Late neandertals and the exploitation of small mammals in northern Italy: fortuity, necessity or hunting variability?

Derniers néanderthaliens et exploitation des petits mammifères en italie du nord : fortuité, nécessité ou variété de chasse?

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LATE NEANDERTALS AND THE EXPLOITATION OF SMALL MAMMALS IN NORTHERN ITALY: FORTUITY, NECESSITY OR HUNTING VARIABILITY?

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ABSTRACT

This work reviews the anthropogenic exploitation of small mammals during a crucial time span for the reconstruction of human behavior at the dawn of the Middle - Upper Palaeolithic boundary in the Northern Mediterranean region. Data are sourced from faunal assemblages recovered in the final Mousterian levels of Grotta di Fumane (A5-A6 complex) and the Late Mousterian levels of Riparo Tagliente (levels 35 and 36) and Grotta di San Bernardino (units II and IV), in the North of Italy. As a whole, these records mostly comprise ungulates, rather than bird and carnivore bones, and derive from primary accumulation processes more than from post-depositional activities or direct carnivore actions. Broadly, the taphonomic analyses reveal the presence of human modifications referable to different butchering activities on almost all of the ungulates. Small mammal bones are present throughout the late MP sequences in variable quantities, with canids and rodents represented in each of the assemblages. This work highlights new qualitative taphonomic records produced by humans within a large area that reveal Neandertals’ exploitation of small mammals as game. At Grotta di Fumane, foxes have been butchered in order to exploit fur and meat. Similarly, at Grotta Maggiore di San Bernardino and Riparo Tagliente some large rodents bear cut-marks related to the same purposes. Krapina Cave is the only other Mousterian site containing evidence of small game exploitation (beaver and marmot) that is in close geographical proximity to the caves analyzed here.

Keywords: Northern Italy, Mousterian, small mammals, taphonomy, archaeozoology

RÉSUMÉ

DERNIERS NÉANDERTALIENS ET EXPLOITATION DES PETITS MAMMIFÈRES EN ITALIE DU NORD : FORTUITÉ, NÉCESSITÉ OU VARIÉTÉ DE CHASSE ?

Cet article passe en revue l’exploitation anthropique des petits mammifères dans un laps de temps d’importance fondamentale pour la reconstruction des changements du comportement humain survenus à travers la limite entre le Paléolithique moyen et le Paléolithique supérieur dans la région de la Méditerranée septentrionale. Les sources de données sont les assemblages faunistiques issus des niveaux du Moustérien final de la Grotte de Fumane (SSUU A5 + A6 et A6) et du Moustérien tardif de Riparo Tagliente (tt. 35 et 36) et de la Grotte Maggiore de San Bernardino (SU II, niveau IV), en Italie du Nord. Dans l’ensemble, ces assemblages comprennent surtout des os d’ongulés, et dans une moindre mesure d’oiseaux et de carnivores, résultant davantage d’un processus d’accumulation primaire que d’activités post-dépositionnelles ou d’actions directes de la part des carnivores. D’une manière générale, l’analyse taphonomique révèle la présence de modifications anthropiques liées à différentes activités de boucherie sur presque tous les ongulés. Dans ces assemblages, des petits os de mammifères sont présents en quantités variables dans toutes les séquences du Paléolithique moyen, ainsi que des os de canidés et de rongeurs représentés dans chacun d’eux. Ce travail met en évidence de nouvelles données qualitatives taphonomiques, produites par les humains dans une vaste zone, qui révèlent l’exploitation des petits mammifères par les Néandertaliens. Dans la Grotte de Fumane, des renards ont été dépecés et découverts pour exploiter la fourrure et la viande. Dans la Grotte de San Bernardino et à Riparo Tagliente, de grands rongeurs portent des traces de découpe liées aux mêmes buts. Dans d’autres sites moustériens, géographiquement proches des sites analysés, l’exploitation de petits mammifères (castor et marmotte) a été enregistrée uniquement dans la séquence de Krapina Cave.

Mots-clés: Italie du Nord, Moustérien, petits mammifères, taphonomie, archéozoologie

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1 - INTRODUCTION

The Middle Palaeolithic is well recorded in Northern Italy, in open air sites, rock-shelters and caves. In the last decade the taphonomic revision of faunal assemblages and new zooarchaeological studies have allowed for the reconstruction of activities, strategies and cultural behaviors of Neandertal groups who frequented this geographical area. Habitual aspects of their dietary habits have been revealed (Fiore et al., 2004) alongside less common ones.

While few Neandertal archaeological sites have been found dating to the Late Middle Pleistocene, a more detailed record is preserved for the Upper Pleistocene, particularly in MIS3 (Peresani, 2011). Remains of small sized fauna bearing traces of anthropogenic modifications, have also been found, which shed light on the range of species hunted by Neandertals beyond functional or alimentary purposes (Alhaique et al., 2004; Fiore et al., 2004, 2016; Peresani et al., 2011b; Romandini et al., 2014b; 2016). This evidence has been previously recorded in the Mousterian and Uluzzian levels of Fumane cave (FC), where several bones of *V. vulpes* are cut-marked (Romandini, 2012; Tagliacozzo et al., 2013). This picture is further enriched by the cut-marks observed on a mandible, humerus and scapula of *Marmota marmota* from Riparo Tagliente (RT; Thun Hohenstein, 2001, 2006; Thun Hohenstein & Peretto, 2005) and on *Castor fiber* remains identified at Grotta Maggiore di San Bernardino (GrMSB).

2 - METHODS

The bones examined in this study have been discovered in the last 30 years of excavations using dry and wet sieving. Taxonomic and skeletal identifications are based on the complete alpine fauna reference collection for Pleistocene and modern fauna. Bone surfaces were macroscopically and microscopically examined using low magnification lens (10-20 X) with incident white light and Leica S6D Greenough stereo microscope with 0.75-70 X magnification range for capturing images. Further qualitative data were collected via SEM observations at the University of Turin. In order to identify the nature of surface modifications and to distinguish human from animal traces, trampling abrasion, and modern mechanical marks produced by excavation tools, reference was made to well-established taphonomic literature (Domínguez-Rodrigo et al., 2009). Combustion degree has been distinguished between moderate (200-500 °C, black/brown) and elevated, with calcination (> 700 °C, grey/white) (Shipman et al., 1984). Cut-marks have been classified as incisions, like skinning marks, delleshing marks, and scraping marks (Binford, 1981; Potts & Shipman, 1981; Shipman, 1981; Shipman & Rose, 1984).

3 - RESULTS

3.1 - FUMANE CAVE

Fumane cave (fig. 1) is located at 350 m asl in the western part of the Lessini Mountains (Veneto Prealps, Northern Italy) and has produced a sequence spanning the Late Middle - Early Upper Palaeolithic from MIS 5 to 2 (Martini et al., 2001; Peresani et al., 2008; López-Garcia et al., 2015; Obrovac et al., 2015). The focus of this paper is the final Mousterian embedded in the stratigraphic complex A5-A6, dated to 44.8-42.2 ky cal. BP (Higham et al., 2009). The faunal assemblage comprises a large association of ungulates and some birds from different ecological contexts (tab. 1) that, except for the wild boar, bear traces of human exploitation and scarce evidence of carnivore gnawing (Peresani et al., 2011a,b). Also some carnivores as *Ursus arctos*, *Ursus spelaeus* and *Vulpes vulpes* where skinned and defleshed (Romandini, 2012; Romandini et al., in press).

Red fox is well represented in A5-A5+A6 (NISP 26 = 3.1 %) and A6 (NISP 20 = 0.8 %) (fig. 2A; tab. 1), with *Vulpes* remains from both units amounting to an MNI of 5-4 adults and one juvenile. All of the anatomical regions are represented: 18 cranial elements (6 cranial fragments, 9 emimandibles and 3 undetermined teeth), 8 from the trunk (5 vertebrae and 3 ribs), 2 from the forelimb (1 radius and 1 carpal), 11 from the hind limb (2 coxals, 2 femora, 1 tibia, 1 patella, 4 tarsals and 1 metatarsal), 7 among 1st, 2nd, and 3rd phalanges and a metapodial from an unidentified limb. Three cranial fragments (1 hemimandible fragment and 2 cranial fragments) from a possible adult *Alopex lagopus* are exclusively present in A5-A5+A6. Even though the analysed RN is limited, it is possible to notice how the balance between anatomical

![Fig. 1: localization of the sites.](source)
regions is biased towards the skull and limb extremities. So far 4 out of the 46 remains attributed to red fox have revealed butchering traces, a calcaneus, cervical vertebra (fig. 2A1), a tibia (fig. 2A2) and calcaneus and an hemimandible of cf. *Alopex lagopus* have clear cut-marks which can be attributed to hide removal and muscle detachment. The extension of the analysis to the whole assemblage is underway.

### 3.2 - RIPARO TAGLIENTE

Riparo Tagliente is a rockshelter located (fig. 1) downslope of Monte Tregnago (250 m asl) on the left slope of Valpantena, one of the main valley-bottoms of the Lessini Mountains. Excavations have exposed a long Late Mousterian stratigraphy over 2.80 m thick (levels 52 to 31). Geological, bioarchaeological and cultural data place the top of this unit in MIS3 (Bartolomei *et al.*, 1982, 1984; Guerreschi *et al.*, 2002) where intense or repeated occupations are recorded in upper levels (42-34) by denser amounts of remains than in the lower ones (52-44) (Arzarello & Peretto, 2005). Faunal remains are dominated by ungulates (tab. 1), but marmot are found in all layers. The overall faunal assemblage (tab. 1) is dominated by adult and sub-adults, with some fetal/neonate cervid bones (levels 37 and 36) suggesting the shelter was used in the spring/summertime.

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**GrMSB - SU H**  | **RT - level 35** | **RT-level 36** | **FC - SU A5/A5sA6** | **FC - SU A6**
---|---|---|---|---
**Taxa** | **NISP** | **%** | **NISP** | **%** | **NISP** | **%** | **NISP** | **%** | **NISP** | **%**
---|---|---|---|---|---|---|---|---|---|---
*Lepus* sp. | 3 | 0.3 | 1 | 0.4 | 1 | 0.1 |
*Marmota* marmota | 16 | 1.8 | 4 | 3.6 | 15 | 5.6 | 1 | 0.1 |
*Castor fiber* | 25 | 2.9 | | | | | | | |
**Total Lagomorpha and Rodentia** | 44 | 5.1 | 4 | 3.6 | 16 | 6 | 1 | 0.1 | 1 | 0.1 |
*Carnis lupus* | 3 | 0.3 | 3 | 2.7 | 2 | 0.7 | 4 | 0.5 | 7 | 0.5 |
*Volpes volpes* | 7 | 0.8 | 3 | 3.1 | 26 | 3.1 | 20 | 0.8 |
*Volpes/Alopex* | | | | | | | | | | 3 | 0.4 |
*Ursus arctos* | 1 | 0.1 | 4 | 0.5 | 10 | 0.5 |
*Ursus spelaeus* | 84 | 9.3 | 2 | 0.2 |
*Ursus sp.* | 38 | 4.1 | 2 | 1.8 | 2 | 0.7 | 13 | 1.5 | 21 | 0.9 |
*Mustela putorius* | 2 | 0.2 |
*Martes sp.* | 1 | 0.1 |
*Mustela nivalis* | | | | | | | | | | 1 | 0.1 |
*Felix silvestris* | 1 | 0.1 |
*Lynx lynx* | 6 | 0.7 |
*Panthera pardus* | 1 | 0.1 |
*Carnivora indet.* | | | | | | | | | | 1 | 0.9 | 2 | 0.2 | 14 | 0.6 |
**Total Carnivora** | 144 | 16.4 | 6 | 5.4 | 7 | 2.5 | 54 | 6.4 | 73 | 3.2 |
*Sus scrofa* | 29 | 3.3 | | | | | | | | 2 | 0.1 |
*Megaloceros giganteus* | 4 | 0.4 | 10 | 1.2 | 28 | 1.2 |
*Alces alces* | 24 | 2.7 | 4 | 1.5 | 1 | 0.1 | 4 | 0.2 |
*Cervus elaphus* | 81 | 9.4 | 8 | 7.2 | 38 | 14.1 | 297 | 35.5 | 1095 | 48 |
*Capreolus capreolus* | 149 | 17.2 | 79 | 71.2 | 137 | 50.7 | 48 | 5.7 | 182 | 8 |
*Cervidae indet.* | 87 | 9.9 | 39 | 4.6 | 128 | 5.6 |
*Bos primigenius* | | | | | | | | | | 1 | 0.1 |
*Bison priscus* | | | | | | | | | | 2 | 0.1 |
*Bos/Bison* | 21 | 2.5 | 10 | 1.2 | 13 | 0.6 |
*Capra ibex* | 1 | 0.1 | 4 | 3.6 | 17 | 6.3 | 30 | 3.6 | 54 | 2.4 |
*Rupicapra rupicapra* | 24 | 2.8 | 5 | 4.5 | 31 | 11.5 | 32 | 3.9 | 55 | 2.4 |
*Caprinae indet.* | 8 | 1.0 | 12 | 1.4 | 7 | 0.3 |
*Equus sp.* | | | | | | | | | | 1 | 0.9 |
*Stephanorhinus sp.* | 1 | 0.1 |
*Ungulata indet.* | 248 | 28.3 | 4 | 3.6 | 20 | 7.4 | 302 | 36.2 | 630 | 27.8 |
**Total Ungulata** | 677 | 78.3 | 101 | 91 | 247 | 91.5 | 781 | 93.4 | 2200 | 96.7 |
**Total NISP** | | 865 | 100.0 | 111 | 100.0 | 270 | 100.0 | 836 | 100.0 | 2274 | 100.0 |

Tab. 1: Mammals NISP (number identifiable specimens) and NISP % at (GrMSB) San Bernardino, (RT) Tagliente Shelter and (FC) Fumane Cave.
Tab 1 : NISP (Nombre de spécimens identifiables) pour les mammifères et % du NISP à San Bernardino (GrMSB), l’abri Tagliente (RT) et la grotte de Fumane (FC).
The zooarchaeological and taphonomical analyses indicated that variability across the sequence in faunal remains accumulated at the site by both Neandertals and carnivores (Thun Hohenstein, 2001, 2006). Neandertals exploited carcasses at the site: butchery marks and bone breakage on ungulate bones increase from the base to the top of the sequence. Countless burned fragments were also found, but limited to levels 35, 36 and 37. Cut-marks, attributable to skinning and to meat procurement have been recognized also on marmot remains in levels

Fig. 2: Late Mousterian sites in the North of Italy, small mammals remains with traces.
(A) Fumane Cave, Vulpes vulpes cervical vertebra (1) and tibia (2) with cut-marks. (B) Tagliolente shelter Marmota marmota hemimandible (1) with a series of thin subparallel and long cut-marks on the lateral side. (C) San Bernardino Cave, Castor fiber right ulna (1) with scrapes and cut-marks in the medial view. All of the animals depicted here show the graphical indication of anatomical elements (number of remains) from the respective Mousterian units: (A) A5-A5+A6 and A6. (B) levels 35 and 36. (C) II.

Fig. 2 : sites du Moustérien final du Nord de l’Italie, petits mammifères avec traces. (A) Grotte de Fumane, Vulpes vulpes vertèbre cervicale (1) et tibia (2) avec traces de découpe. (B) Abri Tagliolente, emimandibule de Marmota marmota (1) avec une série de fines et longues traces subparallèles sur la vue latérale. (C) Grotte de San Bernardino, ulna droit de Castor fiber (1) avec raclages et traces de découpe sur la vue médiale. Tous les animaux décrits ici montrent l’indication graphique des éléments anatomiques (nombre de restes) à partir des unités moustériennes respectifs: (A) A5-A5+A6 et A6. (B) 35 et 36. (C) II.
35 and 36 (fig. 2B) which are devoid of any evidence of burning. In level 35, only five remains of one adult marmot have been recovered (2 teeth, 1 vertebra and 1 cut-marked humerus). Adult marmot bones have been recovered in level 36: 4 fragmented elements of the axial skeleton (1 hemimandible, 3 vertebrae), 7 from the forelimb (1 scapula, 3 humerus, 2 radii, 1 ulna) and 5 from the hind limb (1 tibia, 2 tarsals, 1 metatarsal). The hemimandible contains a sequence of long and parallel striae on the external surface (fig. 2B1) and the scapula a series of thin oblique cut-marks on the suprascapular notch that can be attributed to skinning and disarticulating.

### 3.3 - GROTTA MAGGIORE DI SAN BERNARDINO

The cave opens on the eastern slope of the Berici karst plateau (Vicenza), 135 m asl, west of the alluvial plain of the Bacchiglione River (fig. 1). Eight lithological units compose a Middle-Late Pleistocene stratigraphic sequence (Cassoli & Tagliacozzo, 1994; Peresani, 2001; Piccin et al., 2013, López-Garcia et al., 2017). A majority of the total faunal remains at the site (78 %) belong to ungulates, although the frequency of ungulate remains varies between the units (tab 1).

Preliminary taphonomic observations on large ungulate bone surfaces from the main part of the sequence have revealed traces of disarticulation, recovering of meat, intentional fracturing of shafts and the use of bone flakes like retouchers. Evidence of carnivore activity is scarce (Malerba & Giacobini, 1998a, b).

Unit II is the only one to have been zooarchaeologically analysed in detail. It records humid climatic conditions, the expansion of woodlands (Cassoli & Tagliacozzo, 1994; López-Garcia et al., 2017) and an increase in the rate of accumulation of anthropogenic remains with respect to the underlying units, as suggested from the dense content in faunal remains, lithic artefacts and hearths (Peresani, 2011). Thus far, 7,361 bone have been recovered in total, of those burned bones make up 50 % and the calcinated bones 8 % of the assemblage. Beaver bones are distributed across the sequence and come mainly from units II-level B (No 25) and IV-levels C and D (No 14) (Cassoli & Tagliacozzo 1994, table 11). The most represented anatomical elements are the extremities of the paws (79 %) and of the axial skeleton (9.4 %), whereas the long bones are ascribable only to the forelimb (humerus and ulna). Cranial remains are rare.

Beaver remains from Unit II (fig. 2C) are mostly phalanges (No 11); there are 8 proximal phalanges and 6 of them are complete; there are 2 middle phalanges (1 is complete, and 1 is a distal fragment) and 1 distal phalanx that is complete. Forelimb shafts are rare (1 humerus and 2 ulnae); hind limbs are represented by a patella and fragmented metatarsals. A fragmented left zygomatic bone and a caudal vertebra are also present. The MNI for these fragments is four individuals, two juveniles, probably sub-adults, and two adults, identified on the base of the metapodials and the phalanges with fused and unfused epiphysis. The bones are mostly fragmentary and have abraded surfaces. The patella and the first phalanx are totally combusted, a second phalanx is calcinated. Although rare, traces of carnivore gnawing have been observed. Clear traces of anthropogenic intervention have been documented on a right juvenile 3rd metatarsal and a right ulna of an adult marmot (fig. 2C1). Deep cut-marks and repeated scrapings are related to defleshing (fig. 2C1) and recovering of the hide.

### 4 - DISCUSSION

The Neandertal modifications recorded on beaver and marmot bones at Grotta Maggiore di San Bernardino and Riparo Tagliente are rare finds. The exploitation of fox at Fumane is also rare but within that site they are found in the Uluzzian (A3 and A4) and the Proto-Aurignacian (A2), where in addition to fox, other small and medium sized carnivores (wolf, lynx) were hunted (Romandini, 2012; Tagliacozzo et al., 2013).

In the Northeastern Mediterranean regions, only one other Middle Palaeolithic site has produced evidence comparable to our sites. Krapina Cave in Croatia, has yielded cut-marked brown bear, marmot and beaver bones (Miracle, 2007). Beaver (NISP 353, MNI 19) remains mostly come from layer 1 (Castror fiber zone) dated to ~130,000 years ago (Rink et al., 1995) and is represented by teeth, cranial bones, upper hind limb bones, a pelvis, and lower hind limb bones. Cut-marks on mandibles, tibia and ulna suggest skinning and/or removal of limb extremities; cut-marks on the ilia were probably produced by disarticulation or defleshing. The marmot remains (NISP 26, MNI 3) at the site include the skull, and some long bones, but the distal extremities are almost absent. The only mandible is cut-marked at the base, probably due to skinning.

### 5 - CONCLUSION

In Italy evidence of Neandertal exploitation of small prey has increased in the last decade as a result of the refinement of excavation methods and the re-examination of faunal assemblages excavated during the 20th century. Although limited, the small game hunted in these three sites does not contradict the ecological context reconstructed in the past, which were based on medium-large mammals, often dominated by cervids. Even though other faunal assemblages from this area need to be studied in full, it is important to note that small mammal exploitation occurs more frequently at the end of the Middle Palaeolithic, a crucial period for Neandertals in Western Eurasia as they go extinct around 40 ky BP (Higham et al., 2014). Neandertals were then replaced by the earliest Anatomically Modern Humans. This paper provides evidence that small mammals were utilized by archaic homins as sources of food and fur. This evidence from Northeastern Italy will add to long held debates surrounding Optimal Foraging Theory (Smith, 1983) and the reasons for the selection of resources across the Middle Palaeolithic.
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