

Zooarchaeological and taphonomical analysis of the Epigravettian faunal remains of stratigraphic unit 11 at Riparo Tagliente (Verona-Italy)

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Abstract

Stratigraphic Unit 11 is related to the late Epigravettian occupation of Riparo Tagliente. Faunal remains within this deposit are highly fragmented and present a high degree of combustion. Bone remains are located within a limited area of the outer part of the rock shelter.

This analysis aims at studying the faunal remains in order to understand their taphonomical history and contribute to interpret the paleoeconomy of the site.

Keywords: archaeozoology, Epigravettian, northern Italy.

Introduction

Riparo Tagliente (Valpantena, Lessini Mountains, Verona - Italy) is a rock-shelter located within an environment rich in natural resources. These resources have supported the occupation of the rock-shelter by the Paleolithic groups over a long time. (Bartolomei *et al.*, 1982, 1984; Guerreschi & Fontana, 2004).

Since the Middle Paleolithic Riparo Tagliente was occupied by Neanderthals and, later by groups of anatomically modern humans; The most ancient layers are therefore referred to the Mousterian culture; these are followed by an eroded Aurignacian layer and lastly by an Epigravettian deposit. Abundant lithic and animal remains testify the long and continuous occupation of the site during this last phase (Bartolomei & Broglio, 1975)

Archaeozoological analyses have been carried out in order to highlight the exploitation of faunal resources in the site; a taphonomical analysis has also been undertaken aimed at recognizing fragmentation processes (Thun Hohenstein, 2001)

Archaeozoological and taphonomical analyses provide archaeologists with information on the paleoenvironment and the paleo-economy

of ancient humans. These two approaches of study were applied by using different methods according to the research objectives.

Stratigraphic unit 11

Our case-study was mainly focused on studying the faunal remains from the SU 11 of the Late Epigravettian deposit. This SU is very rich in lithic artifacts while other archeological finds are much less abundant (Fontana *et al.* 2007, in press).

The faunal remains were located in the outer part of the rock-shelter within a limited area of the site covering about 4 m² and corresponding to squares 7, 20-21 and 35-36. (Guerreschi & Fontana, 2004).

The results of the study of the faunal assemblage are presented in this paper.

Methodology

A series of archaeozoological and taphonomical analyses have been employed to reconstruct the depositional history of the bone assemblage and to investigate Modern humans' hunting and subsistence strategies during the final part of the Upper Paleolithic.

We can summarize these analyses as follows:

- The length of bones remains has been measured (nearest mm). Then faunal remains long bone shaft fragments that were larger than 20 mm were classified, while we counted all the bone remains that were shorter than 20 mm.

- The state of burning was recorded for all the fragments larger than 20 mm regardless whether they were identified or not. Categories of burned bones were recorded; partially or completely carbonized.

- Skeletal elements were identified to the closest possible taxonomic unit, including cranial fragments, vertebrae, long bone articular ends and shafts. Since the majority of bones were highly fragmented, the identified bone elements were documented by describing the specific element, its side and the portion of the bone (e.g., proximal-distal epiphysis, medial shaft). Shaft fragments were coded according to the presence of specific zones (i.e., proximal shaft, distal shaft, mid-shaft).

- Frequencies of element portions were used to calculate the minimum number of skeletal elements (MNE), and the minimum number of individuals (MNI). The number of identified specimens (NISP) was used as a basic measure of taxonomic abundance.

- Anthropical and natural modification traces were examined in the laboratory using a normal lamp and a microscopy (LEICA MZ6) with resolution magnifying lamp (LEICA CLS-150XE).

- The colour of the bones was recorded by Munsell Soil Color Chart to classify the degree of burning, the modification due to natural sedimentation and erosion processes on the surface of the bones.

- The mode of bone fragmentation was analyzed by controlling the anthropical modification processes on the bones surfaces. Natural fragmentation processes were also considered.

- The age structure of the faunal remains and the main hunted species were analyzed on the basis of tooth eruption and the ontogeny analysis of the bones.

- Analysis of cutting marks and scraping was performed using Scanning Electron Microscopy (SEM) in the laboratory of the University of Ferrara.

Results

A total of 2884 faunal specimens have been studied in the laboratory of archaeozoology and classified into four groups. These groups were the outcomes of the basic standard of the analysis of the faunal remains according to the archaeozoological and taphonomical analysis.

The first group includes identified bones that were represented by 252 specimens. The second group is composed of 1249 unidentified specimens longer than 20 mm. The third group contains 564 burned bones shorter than 20 mm.

The fourth is represented by 819 fragments shorter than 20 mm.

The following step of analysis has involved the selection of the specimens according to the skeletal anatomy (Fig. 1). Work has been done in order to identify bone species and the Minimum Number of skeletal Elements (MNE). These results were used for the calculations of the Number of Identified Specimens (NISP) and Minimum Number of Individuals (MNI) (Tab.1).

The faunal assemblage is composed of different taxa, most of which are represented by macro-mammals; some of these belong to *Cervidae* like deer, roe deer, elk and , others to *Bovidae* like ibex, chamois, wild boar, bison and auroch. Carnivores are represented by bear, lynx and badger; rodents by the marmot, the beaver and the hare. The estimation of the Minimum Number of Individuals (MNI) (Tab.1) has enabled us to identify three individuals of deer and ibex, two roe deers, elks, aurochs, wild boars, bears and marmots. The MNI has been calculated taking in account age at death and the frequency of the same epiphyseal portions of bones.

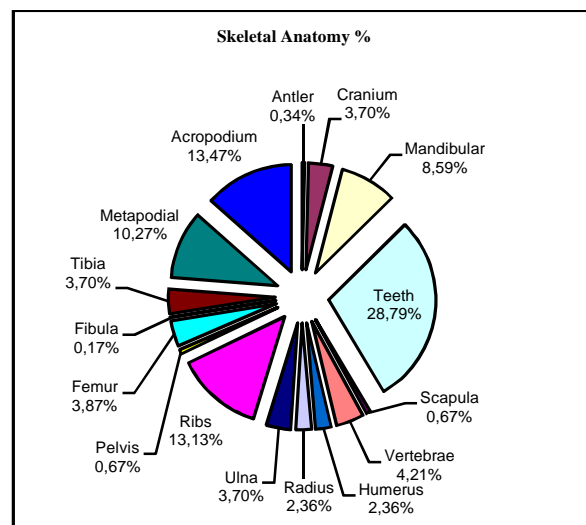


Fig. 1. Riparo Tagliente (S.U. 11) - Skeletal frequency.

Taxon	NISP	MNI
<i>Cervus elaphus</i>	64	3
<i>Capreolus capreolus</i>	26	2
<i>Alces alces</i>	25	2
<i>Megaceros</i> sp.	2	1
<i>Capra ibex</i>	36	3
<i>Rupicapra rupicapra</i>	6	1
<i>Bos primigenius</i>	16	2
<i>Bison bison</i>	6	1
<i>Sus scrofa</i>	21	2
<i>Ursus</i> sp.	9	2
<i>Lynx lynx</i>	1	1
badger	3	1
<i>Marmota marmota</i>	27	2
<i>Castor fiber</i>	3	1
<i>Lepus</i> sp.	7	1

Tab. 1. Riparo Tagliente (S.U. 11) NISP & MNI of *Artiodactyla Cervidae*, *Artiodactyla Bovidae*, *Carnivore*, *Rodents* and *Hare*.

As shown in (Fig.2) these results have been affected by the high fragmentation processes which have also limited the possibility to identify the causes of modification.

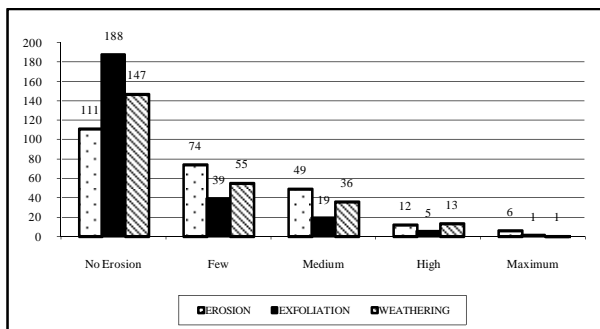


Fig. 2. Riparo Tagliente (S.U. 11) Natural modifications on identified bones.

Fragmentation processes (natural and anthropical)

Taphonomical processes were identified according to their anthropical and natural origin on the surface of the specimens in addition to carnivores and rodents modifications.

Natural modifications are due to weathering, erosion, exfoliation and root etching and are represented either by single or by multiple processes on the surface of each specimen. The degree of decay of the bones has been classified into four groups (low, medium, high, and very high). This was done in order to provide more detailed results about the causes of fragmentation (Fig. 2).

Root etching was also recognised and classified into three groups according to the degree of alteration documented on the surface of the bones.

Anthropical modification was the result of human hunting and butchering processes. Human activities are present more frequently on unidentified specimens because of the high degree of bone fragmentation and represented by anthropical fractures, notches, detachments, percussion cones and scraping (Fig. 3).

Carnivores and rodents marks have been identified especially on the surface of unidentified specimens.

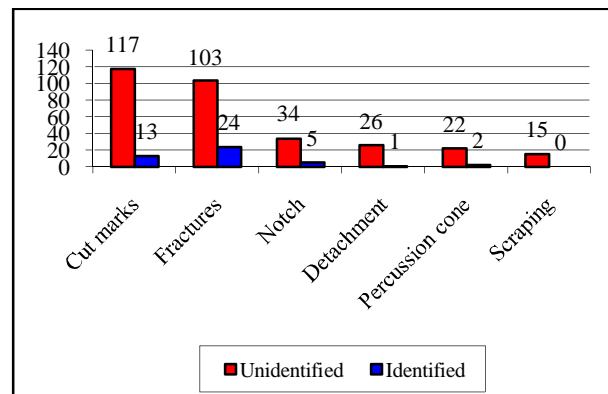


Fig. 3. Riparo Tagliente (S.U. 11) Anthropical modifications on the bones surfaces.

Discussion and conclusions

The analysis of the faunal remains coming from SU 11 of the Epigravettian deposit has revealed the presence of a wide range of taxa among which the deer and the roe deer, the marmot and some carnivores such as the bear.

These remains are related to different portions of the animal skeletons and to different class-ages. Young and adult individuals are represented by the remains of the cartilage and epiphyseal fusion, and different teeth (milky teeth, adult teeth). Faunal remains also reflect different hunting seasons showing that humans have occupied the site throughout the year.

The identification of human practises such as hunting, skinning and butchering was carried out by the identification of anthropical modifications on the surfaces of faunal remains. Cut marks were also found on some bear metatarsals (Fig. 4 A, B, C), revealing skinning activity aimed at obtaining the pelt.

Human groups used to carry into the site specific parts of the animal skeletons particularly long bones (humerus and femurs, ulnas and radius). These skeletal remains located within a limited surface identified as SU 11 are part of the

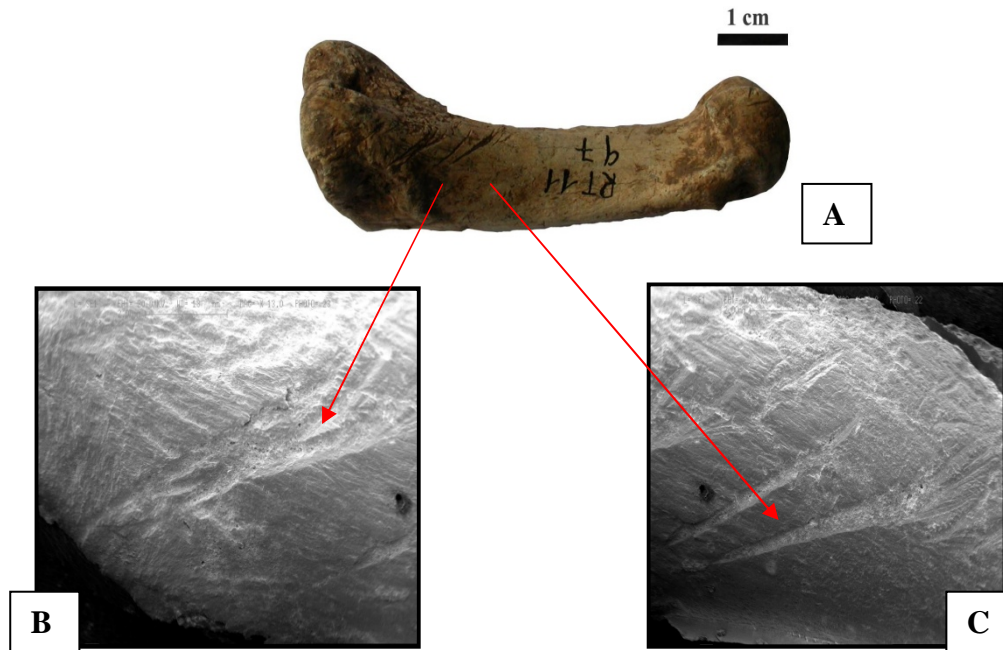


Fig.4. Riparo Tagliente (S.U. 11) Metatarsal (A) of bear (N. 893) showing cut marks originated by skinning. B & C: SEM details of the cutmarks, showing the typical characteristics.

waste remains that the Epigravettian groups damped in the external sector of the rock-shelter (Fontana *et al.*, 2007, 2008). The high presence of burned bones among them is related to the intense use fire. Lastly the location of faunal remains in the outer part of the rock-shelter has

probably increased the processes of natural modifications. Adding their effect to the alterations due to anthropical practices natural agents have had a considerable role in reducing the number of identifiable specimens.

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