

# Animal Resources and Subsistence Strategies

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## ABSTRACT

*Several faunal assemblages excavated in deposits of different antiquity (from Lower Paleolithic to Bronze Age), located in Northern, Central and Southern Italy, were studied from the archeozoological and taphonomic point of view. Data obtained by different Authors allow reconstruction of subsistence strategies adopted by prehistoric humans in these areas and through time, in particular as far as the exploitation of animal resources is concerned. The following assemblages were considered: Isernia La Pineta (Molise; Lower Paleolithic), Grotta Breuil (Latium; Middle Paleolithic), Grotta della Ghiacciaia (Verona; Middle Paleolithic), Riparo di Fumane and Riparo Tagliente (Verona; Middle and Upper Paleolithic), Riparo Mochi (Liguria; Upper Paleolithic), Grotta della Continenza (L'Aquila; Upper Paleolithic and Mesolithic), Grotta dell'Edera (Trieste; Mesolithic and Neolithic), Grotta della Cala at Marina di Camerota (Salerno; Eneolithic), Contraguda (Sassari; Neolithic), Castellaro Lagusello (Mantova; Bronze Age). Exploitation of the vegetal resources has been analyzed in the Neolithic sites of Colle Santo Stefano (Fucino), Settefonti (L'Aquila) and Catignano (Pescara).*

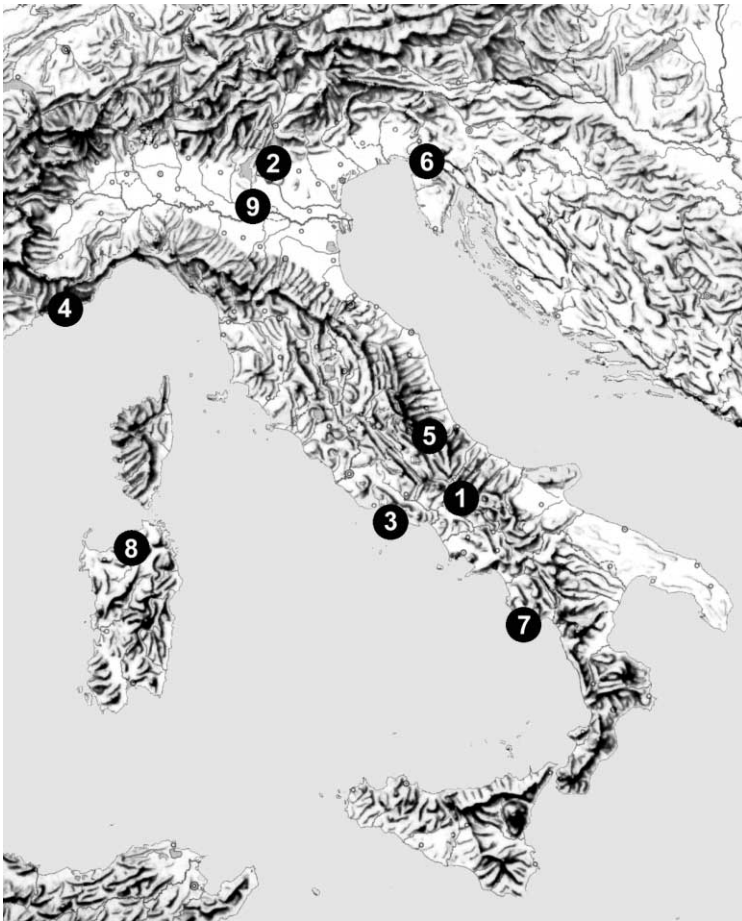
**Key words:** archeozoology, subsistence strategies, taphonomy, Italy

## Introduction

This paper presents the results achieved through the interdisciplinary analysis of very important sites referable to different chronological periods. Therefore, the comparison among the methods, the techniques, the investigations and the importance of the results have been taken into account in chronological perspective in order to underline the com-

mon elements, that characterize human behavior in diachronic phases, and the differences that can depend on the behavioral and cultural evolution and on the technologies connected with the production of tools and their employment.

The choice of the sites has been made according to different criteria: highly anthropized deposits with abundant and well-preserved finds have been privileged. Be-



*Fig. 1. 1. Isernia La Pineta (Molise); 2. Verona area sites (Riparo Tagliente, Grotta di Fumane e Grotta della Ghiacciaia); 3. Grotta Breuil (Monte Circeo); 4. Riparo Mochi; 5. Abruzzo sites (Grotta Continenza, Settefonti, Catignano); 6. Grotta dell'Edera (Trieste); 7. Grotta della Cala (Marina di Camerota); 8. Contraguda (Sassari); 9. Castellaro Lagusello (Mantova).*

sides, they are placed on the whole Italian territory (from North to South) and they illustrate the different geographical and environmental conditions from the Lower Paleolithic to the Bronze Age.

The following assemblages were considered: Isernia La Pineta (Molise; Lower Paleolithic), Grotta Breuil (Latium; Middle Paleolithic), Grotta della Ghiacciaia (Verona; Middle Paleolithic), Riparo di Fumane and Riparo Tagliente (Verona; Middle and Upper Paleolithic), Riparo Mochi (Liguria; Upper Paleolithic), Grotta della Continenza (L'Aquila; Upper Paleolithic and Mesolithic), Grotta dell'Edera (Trieste; Mesolithic and Neolithic), Grotta della Cala at Marina di Camerota (Salerno; Eneolithic), Contraguda (Sassari; Neolithic), Colle Santo Stefano (Fucino; Neolithic), Settefonti (L'Aquila; Neolithic) and Catignano (Pescara; Neolithic). Castellaro Lagusello (Mantova; Bronze Age).

**Isernia La Pineta (Lower Paleolithic): Figure 1, n. 1**  
(U. Thun Hohenstein, G. Malerba, G. Giacobini, C. Peretto)

A taphonomic study was carried out on the faunal assemblage of Isernia La Pineta coming from US 3S10 and 3 »col-luvio« of the first sector of the dig, investigated during the field excavations held in 2000. The area was explored for an extension of 10 m<sup>2</sup>. The analysis of bone surface modifications was carried out on 1,327 remains. Most of them showed different kinds and intensity of superficial alterations such as erosions, abrasions and exfoliations. In many cases these alterations prevented microscopic observations. Attention was focused on the identification of diagnostic criteria useful for the attribution of surface modifications to anthropic activity. In particular, linear marks were observed at the Scanning Electron Microscope<sup>1–5</sup>. Different factors

were considered in the interpretation of linear marks, including their location and orientation and typical microscopic characteristics (observed at the stereomicroscope or SEM).

Even if most of the linear marks observed on the Isernia remains must be attributed to trampling (action of abrasive particles) and in few cases to gnawing by carnivores, some striae reliably identified as produced by the cutting edge of lithic tools were identified (even if their microscopic characteristic appeared effaced at different degrees by the sediment). These cutmarks are mostly located on unidentified shafts fragments near insertions areas of ligaments. Several groups of cutmarks were also recognized on a bison mandible (area of masseter insertion) (Figure 2).

These observations provided insights into the importance of human intervention not only in the accumulation but also in the modification of the faunal assemblage.

**Middle Paleolithic Deposits of the Area of Verona: Figure 1, n. 2**  
(G. Malerba, G. Giacobini, C. Peretto, U. Thun Hohenstein)

Several sites of the area of Verona, such as the Riparo Tagliente and the Riparo di Fumane are well known in prehistoric literature owing to their very rich Middle Paleolithic deposits (they also contain Upper Paleolithic levels). A systematic study of the faunal assemblage from the Mousterian levels of these sites is in progress. Study was also recently carried out on material from a smaller site of the same area, the Grotta della Ghiacciaia.

Several reports on the archeozoology and taphonomy of the Fumane Mousterian levels were already published. A very marked anthropisation of these levels is evident, demonstrated by the abundant faunal assemblage dominated by ungu-

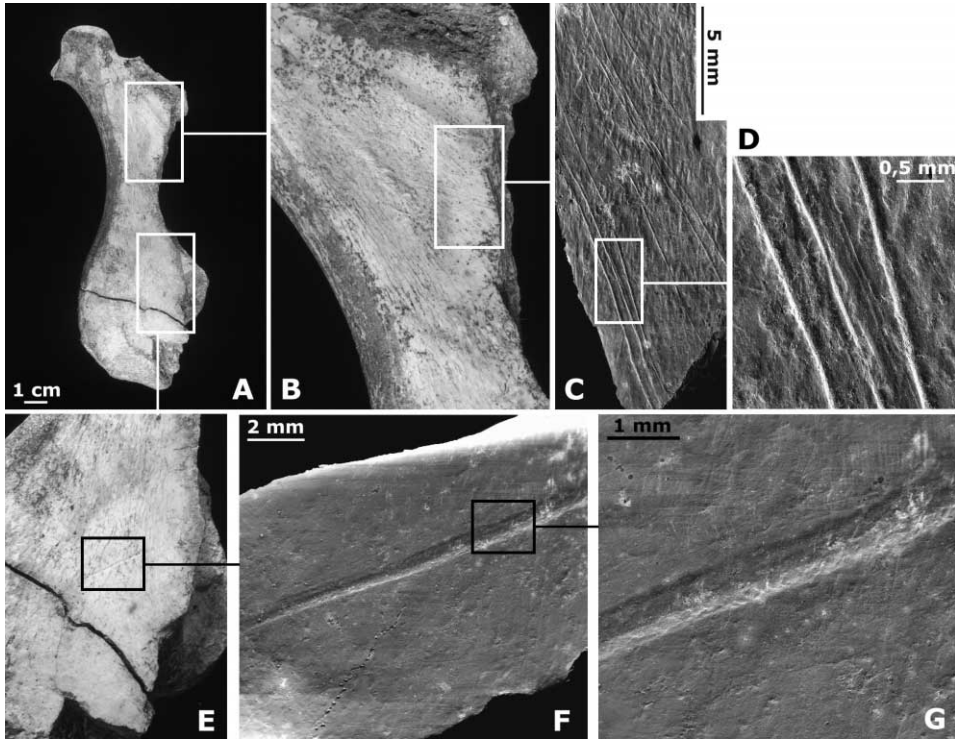


Fig. 2. Isernia La Pineta (Lower Paleolithic). A: fragment of bison mandible from US 3S10 showing cutmarks. B: close-up of a group of cutmarks (stereomicroscope). C, D: SEM details at different magnifications. E: stereomicroscope detail of an isolated cutmark. F, G: SEM details at different magnifications.

lates and by rich evidence of anthropic actions on animal remains<sup>6</sup>.

Taphonomic analysis was recently focused on Mousterian levels A8–9, which provided a highly fragmented faunal assemblage. However, bone surfaces appeared well preserved and modifications produced by anthropic and non-anthropic actions were well identifiable. This good state of preservation allowed reliable microscopic observation. Abundant cutmarks, were observed. Their microscopic characteristics provide clear examples of marks produced by the cutting edge of a lithic instrument (»V« shaped section of the main score, whose walls are covered with secondary striae). Marks produced by scrap-

ing were also identified, represented by numerous fine parallel striae covering areas of the bone surface.

On the basis of their localization and morphology, cutmarks can be related to the different stages of the butchery process, such as dismemberment and filleting. Less frequent are skinning marks. Evidence of intentional breakage is also frequent. Many diaphysal fragments show the typical notches (circular areas of destruction) produced by the impact of the stone hammer.

Riparo Tagliente is the other important site of this area<sup>7,8</sup>. A systematic study of the faunal assemblage from Mousterian deposit is in progress<sup>9–13</sup>. We have

analyzed about 20,000 macromammal remains from levels 52–44, 37, 36 and 35. Identified remains represent respectively 4% of the highly fragmented faunal assemblage for layers 37, 36 and 35 and 15% for layers 52–44. On the basis of the Number of Identified Specimens, among ungulates, the most represented species is roe deer, followed by red deer, ibex and chamois; among carnivores, wolf and fox are dominant but both rare; among rodents some marmot remains have been identified. The Minimum Number of Individuals is very low for all taxa (1 or 2 individuals). This faunal assemblage is mostly formed by adults and sub-adults. Cervids fetal or neonate bones were also identified, providing information concerned with the seasonal occupation of the rock shelter (spring-time).

The high degree of fragmentation of the faunal assemblages is mostly due to intensive human activities. Also in this case, bone surfaces are generally well preserved, allowing detailed analysis of modifications caused by anthropic activities. The typical diagnostic characteristics of marks produced by the cutting edge of a lithic tool were evident at SEM observation. Cutmarks were observed on an average of 22% of the ungulates remains for layers 37, 36 and 35 and 4% for layers 52–44. They were absent on carnivores finds. Moreover, cutmarks were recognized on marmot bones (Figure 3).

In conclusion, the cutmarks identified on the bone surface testify that butchery of the animal carcasses was probably conducted on the site with a consolidated and repetitive technique. The distribution of cutmarks on different skeletal elements provides indications on the butchery strategies adopted by humans who inhabited this highly anthropized site. The occupation of the site by carnivores appears to have been incidental in layers 37, 36 and 35 as indicated both by the low percentage of their remains and by the

rarity of gnawing or chewing marks. Nevertheless it becomes more important in lower layers (52–44).

The Mousterian deposits of the Grotta della Ghiacciaia, in the same geographic area, provided a limited number of faunal remains<sup>14–17</sup>. Some preliminary taphonomic observation can be proposed. Although a few teeth of bear, wolf and fox were identified, bones remains did not show any evidence of modifications by carnivores. Ungulates were represented by roe deer, ibex and bison. Anthropic activities are demonstrated by the presence of cutmarks and intentionally fractured bones. Reconstruction of butchering sequences is not possible on the basis of this small sample. It is important to note that some diaphysis fragments, used as retouchers, similar to those from other sites of the same area<sup>9,18</sup> were found.

**Grotta Breuil (Middle Paleolithic):  
Figure 1, n. 3  
(F. Alhaique, A. Recchi)**

The analysis of the faunal remains recovered in the final Mousterian site of Grotta Breuil (Monte Circeo; Latium) allowed to collect detailed information regarding the strategies adopted by the last Neandertal populations in Italy for the exploitation of animal resources<sup>19,20</sup>.

Hunting focused almost exclusively on ungulates and in particular on red deer and in part on *Bos primigenius*, during warmer periods represented by the lower occupation levels, while in the upper part of the stratigraphic sequence when the climate was colder, ibex was the main prey species. However, there is some evidence for the occasional exploitation of other resources as indicated by the presence of cutmarks on the tibia of a red fox. Furthermore, some use wear traces on lithic implements<sup>21</sup> seem to suggest fish scale removal although fish remains are absent from the faunal sample analyzed

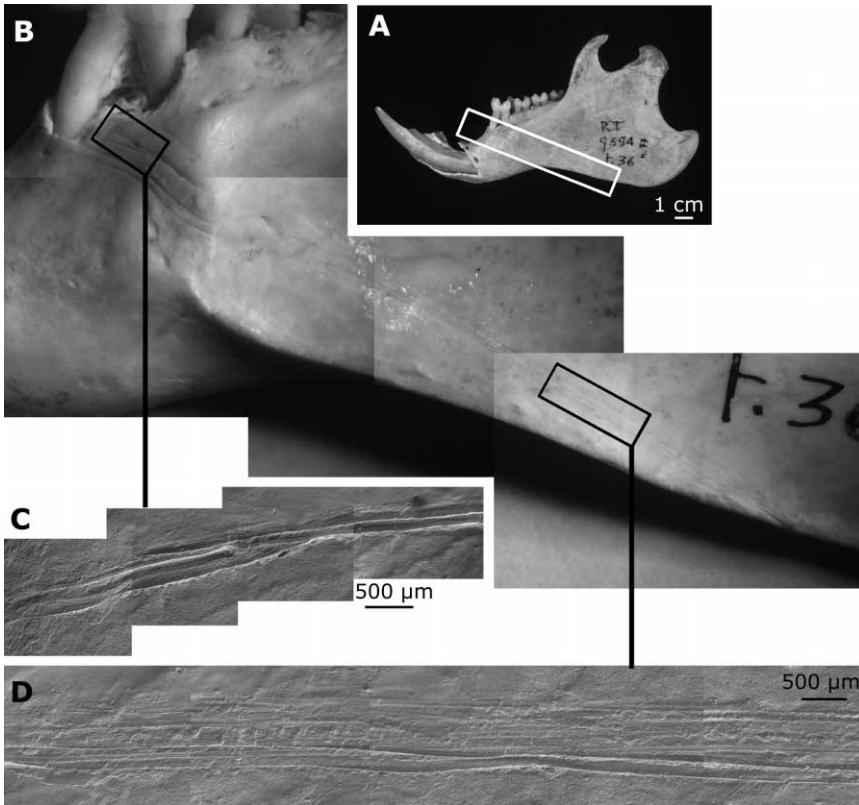


Fig. 3. Riparo Tagliente, Verona (Mousterian level T36). A: marmot mandible, bearing a sequence of long parallel cutmarks. B) close-up of the striae (stereomicroscope). C, D: SEM details of cutmarks.

so far. The use of animal species, other than ungulates, was also evidenced in other Mousterian sites in Latium such as Grotta di S. Agostino and Grotta dei Moscerini<sup>22</sup>. The avian sample, mainly *Pyrrhocorax pyrrhocorax*, *P. graculus* and *Columba livia*<sup>23</sup>, does not show signs of human intervention and is therefore more likely the result of natural accumulation of species nesting on the cliff face rather than the result of hunting.

The determination of the age at death of the ungulates indicates that prime adult individuals were preferentially selected and therefore hunting strategies were quite efficient. This pattern is more

commonly found in Upper Paleolithic sites and in modern ethnographic cases<sup>22</sup>, therefore in this aspect Neandertal behavior is similar to that of anatomically modern humans.

Skeletal representation for the main prey species indicates the presence of all anatomical elements suggesting that whole carcasses were transported to the cave, possibly after a minimal primary butchery at the kill site. This supports the hypothesis that hunting parties usually did not go very far from Grotta Breuil. In fact, although the range of species identified suggests that several habitats were exploited, from the more rocky environ-

ment of the promontory to the plains in front of the cave exposed by marine regression during the glaciation, these hunting grounds are all located close to the site.

Human modifications on the bones are quite rare in the faunal assemblage although different stages of carcass processing from skinning to marrow consumption have been recognized. However, it was not possible to assess a butchery sequence in the sample analyzed so far. The scarcity of human traces may be explained by the small size of lithic artifacts that are not heavy enough to produce very deep marks and also sometimes are not suitable to reach inner ligaments in the articulations therefore bone breakage is used as an alternative method for disarticulation as indicated by repeated fractures in the same location on the bone. These hypotheses have been based both on the basis of the archaeological data and on experiments of butchery with replicas of the Mousterian tools from Grotta Breuil<sup>24,25</sup>. Carnivore activity on the specimens (i.e., gnaw marks, puncture marks, digested bones) is not very common and increases in the upper strata where also remains of large predators such as hyenas and wolves are slightly more frequent.

Preliminary studies of spatial distributions<sup>26</sup> show that in the lower levels, where human occupation is more intense, both species and skeletal elements are distributed differently in the different excavation squares while in the upper strata, where we have evidence of some carnivore contribution to the accumulation of faunal remains, the bones are randomly dispersed in the excavated level. It is not possible at the present stage of the research, to interpret the »human« distribution of the faunal remains, but further, and more elaborate analyses, including also other archaeological data, will be

done on the spatial distribution in order to identify activity areas within the cave.

On the basis of the faunal and the archaeological information analyzed so far the site can be interpreted as a seasonal residential camp used mainly during the colder part of the year as indicated by the season of death of young ungulates.

The identification in some levels of a wider range of activities (e.g., wood working, plant collection, hide processing) based on the use wear analysis<sup>21</sup> as well as the indication of a more intense carnivore occupation in the upper levels indicates changes in occupation strategies through time, therefore new data from the oldest strata, which are still under investigation, will be critical for our understanding of the variability of Neandertal behavior in this crucial period of human history.

**Riparo Mochi (Upper Paleolithic):  
Figure 1, n. 4  
(F. Alhaique, A. Recchi)**

The faunal assemblage from the old excavations at Riparo Mochi<sup>27,28</sup> has been only partially studied and published so far<sup>29</sup>. Some of these studies have been used to suggest that a marked increase in human population during the final phases of the Upper Paleolithic produced a broadening of the range of species exploited with a more intense utilization of marine resources, mainly mollusks<sup>30,31</sup>. Furthermore, in these same levels birds seem to be exploited more intensely than in the previous periods.

New activities were carried out by the University of Rome »La Sapienza« and the Soprintendenza Archeologica della Liguria since 1995 and new archaeological materials, spanning from the Gravettian to the Mousterian, were collected. Preliminary data on the faunal remains recovered during these more recent excavations from the Upper Paleolithic levels

have been published<sup>32</sup>. Except for the uppermost level removed during the old excavations, where there is a significant presence of mollusks and birds, in the other strata ungulates are the most abundant species. Red deer is the most frequent species during the Aurignacian and the Gravettian with Noailles burins, while in level C the few remains analyzed, referred mainly to ibex and marmot, point to a worsening of the climatic conditions. Large carnivores are almost completely absent from the Upper Paleolithic assemblage analyzed and also the traces of their activity on the bones are rare. Some preliminary investigations on the Mousterian show that carnivore remains seem to be abundant suggesting that the site had been used as a den during this period while apparently human occupation was probably more ephemeral.

The few data on the age at death of the ungulates seem to show some differences between periods and also between species within the same level suggesting changes in hunting patterns through time and variable hunting strategies for the different animals.

Considering the traces of human activity on the bones, it is in general possible to say that there is a high degree of fragmentation throughout the Upper Paleolithic sequence and there are no significant differences between levels. However, butchering marks are slightly more frequent in the Aurignacian levels. This may be the result of the size of the tools employed, but experimental work similar to that carried out for Grotta Breuil is needed to support this hypothesis.

Animals were not only exploited as food, but also used during the Upper Paleolithic to produce ornaments (especially mollusks) and bone tools. In particular in the Gravettian level *in situ* manufacturing seems to be indicated. A fragment of a bone point was recovered in the Aurignacian with Dufour bladelets and an almost

complete double-beveled point (Figure 4) was recently discovered in collapsed materials probably coming from level F. The specimen is still under study and shows interesting manufacturing traces. From this same level a fragmentary split-based point was recovered in the materials from the old excavations<sup>29</sup>.

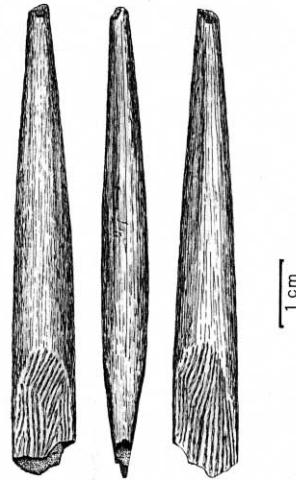


Fig. 4. Riparo Mochi, (Aurignacian level F): double-beveled bone point.

Human occupation during the Upper Paleolithic was relatively intense and concentrated in the eastern area of the shelter as indicated by the abundance of faunal materials and lithic artifacts as well as by the presence of several hearths at different levels within the stratigraphic sequence.

More detailed and complete analyses of the assemblage from the old excavations are needed as well as comparisons with the new samples to have a more complete picture of the changes through time in human behavior within the same site. The information gathered will be then a useful comparative tool with other sites in order to eventually assess possi-



ble settlement patterns within this region

**Riparo Tagliente (Upper Paleolithic Levels): Figure 1, n. 2**  
(C. Cilli, G. Giacobini, G. Guerreschi, G. Malerba, A. Rocci Ris)

A research program on the systematic archaeozoological and taphonomic study of Epigravettian faunal assemblages of Riparo Tagliente is in progress (for data on previous excavations see<sup>7,17,33</sup>).

Analysis was recently carried out on the 50% of the faunal assemblage from the Epigravettian level T 10 (dated at about 13,000 years BP) of Riparo Tagliente (for preliminary data, see<sup>34,35</sup>). This study refers to 79,000 macromammal remains. Identified specimens account for 943 remains corresponding to 1.2% of the assemblage (most of the unidentified fragments measuring less than 2 cm).

Red deer (*Cervus elaphus*) is the most frequent species (78% based on Number of Identified Specimens; NISP = 738, Minimum Number of Individuals, MNI = 24). The following taxa were also represented: *Capreolus capreolus* (NISP = 85, MNI = 5), *Sus scrofa* (NISP = 51, MNI = 5), *Rupicapra rupicapra* (NISP = 28, MNI

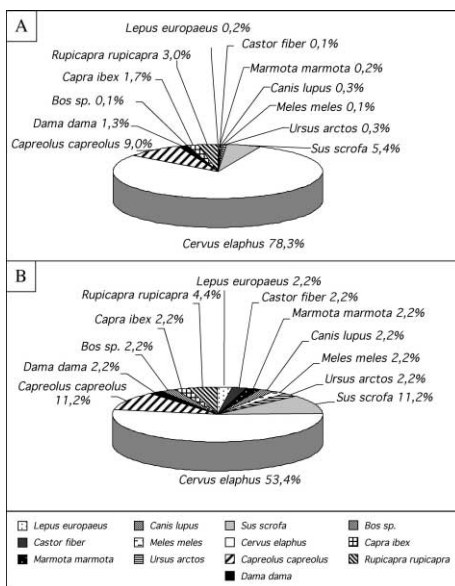


Fig. 5. Riparo Tagliente, Verona (Epigravettian level T10). Faunal assemblage: comparison between NISP (A) and M.N.I. (B).

= 2), *Capra ibex* (NISP = 16, MNI = 1), *Dama dama* (NISP = 12, MNI = 1), *Ursus arctos* (NISP = 3, MNI 1), *Canis lupus* (NISP = 3, MNI 1), *Marmota marmota* (NISP = 2, MNI 1), *Lepus europaeus* (NISP = 2, MNI 1), *Castor fiber* (NISP = 1,

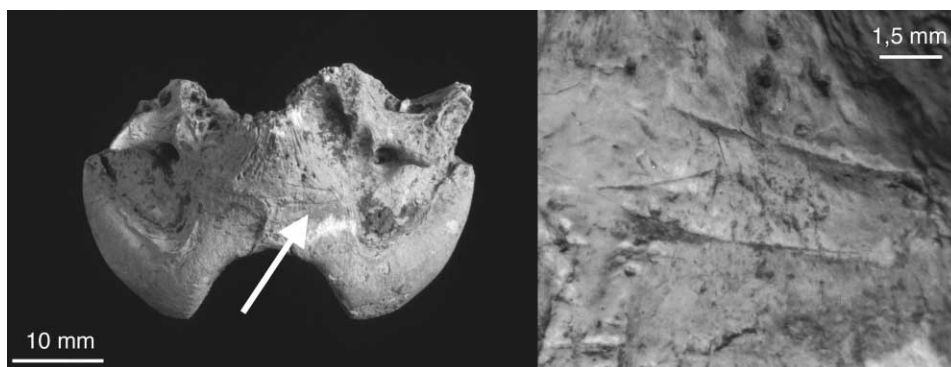


Fig. 6. Riparo Tagliente, Verona (Epigravettian level T10). A: fragment of wolf occipital bone. B: close-up of cutmarks located near the condylar region (stereomicroscope).

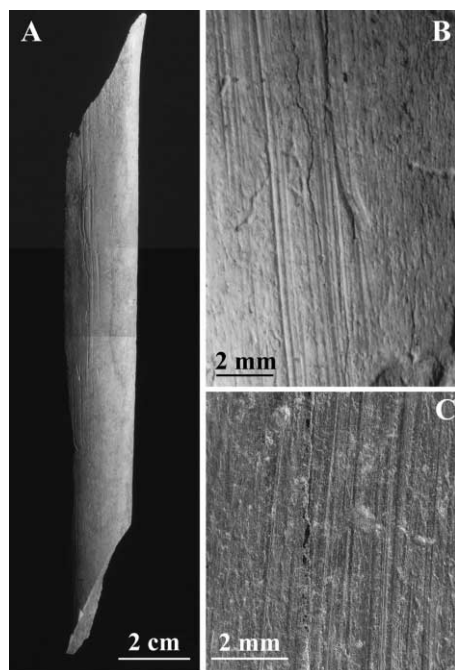


Fig. 7. Riparo Tagliente, Verona (Epigravettian level T10). A: evidence of scraping on a red deer metatarsal fragment. Details of the scraped area at the stereomicroscope (B) and SEM (C).

MNI = 1), *Meles meles* (NISP = 1, MNI 1), and a large bovid (NISP = 1, MNI = 1) (Figure 5). Most of the faunal remains correspond to adult individuals, but juveniles were also identified (3 red deer, 1 roe deer and 1 wild boar). These species suggest a temperate wood environment (see also<sup>33</sup>).

Bone remains are relatively well preserved, allowing reliable observations of surface modifications, carried out at the stereomicroscope and at the Scanning Electron Microscope (SEM) even if about 13% of the sample showed surfaces damaged by root corrosion. Marks related to anthropic and non anthropic actions<sup>35–37</sup> were systematically observed and identified. Analysis of this faunal assemblage suggested the action of rare abiotic pro-



Fig. 8. Riparo Tagliente, Verona (Epigravettian level T10). Percussion mark on red deer fragment of humerus.

cesses and of abundant biotic processes. Only about 1% of the sample showed damage by carnivores or rodents. Marks due to anthropic actions were very frequent (20% of the sample), including linear cutmarks (Figure 6), evidence of scraping (Figure 7) and percussion marks (Figure 8). This high amount of cutmarks and other traces of anthropic actions could be related to different steps of the butchering process: skinning, dismemberment, disarticulation and fileting. Marks related to manufacturing of implements made out on animal hard tissues (bone, antler, teeth) were also observed.

The abundance of faunal remains, their high level of fragmentation and the frequency of anthropic marks (together with the abundance of lithic industry), point out a very high degree of anthropization of this level.

**Grotta Continenza: Figure 1, n. 5**  
(M. Bisconti, R. Grifoni, B. Wilkens)

The Grotta Continenza cave and shelter is located at 710 meters a.s.l. on the hill slopes facing the Fucino lake basin (now reclaimed). Archaeological investigations of this site started in 1987 and are still in progress by the Dept. of Archaeological Sciences of the Pisa University. The stratigraphical sequence (7 meters thick) gave important evidence dating from the early Neolithic to the Upper Paleolithic. Two male burials in stone circles and two uncomplete female burials were discovered in the Upper Paleolithic layers<sup>38</sup>.

The Mesolithic (Sauveterrian) and the Upper Paleolithic (Final Epigravettian) layers have been dated between 9,300 and 11,500 years BP (uncalibrated).

Red deer, wild boar, roe deer and scanty remains of *Bos primigenius*, chamois, ibex, hare and dormouse were found in layers 25–27 together with masses of *Helix ligata* and abundant fish remains (*Salmo trutta*). Birds were typical of a mixed environment ranging from lake-side shores with Anatidae to rocky and bushy areas.

The Final Epigravettian sequence yielded red deer, bear, boar, roe deer, *Bos*, ibex, chamois and hare bones down to layer 39, that marks the appearance of the Equidae. The faunal assemblage points to the exploitation of various environments such as the lake shores, the valleys and the high mountains around the Fucino lake basin.

The fish remains are abundant in all the layers: they are represented by a single species, the trout, and appear as masses around the hearths or scattered on the whole surface.

The analysis of growth rings on fish vertebrae showed that fishing activities took place between the end of the winter and the beginning of the spring. Bird

bones are represented mostly by Anatidae (*Anas platyrhynchos*, *Aythya ferina* and *Fulica atra*) as in other Fucino caves<sup>39</sup>.

From the Upper Paleolithic burials we also recovered several shells of *Columbella rustica*, *Glycimeris* and *Ciclope neritea* that testify commercial contacts with the Adriatic coast, following the Sagittario and Aterno-Pescara valleys. Fossil *Dentalium* and small quartz stones are also present (their provenance is still unknown).

**Grotta dell'Edera di Aurisina**  
(Mesolithic): Figure 1, n. 6  
(L. Fasani, P. Visentini)

The field excavations of Edera Cave have been carried out by P. Biagi of the University of Venice. In the preliminary study of faunal specimens carried out by Boschian e Riedel<sup>40</sup>, only the material from the Castelnovian levels, Neolithic and post Neolithic, has been examined to date.

From the preliminary analyses we know that the fauna of the Neolithic and post Neolithic horizons are represented almost exclusively by domestic animals, with a strong predominance of ovicaprines (goats and sheep) which represent 89.4% of the specimens in layer 2a and 78.6% of the identifiable fragments in layer 2 (Figure 9).

Numerous teeth remains, mainly deciduous, have also been collected which may be indicative of the juvenile age of the faunal specimens examined. This fact considered together with the average age suggests that the animals were utilized for feeding purposes rather than as a source of wool, milk or secondary products. The meat would have been obtained from the best animals with an age between 18 and 30 months.

The preliminary analyses carried out to date on the faunal specimens indicate

| A | Layers            | 2    |      |      | 2a   |      |      | 3    |      |      | 3a   |      |      |
|---|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|
|   |                   | NISP | %    | %    | NISP | %    | %    | NISP | %    | %    | NISP | %    | %    |
|   | Caprines          | 409  | 78.6 | 80.3 | 1001 | 89.4 | 91.4 | 32   | 24.8 | 28.6 | 55   | 38.7 | 40.7 |
|   | Cattle            | 23   | 4.4  | 4.5  | 13   | 1.2  | 1.2  | 1    | 0.8  | 0.9  | 6    | 4.2  | 4.4  |
|   | Cattle/Red deer   | 19   |      | 3.6  | 3.7  | 20   | 1.8  | 1.8  | 33   | 25.6 | 29.5 | 25   | 17.6 |
|   | Red deer          | 9    | 1.7  | 1.8  | 35   | 3.1  | 3.2  | 20   | 15.5 | 17.9 | 35   | 24.6 | 25.9 |
|   | Domestic Pig      | 39   | 7.5  | 7.7  | 15   | 1.3  | 1.4  | 1    | 0.8  | 0.9  |      |      |      |
|   | Domestic Pig/Boar |      |      |      | 1    | 0.1  | 0.1  | 2    | 1.5  | 1.8  | 8    | 5.6  | 5.9  |
|   | Boar              | 3    | 0.6  | 0.6  | 5    | 0.4  | 0.5  | 7    | 5.4  | 6.2  | 2    | 1.4  | 1.5  |
|   | Roe deer          | 2    | 0.4  | 0.4  | 5    | 0.4  | 0.5  | 16   | 12.4 | 14.3 | 4    | 2.8  | 3.0  |
|   | Dog               | 5    | 1.0  | 1.0  |      |      |      |      |      |      |      |      |      |
|   | Wolf              |      |      |      | 2    | 0.2  |      |      |      |      |      |      |      |
|   | Fox               | 2    | 0.4  |      | 2    | 0.2  |      |      |      |      |      |      |      |
|   | Wild cat          | 3    | 0.6  |      | 1    | 0.1  |      |      |      |      |      |      |      |
|   | <i>Martes sp.</i> |      |      |      | 1    | 0.1  |      | 1    | 0.8  |      |      |      |      |
|   | Baedger           | 4    | 0.8  |      | 16   | 1.4  |      | 10   | 7.7  |      | 7    | 4.9  |      |
|   | Hare              | 1    | 0.2  |      | 2    | 0.2  |      | 6    | 4.6  |      |      |      |      |
|   | Hedgehog          | 1    | 0.2  |      |      |      |      |      |      |      |      |      |      |

| B | Layers            | 2   |      |      | 2a  |      |      | 3   |      |      | 3a  |      |      |
|---|-------------------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|
|   |                   | MNI | %    | %    | MNI | %    | %    | MNI | %    | %    | MNI | %    | %    |
|   | Caprines          | 10  | 38.5 | 47.6 | 24  | 53.3 | 66.7 | 4   | 26.7 | 33.3 | 6   | 40.0 | 42.9 |
|   | Cattle            | 3   | 11.5 | 14.3 | 2   | 4.4  | 5.5  | 1   | 6.7  | 8.3  | 1   | 6.7  | 7.1  |
|   | Cattle/Red deer   |     |      |      |     |      |      |     |      |      |     |      |      |
|   | Red deer          | 2   | 7.7  | 9.5  | 5   | 11.1 | 13.9 | 2   | 13.3 | 16.7 | 3   | 20.0 | 21.4 |
|   | Domestic Pig      | 2   | 7.7  | 9.5  | 1   | 2.2  | 2.8  | 1   | 6.7  | 8.3  |     |      |      |
|   | Domestic Pig/Boar |     |      |      |     |      |      |     |      |      | 1   | 6.7  | 7.1  |
|   | Boar              | 2   | 7.7  | 9.5  | 2   | 4.4  | 5.5  | 2   | 13.3 | 16.7 | 1   | 6.7  | 7.1  |
|   | Roe deer          | 1   | 3.8  | 4.8  | 2   | 4.4  | 5.5  | 2   | 13.3 | 16.7 | 2   | 13.3 | 14.1 |
|   | Dog               | 1   | 3.8  | 4.8  |     |      |      |     |      |      |     |      |      |
|   | Wolf              |     |      |      | 1   | 2.2  |      |     |      |      |     |      |      |
|   | Fox               | 1   | 3.8  |      | 2   | 4.4  |      |     |      |      |     |      |      |
|   | Wild cat          | 1   | 3.8  |      | 1   | 2.2  |      |     |      |      |     |      |      |
|   | <i>Martes sp.</i> |     |      |      | 1   | 2.2  |      | 1   | 6.7  |      |     |      |      |
|   | Baedger           | 1   | 3.8  |      | 3   | 6.7  |      | 1   | 6.7  |      | 1   | 6.7  |      |
|   | Hare              | 1   | 3.8  |      | 1   | 2.2  |      | 1   | 6.7  |      |     |      |      |

Fig. 9. Grotta dell'Edera di Aurisina, Trieste (Mesolithic levels). Summary table of the number of faunal remains (A) and of the minimum number of individuals (B) found in the various levels of the Grotta dell'Edera. (NISP – Number of identified specimens; MNI – Minimum number of individuals).

clearly that the Edera Cave was used as a shelter both for man and animals, even if the age distribution does not allow the season in which it was utilized to be recognized.

The data from the faunal complex of levels 3 and 3a are different from those encountered in level 2 due to the presence of numerous wild animals, which constitute almost one third of the whole sample.

The only preliminary report available at the moment on the fauna from the Mesolithic horizons is that on the herpetofauna. In the study by Delfino and Bressi<sup>41</sup> the importance of the collection of fresh water turtles (*Emys orbicularis*) during the Sauveterrian period, Boreal, is underlined while the collection of marine molluscs especially *Patella caerulea* e *Monodonta turbinata* at the end of the Castelnovian is given a certain importance.

**Grotta della Cala at Marina di Camerota (Eneolithic): Figure 1, n. 7 (A. Ronchitelli)**

An interesting example of economic exploitation of the local resources, in this case marine, is documented in the Eneolithic levels of the Cala Cave at Marina di Camerota. These levels, at the moment under excavation, have been dated to the beginning of the III millennium BC (no calibrated chronology) and are culturally referable to the Piano Conte culture.

Here we attest the activity of gathering edible mollusks (*Patella* and *Monodonta* sp.), but above all an intense fishing activity, integrated only in minimal part with the hunting of wild boar.

The study of ichthyofauna just undertaken, will furnish data regarding the variety of hunted species, the seasons in which the cave was frequented, and the use of catching techniques, more or less elaborated.



Fig. 10. Grotta della Cala, Marina di Camerota, Salerno (Eneolithic levels): bone fish-hooks.

On this subject, it is of great interest the finding of three fish-hooks made of bone (Figure 10), all very much alike, two of which have been the object of a preliminary note<sup>42</sup>. The third still unedited, has been found only recently in the cited levels: it is characterized, as the previous, by the point of attachment of the line in the shape of a small fish.

The elegance of these objects underlines by itself the importance of the exploitation of the marine resources for this human group and suggests a symbolic value, not only esthetical of these objects, even if they are strongly connected to the fishing practice.

**The Neolithic Settlements in Abruzzo: Figure 1, n. 5 (E. Castiglioni, G. Radi, M. Rottoli, C. Tozzi)**

The researches on the exploitation of vegetal resources have been performed in Abruzzo region in the sites of Colle Santo Stefano (Fucino), Settefonti (Aquila) and Catignano (Pescara) (Figure 8)<sup>43–45</sup>. The landscape is dominated by deciduous oaks, together with ash tree and morn beam. The beech (*Fagus sylvatica*) is present everywhere but in low percentages, while rare ilex (*Quercus ilex*) charcoals recovered in the Fucino and Aquila basins testify to a sporadic presence of Mediterranean species. The relevant presence of Pomoidea and cornel (*Cornus mas*) at Catignano and Settefonti show changes due to human activities in these areas.

Regarding subsistence patterns we have few data on the early Neolithic because charred remains have not been found yet at Colle Santo Stefano, but impressions of *Triticum dicoccum* and perhaps also of *Triticum monococcum* have been recovered on plaster fragments.

The analysis of Settefonti botanical remains show the predominance of barley (70%) among the domesticated plant species and a higher presence of *Triticum aestivum durum* (18%) compared to *Triticum monococcum* and *dicoccum*.

Pulse remains show the presence of vetch (*Lathyrus cicera vel sativus*), quite common in Abruzzo. The presence of flax (a plant not usually recovered from archaeological contexts) has also to be recorded. Regarding gathering activities we

have to add the presence of seeds and fruits of cornel and Pomoidea.

New excavations of the site of Cati gnano did not give any relevant information on plant husbandry that, however, is well known from old excavation data<sup>46</sup>. Two dominant species of wheat were recovered (*Triticum monococcum* and *dicocum*) together with a rare one (*Triticum aestivum compactum*). Barley is represented by *Hordeum vulgare, nudum and distichon*; the pulses include *Lens esculenta* and *Vicia faba*. Wild fruits and seeds were also gathered (*Pisum, Lathyrus cicera, Galium, Galeopsis, Chenopodium, Polygonum*, berries, nuts and pears).

**The Neolithic village of Contraguda (Perfugas, Sassari): Figure 1, n. 8 (C. Tozzi)**

Contraguda is a large site located on a hilltop at 160–180 meters a.s.l. in Northern Sardinia (Figure 8); excavations by the University of Pisa, Florence and Siena together with the Archaeological Superintendence are still in progress. Several structures belonging to the Neolithic Ozieri Culture have been brought to light together with a discontinuous Bronze Age layer. The dates of the Ozieri layers

range between 5,400 and 5,100 BP<sup>47</sup>. The subsistence patterns are indicated by animal remains, while plant macroremains are almost absent. A deposit that can be tentatively interpreted as an ancient agricultural horizon indicates agricultural activities; moreover, the occurrence of a vertic soil favored the agricultural practices.

Bone remains are highly fragmented due to the intensive exploitation of the carcasses and their poor preservation conditions. Several intentional fractures due to the extraction of the marrow can be observed on long bones. Because of the poor preservation of the surfaces, only in few cases we could observe thin striae left by lithic artifacts during the disarticulation and skinning of jaw, scapula, pelvis, femur and *metapodia*.

The animal species present at the site are represented only by domestic animals such as cattle, sheep and pig and by the endemic species *Prolagus sardus*. The highest percentage is represented by sheep and goat (60% of the total number of remains and 57% of the total number of individuals) followed by cattle (24 and 28% respectively) and pig (around 13%). Mainly adult animals were slaughtered. With reference to other Sardinian sites, the

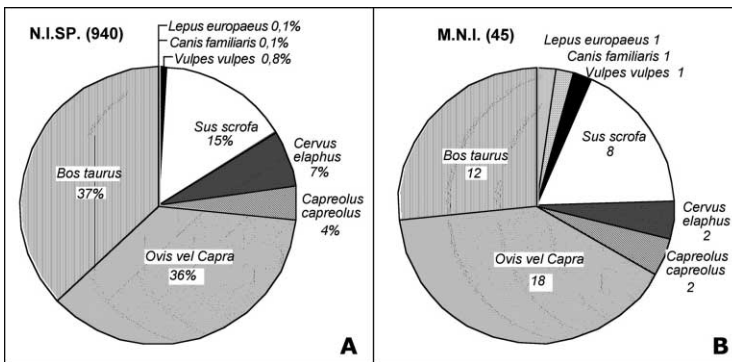


Fig. 11. Castellaro Lagusello, Mantova (Bronze Age, level 104). Faunal assemblage: comparison between NISP(A) and M.N.I. (B).

Contraguda faunal assemblage shows a lower quantity of cattle compared to sheep and goat, thus more resembling the Bronze Age faunal assemblages<sup>48</sup>.

**Castellaro Lagusello (Bronze Age):**

**Figure 1, n. 9**

(G. Malerba, L. Fasani)

The good conditions of preservations of faunal remains suggested to choose the Castellaro Lagusello site (Mantova) as a case study for Bronze Age. Attention was preliminarily focused on faunal remains from level 104 dated to the XVIII century BC<sup>49–51</sup>.

The archaeozoological study refers to 2,263 macromammal remains. Identified specimens account for 940 remains, corresponding to 42% of the assemblage (most of the unidentified fragments measuring less than 5 cm). The identified taxa were: *Lepus europaeus*, *Vulpes vulpes*, *Canis familiaris*, *Sus scrofa*, *Cervus elaphus*, *Capreolus capreolus*, *Ovis* vel

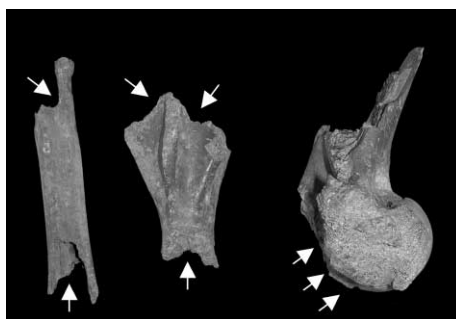


Fig. 12. Castellaro Lagusello, Mantova (Bronze Age, level 104). Carnivore marks (arrows) on faunal remains (left to right: radius and scapula of *Ovis* vel *Capra* and humerus of *Bos taurus*).

*Capra*, *Bos taurus*. The distribution of taxa was calculated on the basis of NISP (Number of Identified Specimen) and MNI (Minimum Number of Individuals) (Figure 11): domestic species are clearly dominant as shown by both figures. Most of the faunal remains are from adult indi-

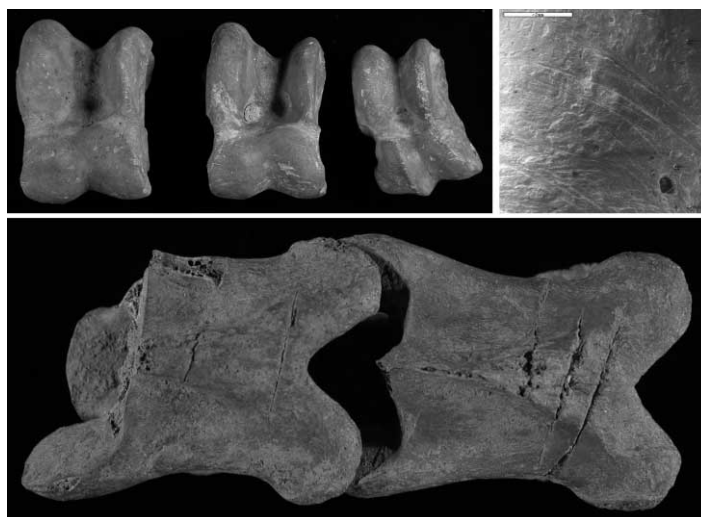


Fig. 13. Castellaro Lagusello, Mantova (Bronze Age, level 104). A: ungulate astragali (left to right: *Bos taurus*, *Bos taurus* and *Sus scrofa*) showing marks (arrows) indicating standardized butchering procedures. B: close-up of A (square): SEM image of cutmarks produced by a metal instrument. C: *Bos taurus* vertebrae showing repeated deep marks produced by a metal instrument.

viduals, but a high percentage of juveniles is also present.

The surface of faunal remains is well preserved and the study of modifications was carried out at the Stereomicroscope and at the Scanning Electron Microscope (SEM).

About 40% of sample showed evidence of carnivore damages. Characteristic tooth marks are recognizable (pitting, scoring, gnawing, furrowing). In many cases, parts of bones were completely destroyed (Figure 12). Only less than 1% of the sample showed traces of gnawing by rodents.

About 20% of sample showed evidence of anthropic actions, related to butchering and manufacturing activities. Traces of metal tools were evident. As far as butchering activities are concerned, characteristic and repeated locations of traces suggest standardized techniques and procedures (Figure 13). Work is in progress on the faunal assemblage from this site which is currently in course of excavation.

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## Conclusions

Data obtained by different Authors allow to understand the importance of anthropic activity compared to the presence of carnivores in the accumulation of the faunal assemblages coming from the different occupation layers of the analyzed sites. Attention was focused on the identification of diagnostic criteria useful for the attribution of surface modifications to anthropic activity. In some cases it has been possible to reconstruct the stages of the butchery process and, sometimes to define the seasonality of the anthropic occupation. The different treatment of the animal carcasses in respect to the size has been underlined. Data related to the exploitation of the vegetal resources has been obtained exclusively for some Neolithic sites.

The studied sites, therefore, furnish different examples of subsistence adopted by prehistoric humans in Italy, in which through time different populations have followed one another, with different cultural characteristics and different economic traditions.

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## **ANIMALNI RESURSI I STRATEGIJE PREŽIVLJAVANJA**

### **S A Ž E T A K**

Nekoliko nakupina životinjskih ostataka iskopanih na nalazištima različite starosti (od ranog paleolitika do brončanog doba) smještenih u sjevernoj, središnjoj i južnoj Italiji ispitivano je s arheozoološkog i tafonomskog gledišta. Podaci dobiveni od različitih autora omogućuju rekonstrukciju strategija preživljavanja koje su tijekom vremena prehistorijski ljudi prihvatili u ovim područjima, posebice onih koje se tiču crpljenja životinjskih izvora prehrane. Proučavana su sljedeća nalazišta: Isernia La Pineta (Molise; rani paleolitik), Grotta Breuil (Latium; srednji paleolitik), Grotta della Ghiacciaia (Verona; srednji paleolitik), Riparo di Fumane and Riparo Tagliente (Verona; srednji i kasni paleolitik), Riparo Mochi (Liguria; kasni paleolitik), Grotta della Continenza (L'Aquila; kasni paleolitik i mezolitik), Grotta dell'Edera (Trieste; mezolitik i neolitik), Grotta della Cala at Marina di Camerota (Salerno; neolitik), Contraguda (Sassari; neolitik), Castellaro Lagusello (Mantova; brončano doba). Iskorištavanje biljnih izvora analizirano je na neolitskim lokalitetima Colle Santo Stefano (Fucino), Settefonti (L'Aquila) i Catignano (Pescara).