone there was food. If a man got an animal, it was his turn to share."p203. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

"The dogs [sled team] were very respected, their food was cooked like for people."p212. **Elizabeth Penashue (Innu). Sheshashiet, Labrador.**

"The meat we didn't want as our food became dog food."p268. **Rachael Uyarasuk (Inuit). Igloolik, Nunavut.**

"Before the White people came, people helped one another in order to go hunting and get food. The only food was animals. We didn't know of White man's food. We helped each other with our catches, the skins for clothes, the meat and fat."p258. **Rachael Uyarasuk (Inuit). Igloolik, Nunavut.**

" . . . [W]hen someone killed a buffalo, people were called to go there and help themselves, to cut any meat they wanted, dry meat, any kind. Hardly ever any one would go hungry."p344. **Wilf Tootoosis (Salteau). Poundmaker First Nation, Saskatchewan.**

"Many families lived in the [traditional] dwelling, they got along good. It was good because in those days there was no alchohol and everybody supported one another." p367. **Martha Rabeskey (Slavey). Fort Good Hope. Northwest territories.**

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