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EPIGRAVETTIAN PROCESSES AND ECONOMIC STRATEGIES IN NORTH-EASTERN ITALY: THE CASE OF THE BIARZO SHELTER (UD)

STRATEGIE E PROCESSI ECONOMICI EPIGRAVETTIANI IN ITALIA NORD-ORIENTALE: IL CASO DEL RIPARO DI BIARZO (UD)

Riassunto breve - Le prime attestazioni epigravettiane in Friuli Venezia Giulia sono evidenti a partire dall'Interstadiale in siti chiave situati tra il fondovalle (le valli del Natisone nelle prealpi Giulie) e gli altopiani carsici del Piancavallo e di Pradis. A Grotta del Clusantin (Clauzetto-PN), nelle Prealpi Carniche a 520 m s.l.m., si sono conservate le prove scientifiche di un'interazione umana attorno ai 14ka Cal ^{14}C BP. L'abbondante presenza di armature e strumenti di piccole dimensioni tra l'industria litica e i numerosi resti di marmotta con evidenti tracce di sfruttamento antropico fanno presumere che si tratti di un sito specializzato alla caccia di questo sciuride. Questo rappresenta un unicum eccezionale in Italia, confrontabile oltre confine solamente in Francia nel massiccio del Vercors e nelle Alpi svizzere della Jura. Le vicine Grotte Verdi di Pradis, a 650 m s.l.m., confermano l'esistenza di contatti con territori limitrofi ponendo l'altopiano come uno dei bacini di caccia prealpini sfruttato attorno alla metà dell'Interstadiale Tardoglaciale, anche in tempi successivi quando la colonizzazione epigravettiana investe l'altopiano del Cansiglio e il Piancavallo. Il Riparo di Biarzo si trova alla base di un terrazzo alluvionale lungo la sponda sinistra del Fiume Natisone a 160 m s.l.m. nel Friuli orientale. Il deposito scavato dal prof. A. Guerreschi tra il 1982 e il 1984 comprende livelli contenenti manufatti attribuibili all'Epigravettiano finale, Mesolitico e Neolitico. Vengono presentati in questo lavoro i risultati dello studio dei reperti faunistici recuperati nel livello epigravettiano, datati 11.100 ± 125 uncal BP. La predominanza del cinghiale tra gli ungulati rendono è una caratteristica peculiare tra i siti epigravettiani dell'Italia Nordorientale. Tracce antropiche sono state identificate sulla maggior parte dei resti di ungulati, tra i carnivori solo alcuni reperti di Ursus arctos presentano strie da strumento litico. L'abbondante presenza tra i resti del cinghiale di denti a vario stadio di eruzione ed usura permette di ipotizzare un'occupazione del sito tra l'inizio dell'autunno e la fine della primavera.

Parole chiave: Riparo di Biarzo, Strategie economiche, Epigravettiano Finale, Tardoglaciale, Friuli Venezia Giulia.

Abstract - *The former Epigravettian occupations in the Friuli Venezia-Giulia are evident since the beginning of the Allerød Interstadial in some keys sites located between the valley bottom (Natisone valleys-Julian Prealps) and the karst plateaus of Piancavallo and Pradis. In the Clusantin cave (Clauzetto-PN), in the Carnic Prealps at 520 a.s.l., evidences of human presence at 14ka Cal ^{14}C BP have been discovered. The abundance of lithic industry and marmots remains bearing butchery marks suggests a specialized hunting and processing of this small game. This is an exceptional unicum in Italy, and it can be compared only to the evidences discovered in the Vercors Massif (France) and in the Swiss Alps of the Jura. The anthropic evidences coming from the Grotte Verdi, in the Pradis plateau at 650 a.s.l., allow to confirm the existence of contacts with the nearest territories, putting the Pradis Plateau as one of the hunting basin of the Prealps during the second part of the Late Glacial Interstadial, and subsequently when the Epigravettian groups colonized the Cansiglio and Piancavallo plateaus.*

Biarzo shelter is located at the base of an alluvial terrace on the left side of the Natisone river at 160 m a.s.l. in eastern Friuli. The deposit excavated from 1982 to 1984 by Prof. A. Guerreschi contains several anthropic levels dated to the final Epigravettian, the Mesolithic and the Neolithic. Our contribution presents the results of the study carried out on the faunal remains recovered in the single epigravettian layer, dated 11.100 ± 125 uncal BP. The predominance of wild boar among the ungulates is a particular feature with reference to the epigravettian sites of Northeastern Italy. Traces of anthropic actions have been identified on the most ungulates bones, whereas among the carnivores only a few bear bones show cutmarks. The high number of wild boar teeth at various eruption stages suggests that site occupation occurred from the beginning of autumn to the end of spring.

Key words: Biarzo rockshelter, Economic strategies, Late Epigravettian, Late Glacial, Friuli Venezia Giulia.

Introduction

The general picture for the entire Italian region to the East of the Veneto is one in which Epigravettian evidences are more scarce than in the region to the West. Starting from the Interstadial only, key sites situated

between the valley-bottom, the Natisone valleys in the Julian Pre-Alps and the karst plateaus of Piancavallo and Pradis have yielded enough evidence to trace the patterns of territorial mobility, organisation of dwelling-structures and economic activities in this geographical area. Despite this, according to some Authors, the relative

rarefaction of the data available could be attributed to the lack of field surveys and good quality flint in the area (PERESANI et al. 2008).

The groups of hunter-gatherers that frequented these lands witnessed a slow and complex process of transformation in the Alpine valley piedmont margin and coastlines. The climate change that was happening at the time led to a remapping of environments, forest biomes and vegetation limits, increasing the availability and variety of faunal resources in the landscape. In some cases, glaciers persisted near settlements.

Pollen data provide evidence of the reforestation of the plateaus towards the end of the Bølling, with conifers reascending towards the spurs. The piedmont forests were of variable composition, with *Pinus sylvestris*, *Betula*, *Juniperus* and *Larix* predominating in the Western Alps and *Pinus sylvestris*, *Larix*, *Picea*, *Betula* and *Pinus mugo* in the Eastern Alps (FINSINGER et al. 2006; RAVAZZI et al. 2007).

In North-East Italy the colonisation of lands above altitudes of 1000 metres developed at the height of the Allerød. The existence of a seasonal settlement system based on complex sites, sometimes used for complementary activities, with a model based on the relationship between the altimetric position and the economic and functional orientation, is supported by settlements distributed between the valley-bottom areas and the karst plateaus up to an altitude of 1600 m (BERTOLA et al. 2007). The model envisages the valley-bottom sites as subject to repeated frequentation and different activities, with evidence pointing predominantly to the exploitation of red deer from spring to autumn and, to a lesser extent, other ungulates, with a marked decrease in caprids and bovids. Faunal data indicate that the Epigravettian groups returned to higher altitudes in the summer and autumn months, not only because of an interest in the wider variety of biological resources but also, in some cases, for specialized hunting (FIORE, TAGLIACOZZO 2006; PHOCA-COSMETATU 2005a, 2005b, 2009).

The study of the faunal assemblages of the archaeological deposits provides good supporting evidence for the reconstruction of the palaeoenvironmental picture, often bringing to light climatic and environmental variations not recorded in pollen spectra and varvological data. Archaeozoological analysis, in association with the study of lithic assemblages, makes us more able to deduce the general anthropic patterns and different functions of the sites (base camp, seasonal camp or haltes de chasse).

Currently, information for research into Epigravettian frequentation of Friuli Venezia-Giulia is based mainly on the analysis of the Pradis plateau, Grotta Clusantin, Grotte Verdi and Riparo Biarzo (Natisone valley) sites, the latter being subject of this study (fig 1).

At Grotta Clusantin (520 m a.s.l., Carnic Pre-Alps, Clauzetto-PN), where scientific evidence of human

frequentation is preserved at 14ka Cal ^{14}C BP, the fauna and vegetation indicate a climate considerably colder than the present, compatible with a coniferous woodland canopy (PERESANI et al. 2008; GURIOLI et al. 2006). The first settlers after deglaciation made this site one of their strategic stopping places.

The analysis of about 26000 bone remains, attributable predominantly to mammals, indicates an alpine meadow environment with few trees, with the marmot representing more than 90% of the identified species, living in colonies in symbiosis with ibex and chamois. The few remains of wild boar, deer and elk indicate the proximity of woodland, possibly dense and of the cold damp type.

Archaeozoological analysis has produced evidence of anthropic intervention on ungulates, particularly on sciurids. The marmot remains have signs linked to skinning and over 80% of them were burnt and grouped around a burning structure at the centre of the dwelling (PERESANI et al. 2009; GURIOLI et al. 2006). The marked presence of armatures and small-size lithic tools indicate that these were used for obtaining and treating the carcasses of small animals. The high percentage of fire-altered remains and the systematic absence of some anatomical elements could indicate a form of "production", by smoking the meat to preserve it during transport (PERESANI et al. 2009; GURIOLI et al. 2006). The characteristics of the specialisation and the species of prey at Grotta Clusantin are an exceptional and unique case in Italy (ROMANDINI 2004-2005; PERESANI et al. 2008), comparable only to those in France on the Vercors Massif and Swiss Alps of the Jura (TOMÈ 2005; TOMÈ & CHAIX 2003; PATOU 1987).

In the same area, Recent Epigravettian frequentations of Grotte Verdi di Pradis, overlooking the river Cosa (CORAI 1980) at 650 m above sea level, provide evidence of the movement patterns of groups, confirming the plateau as one of the most exploited hunting areas not only in the mid Late Glacial Interstadial, but also in subsequent times when Epigravettian colonisation reached the Cansiglio plateau and Piancavallo (PERESANI et al. 2000, 1999-2000; DUCHES et al. 2007; GUERRESCHI 1975).

The small area covered by the systematic excavations has yielded a few remains of meals that are of no help in identifying the faunal context and some bone specimens worked on by man for utilitarian and non-utilitarian purposes. The first of these consists of two punches, one made from left ulna of wolf (*Canis lupus*) with ancient languette tip fractures with extremely rounded margins due to subsequent intense use, and the other from elk telemetacarpal (*Alces alces*) (GURIOLI 2004). The second consists of two marmot right clavicles with a series of cuts-notches (4-3) across the major axis of the item produced by the sciage of a lithic tool. The few palaeontological remains are

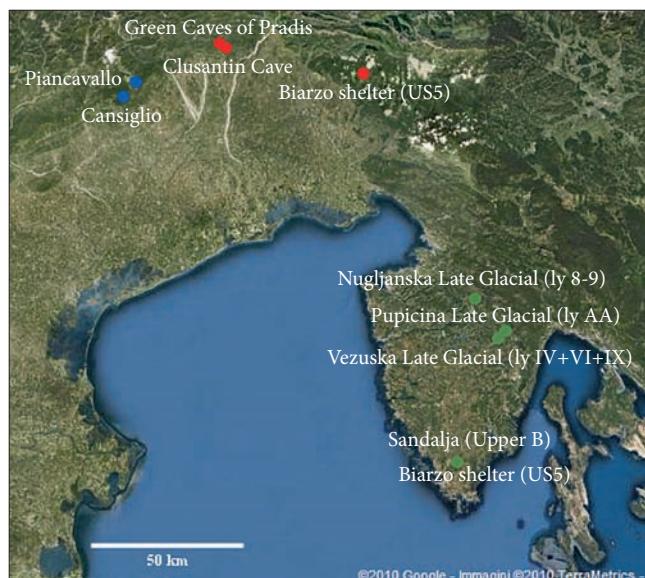
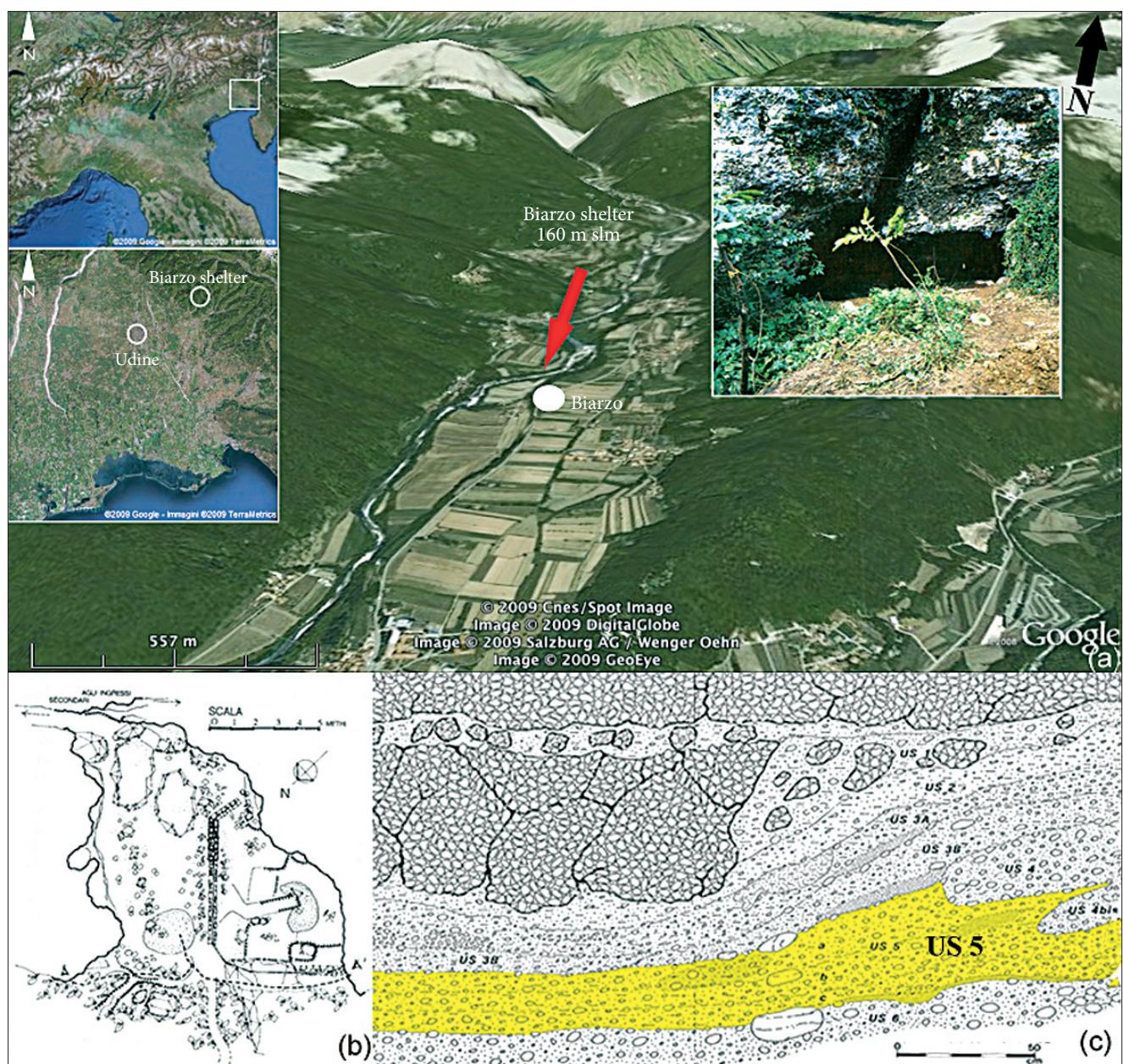


Fig. 1 - Distribution of the Late Epigravettian sites in the North-Eastern Adriatic area. Red circles for the Friuli Venezia Giulia sites with lithic industry and faunal remains. Blue circles for the Friuli Venezia Giulia sites with only lithic assemblages and green circles for the Istrian site with faunal remains.

- *Distribuzione dei siti del tardo Epigravettiano nel settore nord-adriatico. I pallini rossi indicano siti del Friuli Venezia Giulia con industria litica e resti faunistici; i pallini blu indicano siti del Friuli Venezia Giulia solo con industria litica; i pallini verdi indicano siti dell'Istria con resti faunistici.*

Fig. 2 - Location of Biarzo rockshelter (a), planimetry (b; drawing by A. Palumbo), stratigraphy (c; drawing by F. Nalin; the Late Epigravettian layer is marked with yellow).

- *Posizione del Riparo di Biarzo (a), planimetria (b, disegno di A. Palumbo), startigrafia (c, disegno di F. Nalin; in giallo il livello del tardo Epigravettiano).*



almost exclusively of cave bear (*Ursus spelaeus*). Three radiometric datings (AZZI & GULISANO 1979) fix the age of the upper unit to the Allerød oscillation (layer 2 (F-84): 11.770 ± 260 BP; layer 1b (F-85): 11.250 ± 310 ; layer 1 (F-86): 10.970 ± 290).

Nothing comparable to the materials used here has been found in the Alpine sites frequented by man during the Wurm Late Glacial, and they have a role of great interest in that they are unmatched in any of the contemporary sites in North-East Italy. The finding of punches suggests the processing of perishable materials (skins, hide and wood) on the site and these are directly comparable with two apical tool fragments found at Grotta Clusantin; the notched clavicles are proof of a symbolic behaviour of man that goes beyond simple utilitarian purposes (PERESANI et al. 2009).

The Biarzo Shelter

The Biarzo shelter is on the hydrographic left bank of the Natisone river at 160 m a.s.l., a little upstream of the village of Biarzo, in the municipality of San Pietro al Natisone (UD). The site was reported to Dr. F. Bressan of the Museo Friulano di Storia Naturale of Udine after

Taxa	NISP	%NISP	MNI	%MNI
Leporidae	1	0,11	1	2,08
<i>Marmota marmota</i>	13	1,39	1	2,08
<i>Castor fiber</i>	12	1,28	1	2,08
<i>Lynx lynx</i>	1	0,11	1	2,08
<i>Vulpes vulpes</i>	4	0,43	1	2,08
<i>Meles meles</i>	6	0,64	2	4,17
<i>Ursus arctos</i>	22	2,35	3	6,25
Carnivora ind.	27	2,88	3	6,25
<i>Sus scrofa</i>	334	35,68	18	37,50
<i>Cervus elaphus</i>	235	25,11	4	8,33
<i>Capreolus capreolus</i>	2	0,21	1	2,08
Cervidae	38	4,06	2	4,17
<i>Capra ibex</i>	31	3,31	2	4,17
<i>Rupicapra rupicapra</i>	27	2,88	4	8,33
Caprinae	12	1,28	1	2,08
Ungulata ind.	171	18,27	3	6,25
Total identified	936	100	48	100
Big size Mammals	742	41,80		
Medium-Big size Mammals	538	30,31		
Medium size Mammals	459	25,86		
Small-Medium size Mammals	20	1,13		
Small size Mammals	16	0,90		
Total Unidentified mammals	1775	100		
Undetermined	69520			
Total Unidentified	71295			
TOTAL REMAINS	72218			

Tab. I - NISP and MNI of the total faunal assemblage.
- NISP e MNI dell'insieme dei resti faunistici.

an initial sounding made by the Friulian Speleological and Hydrological Association in 1980. The excavations of the deposit, directed by Prof. A. Guerreschi in the years 1982-1984 together with Dr. F. Bressan, made it possible to distinguish different phases of occupation referable to the Final Epigravettian, Mesolithic and Neolithic (fig. 2).

The US 5, dated on carbon to 11.100 ± 125 ^{14}C BP, has yielded lithic artefacts referable to the Recent Epigravettian, abundant faunal remains, coals and some hearth remains (MOZZI 1996). The analysis of osteological material was performed on a total of 72,218 remains, 923 (1% of total) of which were identified at the level of species, genus or family of origin. The presence of burnt remains (47% of total) in association with a large amount of carbonised sediment found in US 5 suggest the lighting of fires and the probable use of bone as fuel.

The faunal composition (tab. I) of US 5, taken as a whole, reflects that evidenced in the previous study by P. ROWLEY-CONWY (1996).

Of the identified remains, wild boar (*Sus scrofa*) is markedly prevalent (35.68% of remains), followed by red deer (*Cervus elaphus*) (25.11%). The ungulates are ibex (*Capra ibex*) (3.31%), followed by alpine chamois (*Rupicapra rupicapra*) (2.88%) and roe deer (*Capreolus capreolus*) (0.21%). Of the carnivores, the most numerous remains are brown bear (*Ursus arctos*) (2.35%), followed by badger (*Meles meles*) (0.64%), red fox (*Vulpes vulpes*) (0.43%) and lynch (*Lynx lynx*).

The rodents present are marmot (*Marmota marmota*) (1.39%) and beaver (*Castor fiber*), with 12 remains (1.28%). Lagomorph remains are very rare (0.11%).

Traces left by the Epigravettians during their exploitation of the carcasses are present on 107 identified remains and 462 unidentified fragments. Actions that were part of a butchery process have been hypothesised only on some of the either identified or anatomically distinguishable remains in which the traces could be contextualised.

Of the categories of traces, 70.09% are cutmarks produced by a lithic tool, 15.89% impact scars, 12.15% impact scars plus cutmarks, 0.93% scraping traces and 0.93 % percussion cones produced by breaking the bone to extract the marrow (tab. II). The cutmarks so far can be linked predominantly to the recovery of the meaty parts. Of these, those produced in the detachment of the meat are more numerous than those related to the cutting of muscle or tendon insertions. There are numerous cutmarks linked to disarticulation and skinning, thanks also to the good preservation of the epiphyses. Remains bearing impact scars are less numerous and these are mainly found on diaphyseal fragments of long bones and metapodials. Of the bones subject to different degrees of burning, 113 also bear cutmarks, whereas 25 also have impact scars.

TAXA US 5	NISP	Cutmarks	Impacts	Scrapings	Cutmarks +Impacts	Percussion cones	Percussion cones + Cutmarks	Tot. butchery marks	% of Butchery marks
Leporidae	1								
<i>Marmota marmota</i>	13								
<i>Castor fiber</i>	12								
<i>Lynx lynx</i>	1								
<i>Vulpes vulpes</i>	4								
<i>Meles meles</i>	6								
<i>Ursus arctos</i>	22	5						5	4,67
Carnivora ind.	27	4						4	3,74
<i>Sus scrofa</i>	334	9	6	1				16	14,95
<i>Cervus elaphus</i>	235	29	12	1	11			53	49,53
<i>Capreolus capreolus</i>	2								
Cervidae	38	14				1	15	14,02	
<i>Capra ibex</i>	31	3					3	2,80	
<i>Rupicapra rupicapra</i>	27	1					1	0,93	
Caprinae	12								
Ungulata ind.	171	3	3	2				8	7,48
Total NISP	936	75	17	1	13		1	107	
%		70,09	15,89	0,93	12,15		0,93		
Big size Mammals	742	91	41		16	11	3	162	35,06
Medium-Big size Mammals	538	62	17		2	8		89	19,26
Medium size Mammals	459	55	4		2		1	62	13,42
Small-Medium size Mammals	20	1						1	0,22
Small size Mammals	16								
Total Unidentified mammals	1775	209	62		20	19	4	314	
Unidentified (- Unid. mammals)	69520	93	17		21	13	4	148	
Total Unidentified	71295	302	79		41	32	8	462	
Combusted remains	29602	104	25		10	7	1	147	
Calcined remains	4394	9						9	
Combusted + Calcined	33996	113	25		10	7	1	156	

Tab. II - Butchery mark quantification of the total faunal assemblage.

- Tracce di macellazione sull'insieme dei resti faunistici.

<i>Sus scrofa</i> Anatomical elements	NISP	Cutmarks	Impacts	Impacts + cutmarks	Total butchery marks	Burning
Skull+teeth	10					
Jaw+teeth	11					
Teeth identified	131					
Teeth Unidentified Frag.	97					21
Scapula	4	3			3	
Humerus						
Radius	1	1			1	
Ulna	3					2
Carpals	2					
Femur						
Tibia	1					
Fibula	1					1
Calcanus	1					1
Astragal	1					
Tarsals	2					
Metapodials	21	2			1	2
Phalanx I	18	1	6		7	4
Phalanx II	19	2			2	1
Phalanx III	9					1
Phalanx unidentified.	1			1		
Total	334	9	6	1	16	32

Tab. III- *Sus scrofa* specimens and number of butchery marks.- Reperti di *Sus scrofa* e numero di tracce di macellazione.

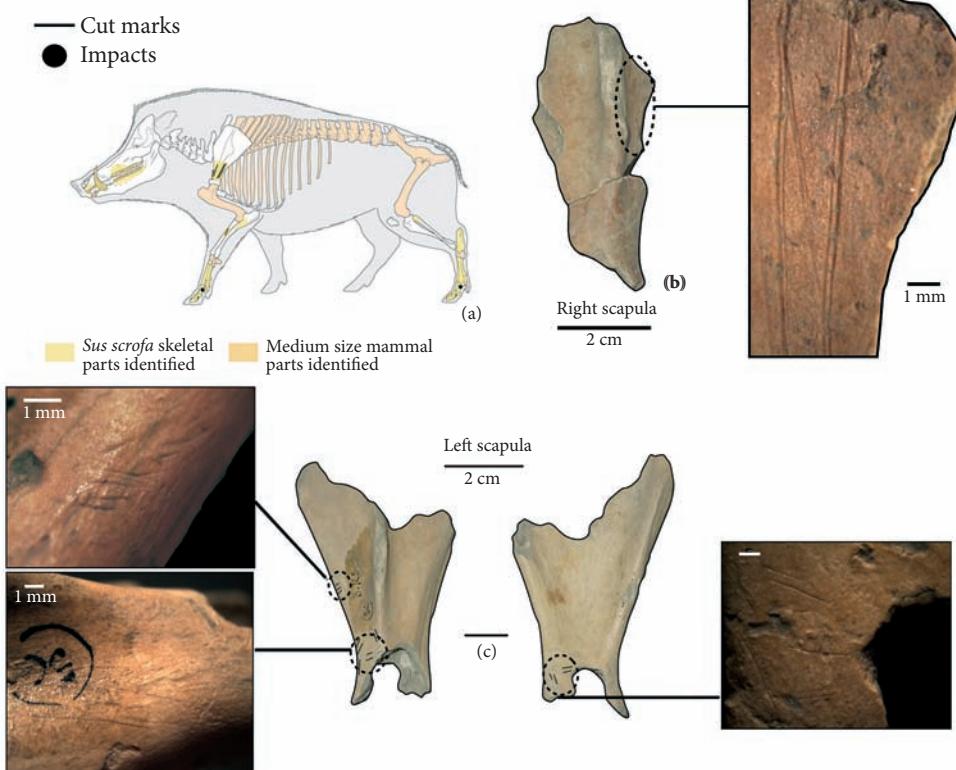


Fig. 3 - Body part representation for *Sus scrofa* specimens and butchery marks location on the skeleton (a). Cutmarks on two scapulae of two juvenile wild boards (b, c; stereomicroscope close-up of the cutmarks) (mod. from PALES & GARCIA 1981).

- Distribuzione cromatica degli elementi identificati di cinghiale e posizione delle tracce sullo scheletro (a). Strie presenti su due scapole di due individui giovanili di cinghiale (b, c; dettaglio allo stereomicroscopio) (mod. da PALES & GARCIA 1981).

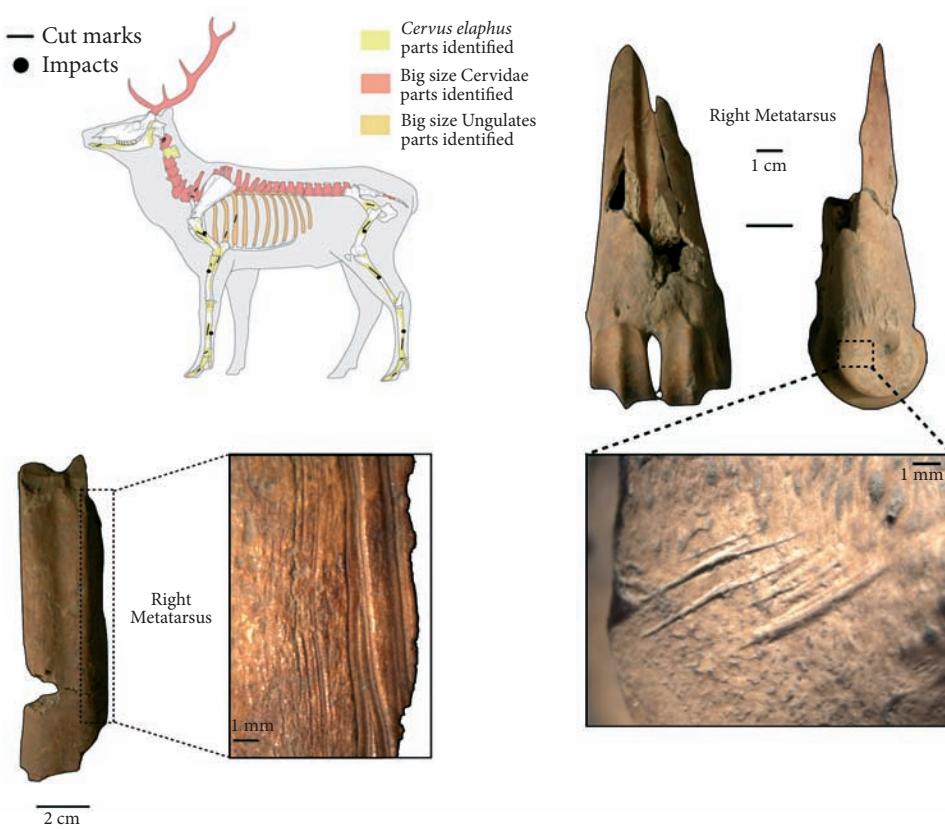


Fig. 4 - Body part representation for *Cervus elaphus* specimens and butchery marks location on the skeleton (a). Cutmarks on the distal epiphysis of a left metatarsal (b, stereomicroscope image) and scraping on a right metatarsal diaphysis (c, stereomicroscope close-up) (mod. from PALES & GARCIA 1981).

- Distribuzione cromatica degli elementi identificati di cervo e posizione delle tracce sullo scheletro (a). Strie sull'epifisi distale di un metatarso sinistro di cervo (b, dettaglio allo stereomicroscopio) e raschiatura sulla diafisi di un metatarso destro (c, dettaglio allo stereomicroscopio) (mod. da PALES & GARCIA 1981).

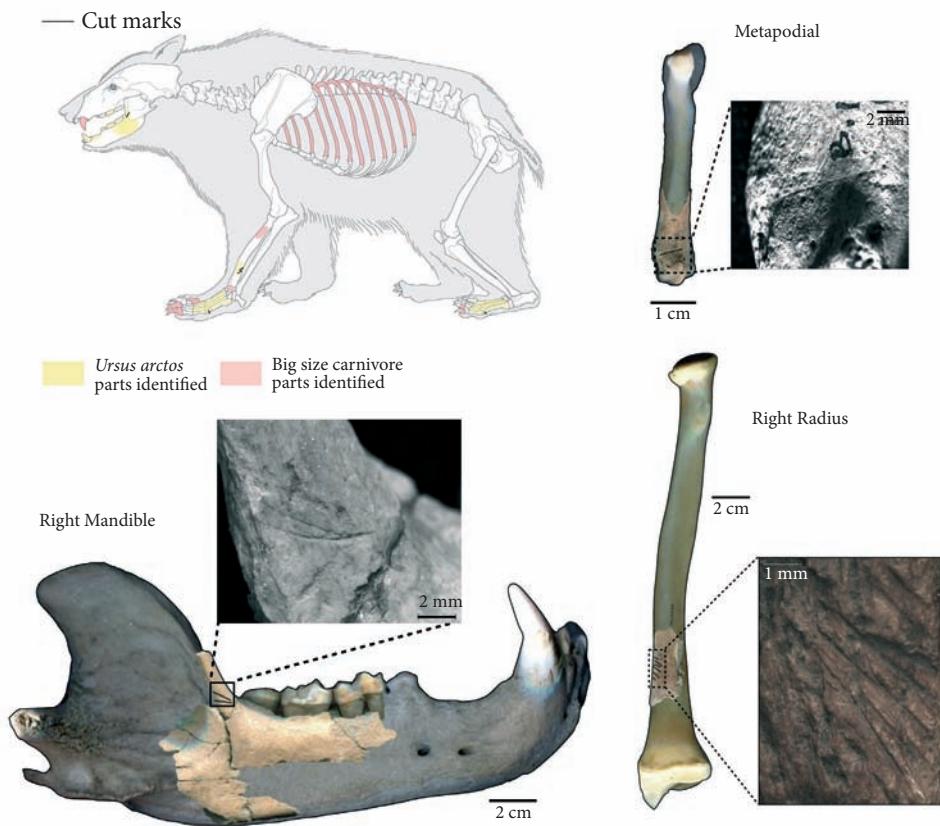


Fig. 5 - Body part representation for *Ursus arctos* specimens and butchery marks location on the skeleton (a). Detail of the cutmark located on the distal epiphysis of a metapodial fragment (b, stereomicroscope image). Left mandibula fragment bearing a cutmark (c, stereomicroscope image) and some cutmarks on a right radius (d, stereomicroscope image) (mod. from PALES & GARCIA 1981).

- Distribuzione cromatica degli elementi identificati di orso e la posizione delle tracce di macellazione sullo scheletro (a). Particolare di una stria presente sull'epifisi distale di un frammento di metapodiale (b, immagine allo stereomicroscopio). Frammento di mandibola destra con strie (c, immagine allo stereomicroscopio) e alcune tracce di macellazione su un frammento di radio (d, immagine allo stereomicroscopio) (mod. da PALES & GARCIA 1981).

Exploitation of wild boar in US 5

The species most represented in the deposit, by a wide margin, merits close attention. The 334 wild boar remains analysed are referable to an MNI of 18 calculated on the basis of number, laterality, wear and degree of eruption of teeth. All in all, cranial remains (75%) are more represented than post-cranial remains. Portions of long bone, while rarely present, are more likely to be appendicular extremities (tab. III), with the axial skeleton totally lacking. Traces linked to anthropic activity are to be found in 13 front limb and extremities.

All in all, the type and positioning of the traces clearly document the removal of meat (fig. 4), the detachment of muscle mass and the non-systematic intentionality of marrow extraction.

Two unmistakably young individuals (aged 6-24 months) bearing signs of meat removal can be recognised in the remains. A single diaphyseal fragment of radius, bearing a long cutmark almost parallel to the major axis indicating a proximal/distal gesture, and one diaphysis of metapodial, with oblique cutmark, are very probably linkable to the animal skinning process. Evidence of the extraction of marrow for utilitarian purposes is provided by 6 first phalanges with classical spiroid fractures.

The presence in the sample analysed of young individuals and two canines attributable to females leads one to presume that the killing of the animals and

their transport to the site took place around the end of spring and beginning of summer, during the mating season, when the females formed small groups with their young, often accompanied by older ones from previous broods. The capturing of young animals, especially if accompanied by a female, definitely calls for a group strategy or elaborate capture techniques, which do not exclude the use of traps, for example. The presence of adult and senile individuals, however albeit rare, means that the possibility of the killing period lasting the whole year cannot be ruled out.

Exploitation of red deer in US 5

Data regarding the processing of red deer in US 5 of the Biarzo Shelter are documented by 235 anatomically identified remains. Remains of limbs and related extremities are well represented and there are numerous cranial elements (teeth and mandibles), a small number of axial elements no torso elements (tab. IV).

The lack of these anatomical elements is probably linked to the different strength and preservation patterns for vertebrae, ribs, sternum and hip on the one hand and to the partialness of the area investigated on the other. For these reasons, the data regarding this large ungulate must be associated to 26 vertebral fragments attributed to large-size cervids. Also, the 63 rib fragments, because of their size and thickness, could also belong to these.

<i>Cervus elaphus</i> Anatomical elements	NISP	Cutmarks	Impacts	Cutmarks +impacts	Scraping	Tot. NISP	Burning with butchery marks	Carnivor marks	Rodents marks
Skull									
Jaw+Teeth	8	1				1			
Teeth	36								
Teeth undet.frag.	1								
Atlas-Axis	1								
Scapula									
Humerus	12	4		3		7			
Radius	7	2	1	1		4	1	1	
Ulna	13						3		
Carpals	16	1					1		
Metacarpal	21		8	1		9	3	3	1
Telemetacarpus									
Coxal	4	2					2		
Femur	21	8	2	3		13	4		
Patella									
Tibia	22	6		2		8	1	1	1
Malleolus	1								
Calcaneus									
Astragal									
Tarsals	2								
Metatarsal	16	3		1	1	5	2		1
Metapodial frag.	1								
Phalanx I	16	1	1			2			
Phalanx II	14						1		
Phalanx III	2								
Phalanx I rud.	1								
Phalanx II rud.	9						3		
Phalanx III rud.	4								
Sesamoids	7	1				1			
Total	235	29	12	11	1	53	18	5	3

Tab. IV - *Cervus elaphus* specimens and number of butchery marks.- Reperti di *Cervus elaphus* e numero di tracce di macellazione.

<i>Ursus arctos</i> Anatomical elements	NISP	Cutmarks	Total NISP with cutmarks	Burning
Jaw+teeth	2	1	1	
Teeth	8			
Teeth frag. undet.	2			
Radius	2	2	2	
Ulna	1			
Metapodials fr.	2	1	1	
Phalanx I	4	1	1	1
Phalanx II	1			
Phalanx III				
Total	22	5	5	1

Tab. V - *Ursus arctos* specimens and number of butchery marks.- Reperti di *Ursus arctos* e numero di tracce di macellazione.

There are 46 remains - i.e. 24% of the 192 identified remains (36 teeth) - presenting traces linked to butchering activity. Cutmarks have been identified on 25 remains, impact scars on 12 and impact scars plus cutmarks on 9. The traces refer above all to the removal of meat and the detachment of muscle mass, although there is also ample evidence of the removal of tendons and disarticulation.

There are also deep scrape-marks probably caused by the removal of the periosteum, this being a stage in preparing the diaphysis for the impact of the percussor. Skinning cutmarks are preserved on the metapodials, in one case only on the phalanges and on the surface of a sesamoid (fig 4).

Exploitation of bear in US 5

There are 22 remains of bear hunted by the Epigravettians at Biarzo Shelter (tab. V), consisting mainly in cranial elements and short bones of the extremities (metapodials and phalanges). There is an evident almost total absence of elements of torso and appendiculars definitely attributable to this animal.

Anthropic traces are present in 5 elements that provide evidence of the removal of the animal's skin. These are situated on the branch of a right mandible fragment (fig. 5) with an anterior-posterior gesture orientation, on the dorsal surface of two fragments of right radius, on the plantar surface of a metapodial in the vicinity of the distal epiphysis and dorsal surface of a first phalanx in the vicinity of the distal epiphysis.

The positioning and orientation of the gestures in the animal skeleton make it possible to deduce the details of the skinning, which started from the extremities of the limbs and/or cranium.

The traces found on the bear remains thus ascertain and confirm the interest of Epigravettian hunters in the skin of this animal. Also, other reasons for exploiting the carcass cannot be ruled out, despite the fact that there is no surviving evidence of them in the area studied.

Conclusions and Comparisons

The earliest archaeological evidence, regarding Epigravettian hunter-gatherers in the Friuli area, becomes more abundant during the Allerød Interstadial. In current research, the sites yielding key evidence for tracing patterns of landscape exploitation and the organisation of habitation by Epigravettian groups are located between the valley-bottom (Natisone valleys) Piancavallo and Pradis karst plateaus.

At Grotta Clusantin, the specialised marmot hunting that was practiced was unique in Italy (ROMANDINI 2004-2005, PERESANI et al. 2008), comparable only with that which took place in the Vercors massif in France and the Swiss Alps of the Jura (TOMÈ 2005; TOMÈ & CHAIX 2003; PATOU 1987). Squirrel hunting was very probably done by a small number of individuals, skilful split stone craftsmen who seem to have been 'organised' to support and supply groups settled elsewhere.

At the nearby Grotte Verdi of Pradis there is evidence of the subdivision of the sphere of behaviour of the hunter-gatherers, who definitely recognised the plateau as being one of the Pre-Alpine hunting basins around the middle of the Late Glacial Interstadial. The scarcity of faunal remains makes it impossible to construct a picture of the type of site and the economic activities practiced in it, although the punches and the two notched marmot clavicles found there are unique in the North-East Italian Epigravettian. The punch made from an elk bone found at Grotte Verdi is extremely interesting in that faunal remains of this large ungulate in North-East Italian Epigravettian sites are mainly found in valley-bottom habitats (Riparo Tagliente, Riparo Soman). It can be hypothesised, therefore, that this tool was imported ready-made, and not processed on the site. A similar tool was found in the Castelnoviana di Mondeval de Sora burial pit, resting on the sternum of the man, with the tip pointing towards the feet (ALCIATI et al. 1992). The finding of punches suggests that the processing of perishable materials (skins, hide, wood) took place on the site and is directly comparable with two apical tool fragments found at Grotta Clusantin.

Biarzo Shelter certainly adds detail the picture so far painted of the Recent Epigravettian in Friuli Venezia-Giulia. The single radiocarbon dating sets the occupation

to around $11,100 \pm 125$ ^{14}C BP (R-1850, $13,051 \pm 170$ cal BP), in the last phase of the temperate Allerød Interstadial. The location of the valley-bottom site, near to the river Natisone and Alpine slopes, is reflected in the faunal association which appears as quite full and heterogeneous, with abundant wild boar (NR 334 - MNI 18), followed by red deer. The low abundance of carnivore remains (bear, badger, fox and lynch) could well be correlated with a consistent and continuous presence of man. As regards rodents, the presence of marmot at relatively low altitudes compared to current populations coincides with the climactic-environmental of the period in question. The beaver, relatively abundant compared to other sites of the same period, had its habitat in the waters of the Natisone. Beavers are often present in the Late Glacial faunal assemblages of North-East Italian deposits, where traces of their exploitation are rarely found or preserved. At Biarzo Shelter too, there are no grounds for asserting that they were hunted by man, but rather that they were introduced by carnivores or died of natural causes. To be stressed, however, is the presence of burnt materials amongst the 12 marmot remains.

Of the carnivores, only the bear seems to have had an economic importance based primarily on the skin and probably the meat. The evidence of this is comparable with that of the Riparo Dalmeri (US 26c) and Riparo Tagliente (tt. 7, 11, 13, 15 e 16) sites (FIORE & TAGLIACOZZO 2008; ROCCI RIS et al. 2004).

The high percentage of wild boar in the ungulates (39.83%) and in the whole sample (35.68%), as ascertained by the MNI (18), is currently unique in North Italy. Note that in Late Glacial sites in North-East Italy, evidence of suidae ranges from 0.2% at Riparo Dalmeri (US26c) to 3% at Riparo Soman (phase I) (TAGLIACOZZO & CASSOLI 1992), and 4.1% at Riparo Villabruna A (phase I levels 17-10) (AIMAR & GIACOBINI 1995), getting to as high as 11.7% in cuts 10e-b at Riparo Tagliente. In the Istrian peninsula sites (fig. 1), during the Interstadial, red deer is predominant in the faunal composition at Grotta Pupicina and Grotta Vešanska, whereas the auroch predominates at the Nugljanska and Sandalja sites. Apart from Grotta Pupicinam, wild boar is present in the other three deposits (MIRACLE 2007).

The evidence provided by the high number of identified remains of wild boar at Biarzo Shelter is not sufficient to support the assumption that there was the removal of other exploitable materials in addition to meat and marrow. It is plausible, without totally discarding the different preservation methods and the smallness of the area investigated, that the absence of many of the skeleton elements could be attributed to the animals being cut into pieces on the scene of the killing and then transported - mainly the quarters and craniums - to the shelter. Also not to be excluded is their use as fuel for burning; suidae bones, in fact, are fattier than those of other animals.

The red deer remains provide evidence of the entire butchering process. Elements of limbs, cranium and axial skeleton are present in large numbers, and it can be assumed that both the transport and exploitation of the entire carcass took place in the shelter, as is the case for ibex and red deer at Riparo Dalmeri (FIORE & TAGLIACOZZO 2006). The traces indicate that the exploitation of the animal began with the removal of the skin and tendons, followed by the detachment and extraction of the meat and marrow. Traces of butchering that can be attributed to skinning and disarticulation are also found on ibex and chamois.

There are also some fragments of bone points in the shelter, together with an atrophic red deer canine with an incomplete hole and thirteen shells, evidence of a collection made on the shores of the upper Adriatic, and several perforations that indicate the use of parure or decorations on items of clothing (BRESSAN et al. 1982).

Almost half the sample (47%) consists of fire-altered remains, well supported by the finding of carbonised sediment during the excavation stages. It is likely that bone was used as fuel in the hearths, evidence of which has also been found in the habitation structure of level 26c of Riparo Dalmeri (FIORE & TAGLIACOZZO 2008) and on almost all the investigated surface of Grotta Clusantin (PERESANI et al. 2008).

Analysis of the wear and eruption of teeth indicates that the killing of the animals took place from the end of autumn to the beginning of the summer, peaking between spring and the beginning of the summer, the period in which births were concentrated. In support of the ungulates data, the study made by CASSOLI & TAGLIACOZZO (1996) on the ichthofauna of the entire deposit provides evidence - despite the small number of remains for the Epigravettian level - of the shelter possibly being frequented all the year round, with fishing activity concentrated in the spring and summer. In addition, the absence of brown bear deciduous teeth seems to rule out the use of this shelter by the animal for weaning its young during the winter period.

Despite the low abundance, the Friulian evidence points to the existence of a seasonal settlement system characterised by complex sites, with a model based on the relationship between the altimetric position and the economic and functional orientation, supported by settlements distributed between the valley-bottom areas and the karst plateaus up to an altitude of 600 m. The Biarzo Shelter falls fully within the model that envisages valley-bottom sites as subject to repeated frequentation and different activities, with evidence pointing predominantly to the exploitation of red deer from spring to autumn and, to a lesser extent, other ungulates, with a marked decrease in caprids and bovids. The proximity of a water source, the abundant availability of fauna and the possibility of reaching

medium-high altitudes in short times without great movements make the shelter an ideal "base camp", in the context of a land use based on seasonal hunting camps (Clusantin, Grotte Verdi di Pradis) and frequentation of the coasts, plausibly the Adriatic coasts. These camps, located strategically over a vast area, must have been linked not only to a more extensive variety of biological resources but also, in some cases, to specialised hunting (FIORE & TAGLIACOZZO 2005; PHOCA-COSMETATU 2005a, 2005b, 2009).

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