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Upper Perigordian Hunting: Organisational and Technological Strategies

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1. Introduction

Hunting strategies reflect the interplay of several variables including the social organisation and technology of the hunter, that is the human element; and the overall behaviour and seasonal life cycle of the prey, the prey species element.

The goal of this paper is to examine the impact of these critical variables on Upper Perigordian hunting strategies. I will attempt to illustrate an example of how Upper Paleolithic people frequently characterised as "reindeer hunters" appear to have procured an alternate prey, red deer (*Cervus elaphus*), in a manner very different from that commonly suggested for the hunting of reindeer. Comparison of faunal evidence from four Upper Perigordian assemblages from Le Flageolet I, La Ferrassie, Roc de Combe and Les Battuts to that from the late Upper Paleolithic levels of Gare de Couze, Le Morin and Pont d'Ambar, sites situated in the Aquitaine Basis of Southwest, France, suggests that the hunting strategies employed for the procurement of red deer and other prey would have changed dramatically with the introduction of the spear-thrower.

Two sources of zooarchaeological data have proved critical to this investigation. The first source of data is the *season-of-death* of the prey. This provides information regarding the degree to which resource scheduling was employed by the hunter. Seasonally data also aid in determining whether a bone accumulation represents a single hunting episode, several episodes closely spaces in time, several episodes years apart, or if, in fact, the seasonal mortality cycle of prey species rather than strategic planning on the part of hunters is the driving force behind the bone accumulations.

The *age compositions* of the prey species is the second source of data. This, accompanied by a knowledge of the species ethology and seasonal mortality cycle, aids in the inference of hunting strategies.

2. Methodology

One of the most reliable direct indicators of *season-of-*, and *age-at-death* is the *cementum annuli* analysis of mammalian teeth. This method, which can be used even on isolated teeth, is based upon seasonally-influenced growth increments. Seasonal variation in the deposition of outer root *cementum* and internal dentine in teeth has been observed and investigated by biologists for over half a century (see Pike-Tay, 1990 for review and extensive bibliographic references of *cementum annuli* studies in mammals). *Cementum annuli* are thin "rest" bands formed during the winter months, which differ microscopically in optical quality from the wider bands deposited during warm months.

Due to the long-standing management importance of *Cervus elaphus* in both Europe and North America (where it is known by the Algonquian Indian name of "wapiti"), the red deer has long been the pioneer subject for new techniques of age determination. Always the test case for new techniques, the red deer had accumulated a long record of poor and ambiguous results in dental annuli studies. Therefore before attempting to extend *cementum annuli* analysis to red deer from archaeological sites it was necessary to compile a modern control sample to clarify species specific issues surrounding annuli formation. Careful work with a growing control sample of multiple teeth from over 30 deer of known age and date-of-death verified that the red deer's poor record stems from inconsistent application of previously untried techniques and lack of standardisation, not from any inherent anomalies (Pike-Tay, 1990).

Standard ground sections from longitudinal cuts along the meso-distal axis of the tooth were made to expose the full range of cement coverage. No decalcification was employed as this process renders most archaeological teeth unable to withstand sectioning. Slides were examined under transmitted, polarised light.

Data from my control sample, coupled with that from studies by wildlife biologists of an additional 2,000 *Cervus elaphus* individuals reveal rest band formation beginning in January and ceasing by early May for red deer inhabiting regions from 40° to 60° North Latitude (Pike-Tay, 1990). The optimal area for finding the *cementum* evenly deposited and without distortion was consistently that nearest the tooth cervix, while the most unreliable area was between the roots and at the root apex (fig. 1).

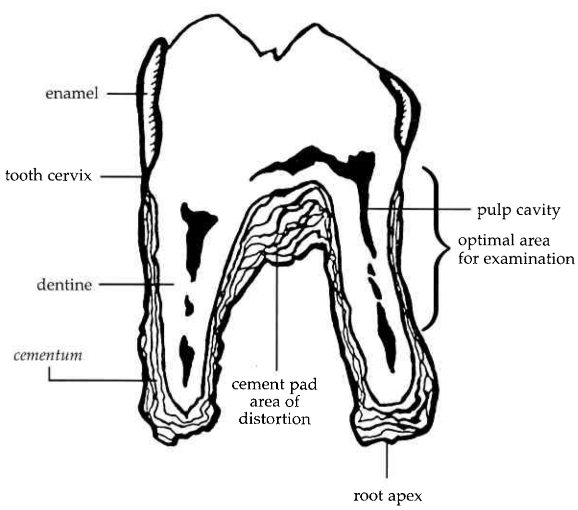

Fig. 1 — Longitudinal section of *Cervus elaphus* lower molar.

The first category of data derived by these methods refers to the season-of-death. The Pleistocene red deer teeth I analysed came from recently excavated, stratigraphically controlled Upper Paleolithic sites, with levels assigned to precise climatic phases. Even with seemingly discrete levels of bone accumulation, we cannot be certain of the time span represented. Therefore, it is absolutely necessary that seasonally studies of any kind be based *exclusively* upon well provenience material.

The second type of data refers to the age profiles. The age (mortality) profiles of the red deer were constructed from *cementum annuli* counts, which occurred with eruption and wear estimates of the partial maxillae and hemi-mandibles whenever those dental series were present. However, the majority of the sample were isolated teeth. Therefore all D4, P4, M1 and M2 *Cervus elaphus* teeth in the faunal sample were analysed to insure that every animal present was accounted for. Numbers of animals present were estimated by a conservative linking of same age and season-of-death teeth. It is not notable that the age curve of animals linked by this method were similar to the curve which treated each tooth as an individual (see Pike-Tay, 1990 Appendices B and C). Before each tooth was sectioned, careful measurements and scanning electron microscope quality casts were made and submitted to the Institut du Quaternaire in Bordeaux to insure availability of data for future researchers. In addition, the necessary dental crown height measurements were taken, and Klein's (Klein & Cruz-Uribe, 1984) program was run on all samples. However, only the sample from Pont d'Ambon proved large enough for this method to be effective (*Ibid.*: Appendix D).

Hunting strategies are inferred from the age profiles (mortality patterns) of the archaeofauna. Changes occurring in the proportion of species and demography of human prey under stable environmental conditions are presumed to reflect changes in the way hunting strategies were organised and implemented (Frison, 1987; Gilbert, 1980). Archaeozoologists have increasingly used age profiles for reconstructing prehistoric exploitation patterns and monitoring their change through time (e.g. Klein, 1982; Levine, 1983; Stiner, 1990; Pike-Tay, 1990). In this regard, I have followed Klein (especially 1982), Stiner (1990) and others, by adopting an interpretive framework which defines three characteristic age profiles for the red deer: that is, comparison to a catastrophic, attritional, and prime-dominated pattern.

The catastrophic pattern is characterised by a large number of individuals in the youngest age class and gradually decreases in numbers down to the oldest age cohort. This is the pattern a healthy, living population of deer would yield.

The attritional pattern has the highest number of individuals in the youngest age class, then drops off steeply with a second rise in the oldest age class. This profile reflects the normal attrition of a population, where the youngest and oldest members are most susceptible to predation, disease, starvation, and accident and therefore exhibit the highest rate of mortality. Klein (1982) argues that a relatively high proportion of young animals in an archaeological assemblage suggests active hunting rather than scavenging, since other carnivores would quickly decrease the quantity of the scavengible remains before humans got to them.

Stiner (1990) introduces a third pattern, the prime-dominated profile which, she suggests, is specifically attributable to human exploitation and implies selective hunting by some means of intercepting and detaining of the prey.

3. The archaeological sample

3.1. The Upper Perigordian Assemblages

The Upper Perigordian sample dates to *ca.* 26000 B.P.

Laville's (1975) sedimentological analyses place the red deer bearing levels within the Würm III, Perigord phase VIc in the case of Le Flageolet I (level 7) and La Ferassie (level D2); and in phase VIIb in the case of Roc de Combe (level 1) and Les Battuts (level 5). All of these levels furnished Upper Perigordian industries (for further detail and reference to complimentary studies of both Upper Perigordian and Tardiglacial assemblages described here, see Pike-Tay, 1990).

Le Flageolet I (level 7)

Excavated by Jean-Philippe Rigaud, Le Flageolet I is a collapsed rock-shelter located on a cliff face on the north side of the Dordogne valley. Its topographic location would have provided a clear view of game movement on the valley floor below. *Cementum annuli* analysis shows red deer hunting to have been a cold season activity, occurring from late fall through late spring (fig. 2). Delpech's (1983 : 352) determination of the ungulate species present in this level shows red deer and reindeer to be the main prey.

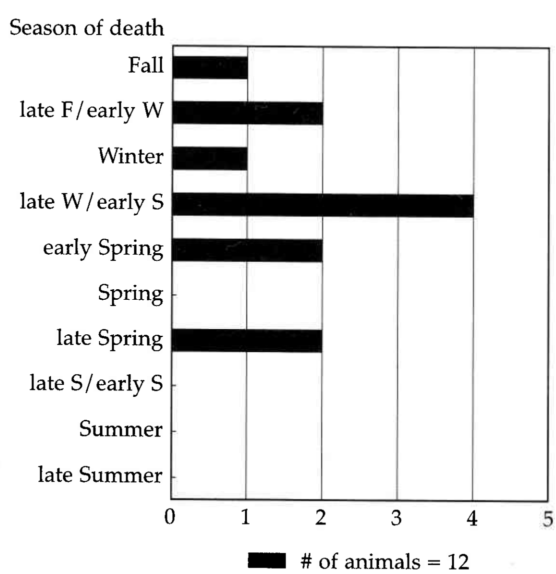

Fig. 2 — Le Flageolet I (level 7). Seasons of red deer hunt. Late fall through late spring.

La Ferrassie (level D2)

La Ferassie is situated in a sheltered, dry valley. Topographically it differs from other Upper Perigordian sites in this sample in that it is an upland interfluvial site. The study sample is from Delporte's (Delporte *et al.*, 1984) excavations. *Cementum annuli* analysis shows that the red deer hunting took place during spring and summer (fig. 3). It appears that the Upper Perigordian hunters at La Ferassie were taking advantage of the red deer's preference for upland habitat during the warm season. Significant here too is the fact that red deer is virtually the exclusive prey animal at La Ferassie (Delpech, 1983 : 348).

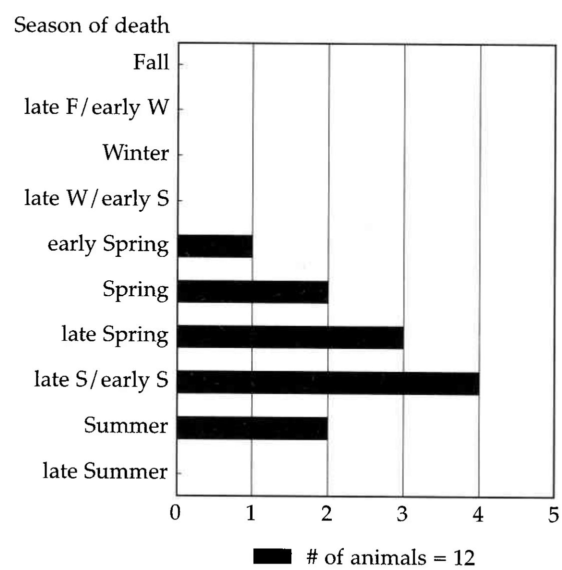

Fig. 3 — La Ferrassie (level D2). Seasons of red deer hunt. Spring and summer.

Roc de Combe (level 1)

Roc de Combe, excavated by Bordes and Labrot (1967), is situated in a dry valley opening onto the Dordogne floodplain. *Cementum annuli* analysis indicates that red deer were hunted from late summer through early winter (fig. 4). Bone count frequencies (Delpech, 1983 : 343) suggest that Roc de Combe was essentially a reindeer hunting site. The late summer, late fall, and early winter red deer kills may have coincided with autumn migration hunting of reindeer, however, season-of-death of the reindeer remains to be determined.

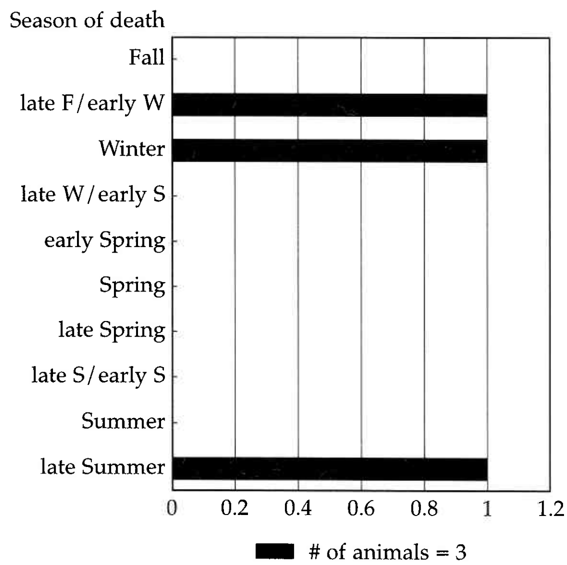

Fig. 4 — Roc de Combe (level 1). Seasons of red deer hunt. Late summer through early.

Les Battuts (level 5)

Les Battuts, excavated by Alaux (1969), is a small rock-shelter situated on a rugged cliff face near the Aveyron river in Tarn. Red deer kills are limited to the winter (fig. 5). Season(s) of hunting ibex and chamois, animals more commonly found here than in the Dordogne sites (Delpech, 1983 : 328), have not been assessed.

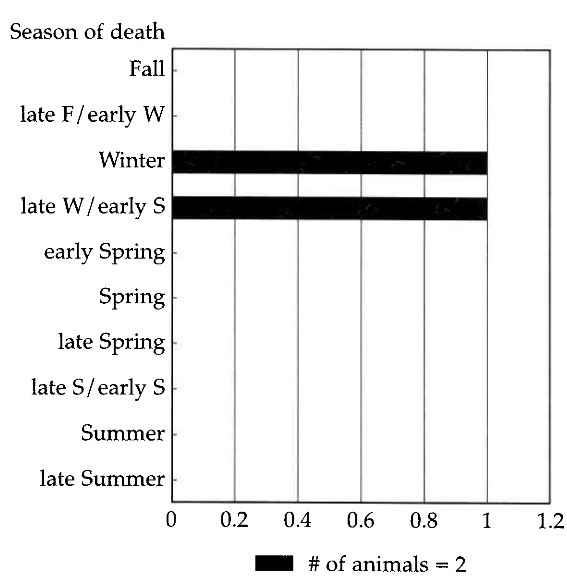

Fig. 5 — Les Battuts (level 5). Season of red deer hunt. Winter.

3.2. Age profiles of Red Deer from the Upper Perigordian Sample

The age profiles of the red deer from all four Upper Perigordian sites reflect a catastrophic pattern. In other words, all age groups are represented. Age profiles were constructed for each individual site, but as these are detailed elsewhere (Pike-Tay, 1990) and the differences were not significant, I have grouped them together for the sake of expediency (fig. 6).

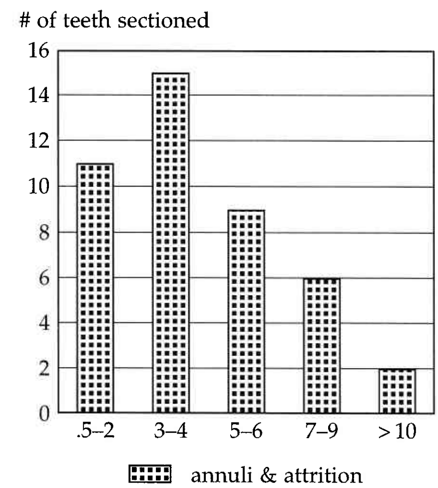

Fig. 6 — Upper Perigordian Sample. Living structure pattern (catastrophic). Age profiles of red deer based on individual teeth.

3.3. The Tardiglacial Sample

The Tardiglacial sample consists of levels associated with Magdalenian and Azilian industries dating to roughly 11 000 years ago (Laville, 1975). The red deer remains come from levels at Gare de Couze, Le Morin and Pont d'Ambon.

Gare de Couze (levels B-G1)

The site of Gare de Couze, excavated by Bordes and Fitte (1964), is situated on the right bank of the Dordogne River, facing its confluence with the Couze River. *Cementum annuli* analysis indicates that the red deer hunting occurred almost exclusively during the spring (fig. 7). The bone frequencies (Delpech, 1983 : 370) suggest that reindeer hunting was the main activity at this site.

Bordes and De Sonneville-Bordes (1979) hypothesised that the Couze valley furnished a natural funnel for migrating reindeer. Perhaps Couze does represent a situation where reindeer were hunted by some strategic, organised means such as a drive, as has been frequently suggested by researchers for other Magdalenian sites. But this remains to be tested. However, the red deer remains suggest use of a different hunting technique—one that was probably more opportunistic and incidental to the main activity of reindeer hunting.

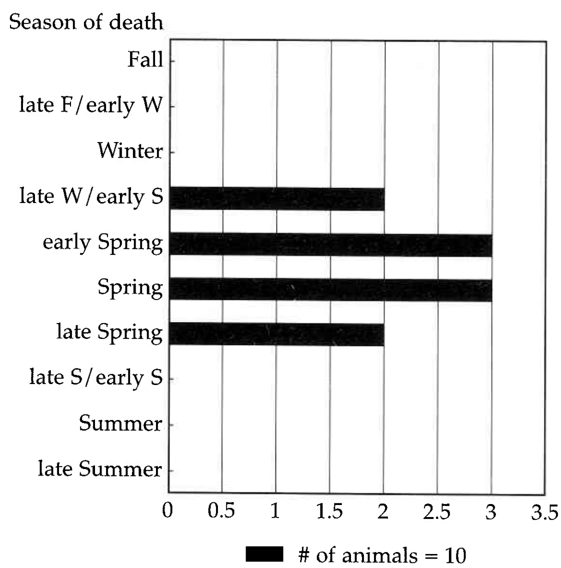

Fig. 7 — Gare de Couze (levels B-G1). Season of red deer hunt. Spring.

Le Morin (levels AI-AIV)

The rock-shelter of Le Morin, excavated by Deffarge (1956), is located in a small dry valley with a gradual slope to the plateau above and to the Dordogne river below. *Cementum annuli* analysis supports late fall through early spring red deer hunting (fig. 8). Bone frequencies (Delpech, 1983 : 376) show that reindeer, bovines and horse were important prey as well.

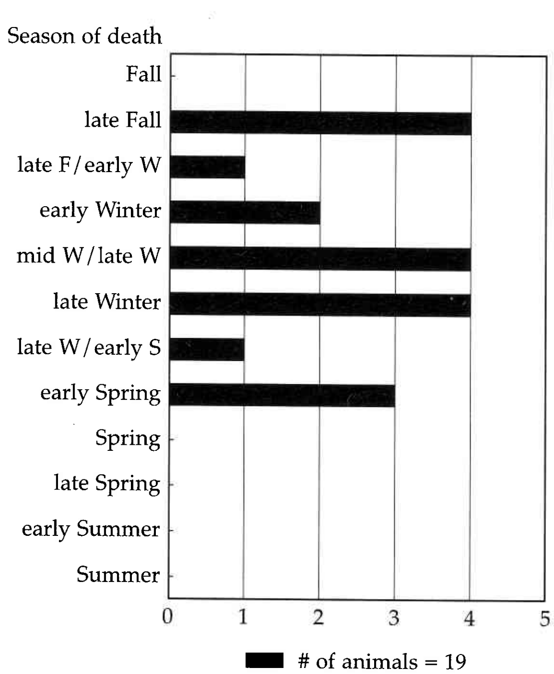

Fig. 8 — Le Morin (levels AI-AIV). Seasons of red deer hunt. Late fall, winter, early spring.

Pont d'Ambon (levels 2, 3, 3a, 3b)

Pont d'Ambon, excavated by Célérier (1979), is one of a series of rock-shelters situated under the continuous limestone cliffs bordering the Dronne river. Red deer hunting at this site is represented by nearly 60 % fall kills, with the remainder being distributed throughout the year (fig. 9). Aurochs, hors, wild boar, fish and rabbit (Delpech, 1983 : 382) appear to have been important to subsistence as well.

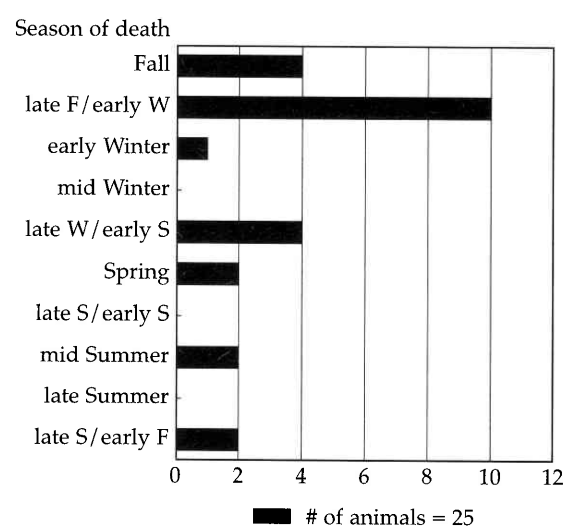

Fig. 9 — Pont d'Ambon (levels 2, 3, 3a, 3b). Seasons of red deer hunt. All seasons represented.

3.4. Mortality pattern of Red Deer from the Tardiglacial Sample

All of the red deer age profiles from this Tardiglacial sample demonstrate a juvenile bias pattern (fig. 10). In sum, there was an emphasis on red deer lees than four years old.

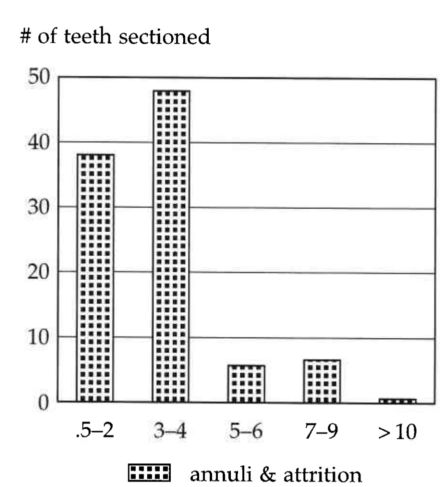

Fig. 10 — Tardiglacial Sample. Juvenile bias. Age profile of red deer based on individual teeth.

4. Interpretation of observed Patterns

The constructed age profiles reveal a catastrophic pattern for the Upper Perigordian sample, indicating that animals of all ages were procured. On the contrary, the Late Upper Paleolithic sample demonstrated a juvenile biased age pattern, indicating the procurement of mostly young animals.

If late Magdalenian hunting strategies included the use of some sort of organised human or natural surround by which animals could be detained and selectively culled, as has been repeatedly suggested for the procurement of reindeer, with their natural herding tendencies (for references and discussion see Pike-Tay, 1990 : 6–17), there is no evidence of such a communal strategy in the hunting of red deer from the late Upper Paleolithic levels at Gare de Couze, Le Morin, or Pont d'Ambon. If this sort of technique were being employed, we would expect a prime-dominated age profile or at least a strong presence of prime animals since these yield the most desirable meat, fat, hide, and antler. Rather, the juvenile-biased pattern at these three Tardiglacial sites, is what might be expected from either single or small groups of hunters using spear-throwers.

In population terms, there are far more juveniles present in a given stable group of *Cervus elaphus*, than there are in the older age-cohorts. In behavioural terms, juveniles are the least wary of all red deer. On approaching a cow-calf-juvenile group, the first of these extremely skittish animals to flee are the adults, who far outrun the younger animals, leaving those juveniles in the rear to be picked off by hunters.

Given the level of difficulty of procuring prime adult red deer, how is it that the Upper Perigordian hunters of 26,000 years ago were taking as many prime adults as juveniles? The Tardiglacial hunters, who we know were equipped with the effective projectile technology of the spear-thrower, seem to have been limited to taking younger animals?

Recent experimental work by Cattelain (1988) replicating Magdalenian spear-throwing technology demonstrates that, 1) killing distance for spear-throwers with a 150 g projectile is between 10 and 25 m; and 2) by using the spear-thrower, the speed of the projectile is nearly 3× that of a hand thrown spear. Therefore, we may infer that if the Upper Perigordian hunters were equipped only with a hand thrown spear he/she would need to be much closer than 25 m from a red deer to have a chance at a kill. Given the elusiveness and skittishness of healthy adult red deer such close-range stalking is highly unlikely as a common practice. I suggest that the Upper Perigordian pattern, with as many prime adult as juvenile red deer prey, is a product of technological limitation that forced the hunters to find some method, perhaps co-operative and organised, that allowed people to get very close to intercepted or detained animals. The hunting methods would have included: 1) a strong reliance upon organised, co-operative interception and detention of the prey; 2) the use of traps, snares, or pits; and 3) perhaps least frequently, stalking and/or ambush of individuals. These hunting methods, being generally indiscriminant of age or sex of the prey, eventually accumulate in a catastrophic (living structure) age profile.

On the other hand, even a single hunter armed with Final Magdalenian or Azilian spear-thrower hunting technology, could come away with at least the younger red deer without having to expend the time and energy to organise in the manner suggested for the Upper Perigordian. The analysis of the red deer sample from the Tardiglacial levels at Gare de Couze, Le Morin and Pont d'Ambon provides: 1) no evidence for strategic surround and detention of red deer which would have allowed for the selection of prime-adults; 2) clearly juvenile-biased red deer age profiles, the expected result of single or small groups of hunters armed with spear-throwers.

5. Conclusions

In conclusion, it is probable that hunting methods used by at least some Upper Perigordian as well as other early Upper Paleolithic groups involved a good deal of forethought and organised group co-operation, rather than the opportunistic foraging strategy proposed by many researchers (e.g. Binford, 1985). Inferred differences in the hunting strategies of red deer as opposed to those for reindeer, during the Upper Paleolithic show that what holds for one species does not necessarily hold for another. Therefore it is necessary to consider the differences in behaviour and ecology among prey species along with the organisational characteristics and technology of the hunters. The seasonal behaviour of a prey species is manifest in changing group composition in terms of sex, age and number of animals and seasonal mortality patterns. It is essential that these characteristics are to be considered in the interpretation of seasonally accumulated age profiles of the prey.

This discussion has considered the effects of the human element, that is the social organisation and technology of the hunter, as well as the prey element, that being the behaviour and seasonal life cycle of the prey. However, other variables which impact hunting strategies such as the horizontal and vertical densities of vegetation and fauna in the environment (Smith, 1983) remain to be explored. The situation and density of fauna and vegetation is dictated by both climatic seasonality and the topography of the land. From the perspective of the Paleolithic hunter, this relationship affects both the visibility and abundance of prey animals, and it determines the effectiveness of the hunting technique employed. Controlled analyses of variables such as these will lead us to better informed reconstruction's of Paleoltihic hunting strategies.

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