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Preliminary report on the new faunal remains from Grotta Guattari (Late Pleistocene, San Felice Circeo, Latium)

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Abstract

Grotta Guattari (San Felice Circeo, central Italy) is best known for the discovery of a Neanderthal skull in 1939. New investigations of an area never investigated before, the so-called *Antro del Laghetto* (literally Chamber of the small lake), have been recently carried out by the Soprintendenza Archeologia, Belle Arti e Paesaggio per le Province di Frosinone, Latina e Rieti. The excavation highlighted a hyena frequentation correlatable with the paleosurface investigated since 1939 within other rooms of the cave. The stratigraphic analysis made it possible to identify, below the paleosurface, at least two layers, one of which reveals a human frequentation.

In addition to *Homo neanderthalensis*, the faunal assemblage from *Antro del Laghetto* consists of abundant *Cervus elaphus*, followed by *Crocuta crocuta*, *Bos primigenius*, *Sus scrofa* and *Equus ferus*. Remains of at least another 20 taxa of medium and large size mammals, some of which previously unknown at Grotta Guattari, rare micromammals and birds complete the fossil record.

The preliminary taphonomic study of bone remains

of bovids and cervids remains shows modifications typical of large carnivores' activity. The epiphyseal ends have been removed by chewing, as can be deduced by the irregular and rounded fracture margins and their zig-zag pattern; somewhere the notches and grooves due to teeth contact are also preserved.

Although sporadic, the occurrence of chamois, ibex and Irish elk, together with the prevalence of the red deer compared to the rare fallow deer, suggests that the fossil deposit was accumulated in colder times than the present. This reconstruction is consistent with the available radiometric dating. The ecological features of these *taxa* indicate that the surrounding environment was mainly covered with woods and forests, with large open spaces and steep rocky areas.

Keywords: Quaternary, Central Italy, mammals, taphonomy, palaeoenvironment

Riassunto

Grotta Guattari (San Felice Circeo, Italia centrale) è nota soprattutto per la scoperta di un cranio dell'uomo di Neanderthal nel 1939. Le recenti ricerche preventive nella grotta, intraprese dalla Soprintendenza Archeologia, Belle Arti e Paesaggio per le Province di Frosinone, Latina e Rieti, hanno permesso di esaminare una porzione del deposito finora mai indagata, il cosiddetto Antro del Laghetto. Le indagini hanno evidenziato un livello frequentato prevalentemente da iene, correlabile con la paleosuperficie indagata a partire dal 1939 in altre aree del sito. Lo studio preliminare della stratigrafia ha permesso di individuare, al di sotto del paleosuolo, almeno due ulteriori livelli, uno dei quali con tracce di frequentazione umana.

Oltre a *Homo neanderthalensis* l'associazione faunistica dell'Antro del Laghetto è costituita prevalentemente da *Cervus elaphus*, seguito da *Crocuta crocuta*, *Bos primigenius*, *Sus scrofa* e *Equus ferus*. Resti di almeno altri 20 *taxa* di mammiferi di medie e grandi dimensioni, alcune mai identificate nel sito in precedenza, e rari micromammiferi e uccelli completano il quadro faunistico.

Lo studio tafonomico preliminare dei reperti ossei di bovidi e cervidi evidenzia modificazioni tipiche dell'attività di grossi carnivori; le estremità epifisarie sono state asportate dall'attività di masticazione, come si deduce dai margini di frattura irregolari, arrotondati e con andamento a zig-zag; in alcuni punti i margini conservano anche l'incavo e i solchi lasciati dal contatto con i denti.

La presenza, seppur sporadica, di resti di camoscio, stambecco e megalocero, unitamente alla netta dominanza del cervo nobile rispetto al raro daino, suggerisce che i suddetti resti faunistici sono stati accumulati in momenti più freddi dell'attuale, coerentemente con le datazioni radiometriche disponibili. Le caratteristiche ecologiche dei *taxa* individuati indicano che l'ambiente circostante la grotta era prevalentemente coperto di boschi e foreste, con ampi spazi aperti ed aree rocciose scoscese.

Parole chiave: Quaternario, Italia centrale, mammiferi, tafonomia, paleoambiente

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Introduction

Grotta Guattari (San Felice Circeo, Latina, central Italy; Fig. 1) is a prehistoric site well known since the fortuitous discovery in 1939 of the third Neanderthal skull of Italian history after those from Saccopastore in Rome (Sergi 1929; Breuil & Blanc 1935; Blanc 1939, 1942; Marra et al. 2015; Salari et al. 2019). A Neanderthal mandible found on the cave floor near the skull the same year (Blanc 1939; Sergi 1954), and a second mandible recovered in 1950 within the breccia outside the main entrance of the cave (Blanc 1951; Sergi & Ascenzi 1955), complete the human discoveries before recent investigations. Several archaeological excavations were carried out inside and outside the cave in the following years collecting a large assemblage of mammal fauna, other vertebrates and a few

Mousterian artifacts (Blanc & Segre 1953; Piperno 1977; Piperno & Giacobini 1991; Stiner 1991a, 2013; *inter alios*). The studies on Guattari's fauna allowed to recognise 17 genres of macro-mammals (i.e. Lagomorphs, Carnivores, Proboscideans, Perissodactyls and Artiodactyls), 4 taxa of micromammals, as many birds and one of amphibians and reptiles (Blanc & Segre 1953). In these studies, the red deer (*Cervus elaphus*) prevailed over the auroch (*Bos primigenius*) and the horse (*Equus ferus*) among large mammals (Blanc & Segre 1953; Sergi 1954, 1974; Taschini 1979; Toth & White 1991; Stiner 1991b, 1994; Alhaique & Tagliacozzo 2000; among the others). Subsequently, Piperno & Giacobini (1991) studied over 600 bone remains from the palaeosurface of the two main rooms of the cave (i.e. *Antro dell'Uomo* and *Vano Principale*) belonging to 12 taxonomic groups and identified the cave

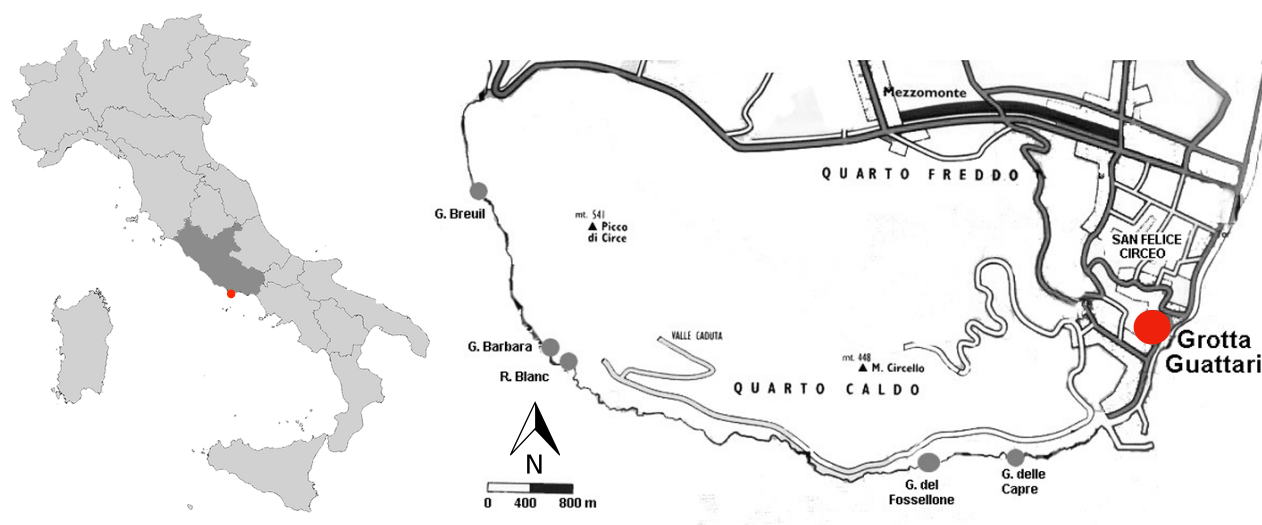


Figure 1: Geographical location of Grotta Guattari (San Felice Circeo, Latium, Italy).

hyena as the main agent of bone accumulation.

The construction works of a new visiting route of the cave by the Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Frosinone, Latina e Rieti led to new archaeological investigations carried out with the collaboration of archaeologists of the Chair of Prehistoric Archaeology at the Università degli Studi di Roma "Tor Vergata". The project began in 2019 with the cleaning of the existing sections of the cave and a survey of a room never investigated before, the so-called *Antro del Laghetto* (literally Chamber of the small lake; Blanc & Segre

(1953); Fig. 2). The excavation of the area brought back to light the same hyena palaeosurface investigated elsewhere since the 1939 and returned a large faunal assemblage of which over one thousand remains have been anatomically and taxonomically determined. Moreover, twenty-six bone remains of *Homo neanderthalensis*, belonging to at least nine individuals, have been identified. A large part of these shows clear signs of hyena gnawing. Finally, the identification of a layer with numerous lithic artefacts below the hyena palaeosurface, although it has only

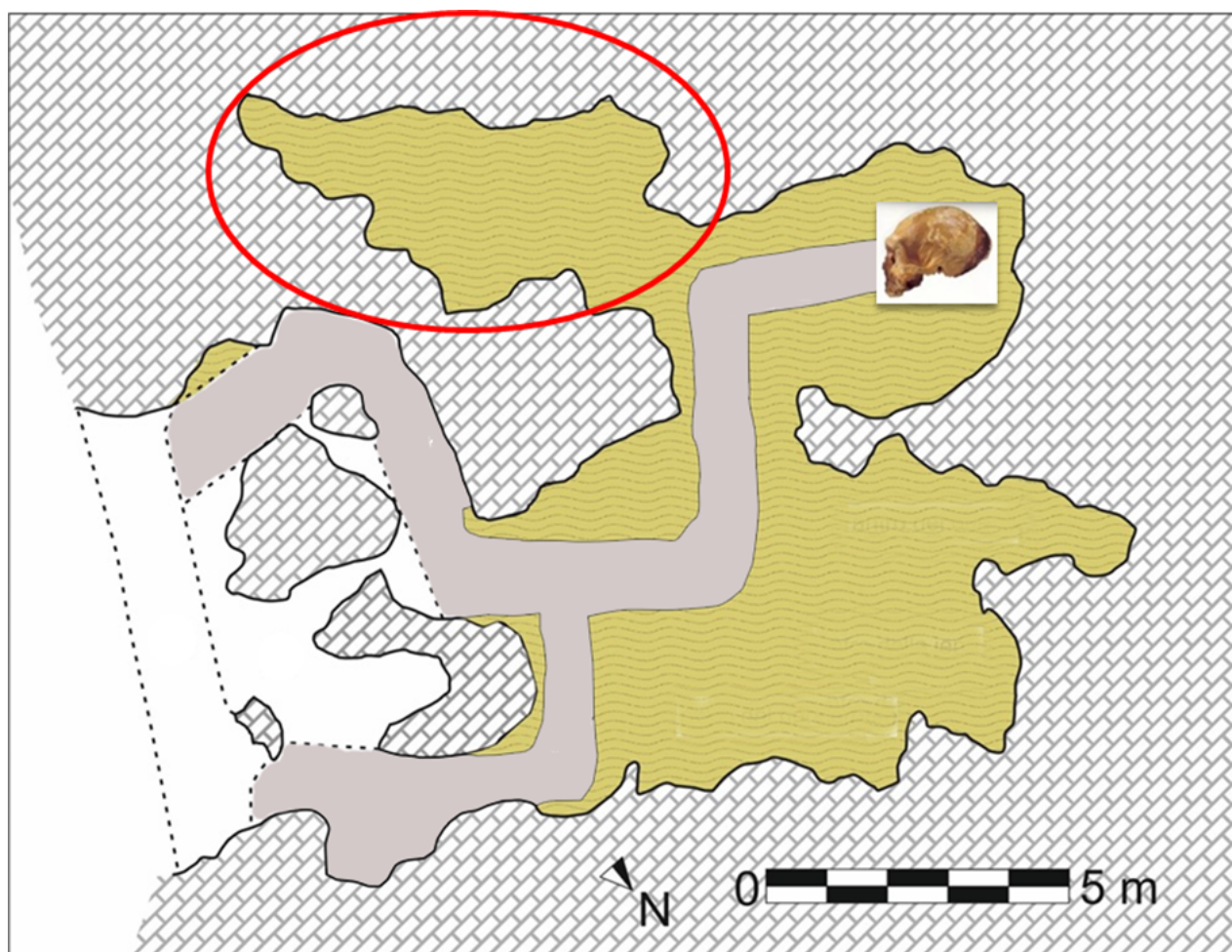


Figure 2: Plan of Grotta Guattari (after Blanc 1939, modified). In other the paleosurface today (the little skull indicates the position of the Neanderthal cranium discovered in 1939), in gray the archaeological trenches by A.C. Blanc and L. Cardini; the red ellipse highlights the *Antro del laghetto*.

been partially investigated at present, is archaeologically remarkable.

The aim of this study on the bone assemblage from the *Antro del Laghetto* is to provide an updated faunal list of Grotta Guattari, comparing it with the fossil data from the other rooms of the cave, and discuss its palaeoenvironmental implications and preliminary taphonomic observations.

Materials and Methods

The faunal assemblage is stored within a warehouse-laboratory in the town-hall building of San Felice Circeo. The determined fossil remains were measured with a standard calliper and compared with the osteological collection from the laboratory of Prehistoric Archaeology of the Università degli Studi di Roma "Tor Vergata" with the support of Pales & Lambert (1971) and Schmid (1972). The preliminary taphonomic observations were carried out with the aid of a 10X optical lens and a Dino-Lite microscope, albeit bones were often covered by hard concretions which in some cases prevented the analysis of the original surface.

Results and Discussion

The preliminary study highlighted a large percentage of the assemblage is covered by carbonate concretion, particularly thick on bones from the palaeosurface but also on many of those recovered from the lower part of the deposit. This feature does not hinder the anatomical and taxonomic classification but sometimes prevents accurate measurements.

The taxonomic study allowed us to preliminary identify at least 25 taxa from *Antro del Laghetto* (Tab. 1 and Fig. 3). The

red deer (*Cervus elaphus*) is the dominant species followed by abundant spotted hyena (*C. crocuta*) and auroch (*B. primigenius*). Other species identified are the wild horse (*E. ferus*) and wild boar (*Sus scrofa*), rare fallow deer (*Dama dama*), two species of bear (*Ursus spelaeus* and *U. arctos*), a few remains of a species of rhinoceros (probably *Stephanorhinus hemitoechus*), abundant giant cervid (the Irish elk, *Megaloceros giganteus*), never identified before, scarce elephant (*Palaeoloxodon antiquus*) and hippopotamus (*Hippopotamus amphibius*), roe deer (*Capreolus capreolus*), leopard (*Panthera pardus*), ibex (*Capra ibex*), chamois (*Rupicapra* sp.), cave lion (*Panthera spelaea*), wild cat (*Felis silvestris*) and European hemione (*E. hydruntinus*), also never identified before, hare (*Lepus* sp.), fox (*Vulpes vulpes*), wolf (*Canis lupus*) and at least one mustelid besides sparse birds and micromammals (study in progress).

Italian biochronology of the species identified (Gliozzi et al. 1997; Petronio et al. 2011) provides a chronological range of the assemblage from Grotta Guattari. *Dama dama* and *C. elaphus*, whose most evolved forms are characteristic of the Late Pleistocene (Di Stefano & Petronio 2002; Petronio et al. 2007, 2011, 2019), are the most useful taxa in this regard and set the entire assemblage within this age. This assumption agrees with the chronostratigraphy based on sea-level fluctuations recognised inside and outside Grotta Guattari (Marra et al. 2020).

The widespread presence of the spotted hyena is attested by the abundance of bone remains as well as numerous coprolites. *Crocota crocuta* transported within the cave hunted preys living around the Circeo Promontory but also scavenged carcasses.

Table 1: Large and medium size mammals from Grotta Guattari (Late Pleistocene) according to Blanc & Segre (1953) and this work.

Previous works (after Blanc & Segre 1953)	This work
<i>Lepus europaeus</i>	<i>Lepus</i> sp.
<i>Canis lupus</i>	<i>Canis lupus</i>
<i>Vulpes vulpes</i>	<i>Vulpes vulpes</i>
<i>Ursus spelaeus</i>	<i>Ursus spelaeus</i>
<i>Ursus</i> sp. cf. <i>arctos</i>	<i>Ursus arctos</i>
<i>Putorius putorius</i>	
	Mustelidae
<i>Felis pardus</i>	<i>Panthera pardus</i> <i>Panthera spelaea</i> <i>Felis silvestris</i>
<i>Hyaena crocuta spelaea</i>	<i>Crocuta crocuta</i>
<i>Elephas antiquus</i>	<i>Palaeoloxodon antiquus</i>
<i>Rhinoceros Merckii</i>	<i>Stephanorhinus</i> cf. <i>S. hemitoechus</i>
	Rhinocerotidae
<i>Equus caballus</i>	<i>Equus ferus</i>
<i>Hippopotamus amphibius</i>	<i>Hippopotamus amphibius</i>
<i>Sus scropha</i>	<i>Sus scrofa</i>
	<i>Megaloceros giganteus</i>
<i>Capreolus capreolus</i>	<i>Capreolus capreolus</i>
<i>Cervus elaphus</i>	<i>Cervus elaphus</i>
<i>Dama dama</i>	<i>Dama dama</i>
	Cervidae
<i>Bos primigenius</i>	<i>Bos primigenius</i>
<i>Capra ibex</i>	<i>Capra ibex</i>
	<i>Rupicapra</i> sp.
	Caprinae

Extensive gnawing by a large carnivore was already documented by previous studies (Piperno & Giacobini 1991; Stiner 1991b, 2013) and are also evident in the new assemblage: epiphyses of long bones are mostly absent and display rounded fracture margins with a zig-zag pattern (ragged-edged chewing), hollows and sulcus by teeth are also visible on several remains.

The faunal assemblage with a high taxonomic diversity and percentage of gnawed bones, together with abundant remains and coprolites of *C. Crocuta*, suggest that Grotta Guattari is one of the

most significant Late Pleistocene hyena dens of the Italian peninsula, together with the nearby Cava Muracci (Gatta et al. 2019), Grotta La Sassa (Fiorillo et al. in press) and Tana delle Iene in Apulia (Conti et al. 2012). The ecological features of the taxa identified suggest that the landscape surrounding the cave was mostly covered with forests with large clearings providing food and shelter to the numerous red deer, wild boar and various species of carnivores. Auroch and horse indicate large open areas to graze were also present as well as steep rocky



Figure 3: Grotta Guattari, San Felice Circeo, Late Pleistocene: *Cervus elaphus*: A) antler portion, B) radius, C) metatarsus; *Megaloceros giganteus*: D) basal portion of antler; *Bos primigenius*: E) metatarsus; *Equus ferus*: F) metatarsus; *Dama dama*: G) basal portion of antler; *Sus scrofa*: H) maxillary fragment in occlusal view; *Crocuta Crocuta*: I) occipital portion of skull, L) emimandible in lingual view; scale bar: 5 cm.

surfaces inhabited by chamois and ibex and wetlands frequented by hippopotamus.

The sporadic occurrence of chamois, ibex and Irish elk, together with the clear dominance of the red deer over the rare fallow deer, suggests that the faunal deposit was accumulated in colder times than the present, consistently with the radiometric dating obtained so far (Schwarcz et al. 1991).

Conclusions

The recent excavation of the *Antro del Laghetto* within Grotta Guattari has made it possible to confirm the widespread presence of *Homo neanderthalensis* in the Circeo Promontory.

The most abundant species between medium and large size mammals are *Cervus elaphus*, *Crocota crocuta* and *Bos primigenius*, followed by several taxa of Lagomorphs, Carnivores, Proboscideans, Perissodactyls and Artiodactyls, including some never previously identified, such as *Felis silvestris*, *Panthera spelaea*, *Equus hydruntinus*, *Rupicapra* sp. and *Megaloceros giganteus*.

The high taxonomic diversity with abundant hyena remains, the presence of numerous coprolites and the occurrence of many bones gnawed by large carnivores suggest that *C. crocuta* was the main accumulation agent of the bone assemblage analysed as well as the paleosurfaces of the other rooms of the cave.

The ecological features of taxa identified indicate that the environment surrounding Grotta Guattari was characterised by woods and forests, with large open spaces, wetlands and steep rocky areas. The occurrence of chamois, ibex and Irish elk, together with the clear dominance of the red

deer over the rare fallow deer, suggests that the faunal assemblage of *Antro del Laghetto* was accumulated in colder times than the present.

Author contributions

Conceptualisation: MFR and CP; Data Curation: CP, IF and LS; Formal Analysis, Funding Acquisition, Investigation, Methodology and Resources: All the authors; Project Administration: MFR; Writing – Original and Final Draft Preparation: MG and LS.

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