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Short report on Pleistocene fauna from Grotta Lina (Marina di Maratea, Southern Italy): palaeoecological and geochronological implications

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ABSTRACT – A faunal assemblage from the continental deposit of Grotta Lina, Marina di Maratea (Potenza, Southern Italy) referable to a time span from late Middle Pleistocene (isotopic stage 9) to Late Pleistocene (isotopic stage 3/2) has been described. The biostratigraphical analysis allow us to refer the bedrock of the cave (a biocalcarene with *Cladocora*) to the isotopic stage 7, the fossiliferous continental deposit to the stage 6, while a Tyrrhenian shoreline with *Lithodomus* holes affects the continental deposit at 8-9 m a.s.l. (stage 5 e). The mammal fauna studied may be referred to the late Middle Pleistocene, Vitinia Faunal Unit, Aurelian Mammal Age (AIQUA Working Group Inqua Berlin, 1995). The occurrence of *Microtus* ex gr. *agrestis-arvalis*, *Capra ibex*, rhino and a very big red deer suggest a palaeoenvironment with a partially wooded grassland with rocky areas and a temperate-cold climate.

RIASSUNTO – [Breve nota sulla fauna Pleistocenica di Grotta Lina (Marina di Maratea, Sud Italia): implicazioni paleoecologiche e geocronologiche] – L'associazione faunistica studiata e rinvenuta nel deposito continentale della Grotta Lina di Marina di Maratea (Potenza), può essere riferita ad un intervallo temporale che va dal Pleistocene medio superiore (stadio 9 delle paleotemperature) al Pleistocene superiore (stadio 3/2 delle paleotemperature). Per una maggiore precisione cronologica sono stati analizzati perciò i rapporti stratigrafici fra questo deposito e la biocalcarene inferiore. Attraverso una serie di considerazioni stratigrafiche si è ritenuto possibile correlare il livello inferiore a *Cladocora* della grotta allo stadio isotopico 7; il successivo deposito continentale risulta strettamente correlato con lo stadio 6 in quanto deposto durante una fase di basso stazionamento del livello marino posteriore allo stadio 7; la fascia di fori di *Lithodomus* a 8-9 m slm che perfora il deposito continentale, risulta corrispondere ad una linea di riva Tirreniana (stadio 5e). I resti faunistici di Grotta Lina rientrano perciò nell'Unità faunistica di Vitinia della Età a Mammiferi Aureliano (AIQUA Working Group Inqua Berlin, 1995) e confermano con la presenza di *Microtus* gr. *agrestis-arvalis*, *Capra ibex*, del rinoceronte e di un cervo particolarmente robusto, un paleoambiente di prateria di boschi con ampi spazi aperti con zone a luoghi particolarmente scoscese, a clima temperato con puntate fredde.

INTRODUCTION

Grotta Lina is a coast cave near Marina di Maratea (Potenza, Southern Italy) (Text-fig. 1), already referred to in a previous work (Barbera *et al.*, 1988); it opens in an ancient fault or fracture on a series of stromatolithic dolomite bedrock of Noric age appearing in the area.

The cave, at about 35 m a.s.l., consists nowadays in three different sections: the lowest one, thoroughly without any sediment; the second one, partially excavated by the sea, contains the fossil remains referred in the present work; the third one, and latest one, formed by a funnel opening in the present country surface.

A first cycle of *Lithodomus* holes is developed directly on the bedrock and pierces the cave walls as far 35 m a.s.l.; it is covered, together with holes themselves by a thin layer of biocalcarene bearing *Cladocora coespitosa*, Algae and *Spondylus gaederopus* and developing itself along the cave walls as far 35 m a.s.l..

A second cycle of *Lithodomus* holes affects the biocalcarene.

A well developed continental deposit overlaps the biocalcarene which is constituted (Text-fig. 2) from the bottom to the top by:

a) dolomite blocks at the basis (4.80 m thick) collapsed from the vault constituting the floor for the later sedimentation;

b) stratified levels of debris in a micro-conglomerate-sandy matrix (b1), interiorly eteropic with sandy levels (b2) (0.60 m thick); becoming thinly laminated in the inner part of the cave and containing continental mollusks (b3) (2.40 m thick); more internally, a thin yellow silty-sandy layer (b4) (0.20 m thick) is present;

c) breccias containing layers of red soils yielding vertebrate remains.

Finally, the deposit, especially the breccia b1, is pierced by an another belt of *Lithodomus* holes developed until 8-9 m a.s.l..

In the present work, two aspects will be focused: the first one concerns the chronostratigraphical relationships among the continental sediment, the marine-biocalcarene and the different shorelines, testified by the *Lithodomus* holes; the second one concerns the comparative analysis between the



Text-fig. 1 - Anterior view of Grotta Lina, Marina di Maratea (Potenza, Southern Italy).

faunal remains found in the cave and those from the most important neighbouring sites. This analysis will allow to hypothesize palaeoecological reconstructions.

THE FAUNA REMAINS

Muridae Gray, 1821

Microtus Schrank, 1798

Microtus gr. *arvalis-agrestis*

Only some isolated teeth can be referred to this taxon.

Ursidae Gray, 1825

Ursus Linnaeus, 1758

Ursus arctos Linnaeus, 1758

Two metatarsals (fourth and fifth), one scapular and one first fragmentary phalanx (Text-fig. 3) are referred to this species.

According to Torres (1988), the fourth metatar-

sal, in *norma lateralis*, shows a remarkable bending from the diaphysis to the distal epiphysis; in *norma verticalis*, the proximal articular surface is flat with a subtriangular border; in *norma medialis*, there are three very distinct articular facets.

The fifth metatarsal, in *norma caudalis*, has a low proximal articular surface; in *norma medialis*, the distal epiphysis shows a tuberosity which is typical of the brown-bear; the proximal articular surface with the fourth metatarsal is joined.

The relationships between the distal transversal diameter and the length of the fourth metatarsal, and between the medium transversal diameter and the same length of the fifth metatarsal well fit perfectly in the range of Pleistocene *Ursus arctos* (Torres, 1988) and they denote extremely thin and more extended metapodials. In *norma verticalis*, the articular surface of the scapular shows a subquadrangular outline; in *norma ventralis*, the articular surface is divided into three portions and the border of the central *doccia* is typically V shaped.

Ursus spelaeus Rosenmueller, 1794

All the metapodials referable to this species (Text-fig. 3) show proportions between lengths and different diameters which are comparable with biometrical data given by Torres (1988); particularly, the fourth metatarsal, in *norma lateralis*, shows a not bending outline; the articular surface of the proximal epiphysis is joined; in *norma verticalis*, the same metatarsal shows a convex articular surface with subrectangular border.

Also the proportion of the first metacarpal are comparable with those referred to *U. spelaeus* by Torres (1988). On the other hand, the first metacarpal is characterized by a proximal articular surface laterally lengthened; the medial and lateral profile show a bending which is peculiar of this species.

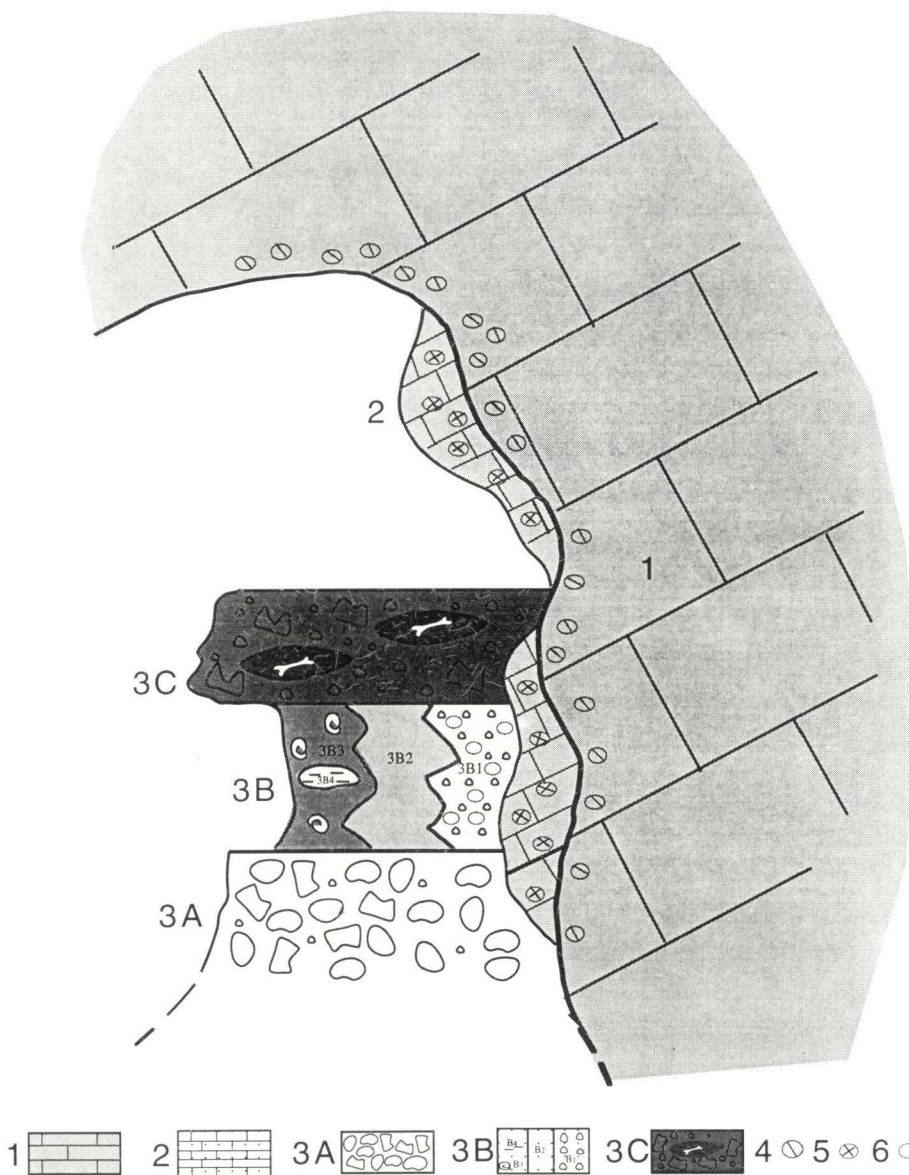
The relationships among lengths and diameters of two radii-ulna are comparable with the values given by Torres (1988). Some other morphological features can be considered: the ellipsoidal outline of the proximal articular surface, very developed subarticular tuberosities of the proximal epiphysis and straight diaphysis.

Canidae Gray, 1821

Canis Linnaeus, 1758

Canis lupus Linnaeus, 1758

The large size and the morphology of premolars (Text-fig. 4), which are not too secodont, allow to ascribe these fossil remains to this species.



Text-fig. 2 - Stratigraphy of Grotta Lina, Marina di Maratea (Potenza, Southern Italy);

- 1) stromatolitic dolomite bedrock with *Lithodomus* holes;
- 2) biocalcarene with *Lithodomus* holes, *Cladocora coespitosa*, *Spondylus gaederopus* and Algae;
- 3) a, dolomite blocks; b, continental debris (b1: micro-conglomerate and sand; b2: reddened sands; b3: sandy layers thinly laminated with continental mollusks; b4: silty-sandy layers); c, brecias with vertebrate remains;
- 4) 1st cycle *Lithodomus* holes;
- 5) 2nd cycle *Lithodomus* holes;
- 6) 3rd cycle *Lithodomus* holes.

Vulpes Oken, 1816

Vulpes vulpes (Linnaeus, 1758)

The morphology of the few remains (a humerus proximal epiphysis, a tibia proximal epiphysis and two metapodials) testify the presence of this species.

Hyenidae Gray, 1869

Crocuta Kaup, 1828

Crocuta crocuta Erxleben, 1777

One lower carnassial (Text-fig. 4), typically elongated, secodont, with a sturdy anterior *cingulum* is referred to this species. One second fragmentary metapodial and a fragmented humerus distal epiphysis are ascribed to this species.

Felidae (Gray, 1821)

Panthera Oken, 1818

Panthera spelaea Goldfuss, 1810

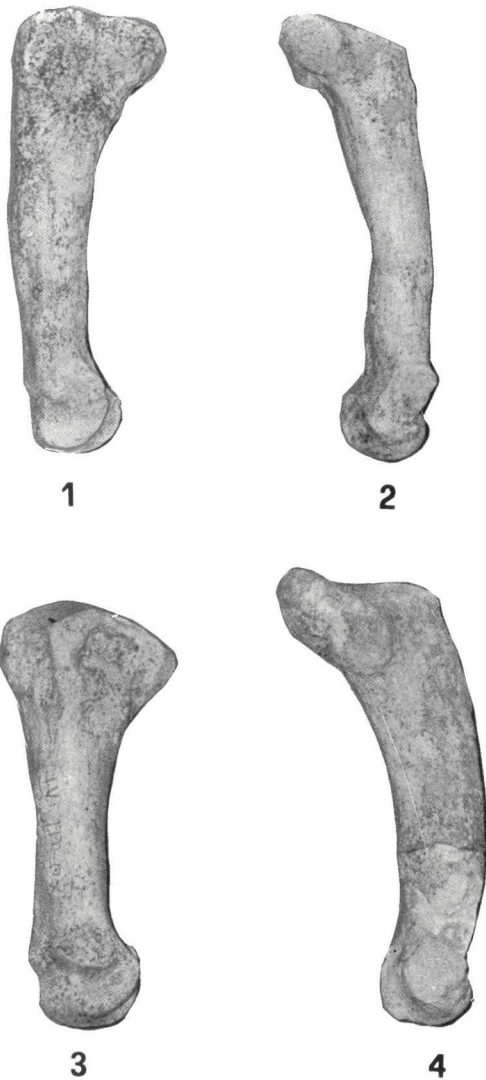
One first (Text-fig. 4) and one second phalanx of the first finger have been collected large size of these remains confirm (Argant, 1991; Capasso Barbato & Gliozzi, 1993) the attribution to this species.

Panthera pardus (Linnaeus, 1758)

One first (Text-fig. 4) and one second phalanx of the first finger, which show considerable size, can be referred to this species.

Elephantidae Gray, 1821

Genus and species indet.



Text-fig. 3 - (above) *Ursus arctos* Linnaeus, Grotta Lina, Marina di Maratea (Potenza, Southern Italy), late Middle Pleistocene: IV (1) and V (2) metatarsal; (below) *Ursus spelaeus* Rosenmueller: IV (3) and V (4) metatarsal.

Some fragments of limbs bones can be ascribed to members of this family.

Rhinocerotidae Owen, 1875

Stephanorhinus Kretzoi, 1942

Stephanorhinus cf. *kirchbergensis* (Jaeger, 1839)

Two incomplete dental upper rows (Text-fig. 5), some skull fragments and one third metacarpal, belonging to same individual, are ascribed to this species. The teeth have large size, remarkably much higher buccally than lingually, with *cingula* and with many styles in the mesial and distal valleys. The

molars are very brachyodont; the ectoloph of the premolars, which are much less brachyodont than the molars, bend strongly towards the inner side of the tooth in mesial position.

Stephanorhinus sp.

Some fragmentary remains, of uncertain systematic significance, are ascribed to this *genus*.

Suidae Gray, 1821

Sus Linnaeus, 1758

Sus scrofa Linnaeus, 1758

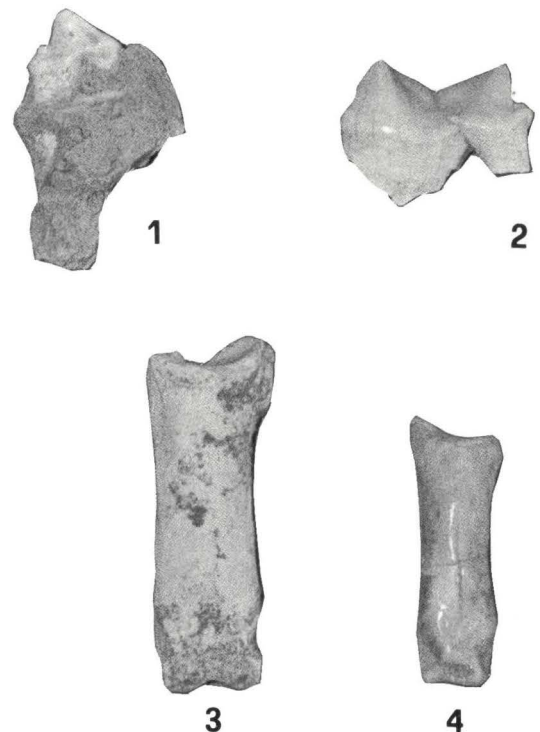
The few remains which are referred to this species (two fragmentary radii and one third phalanx), show large size.

Cervidae Gray, 1821

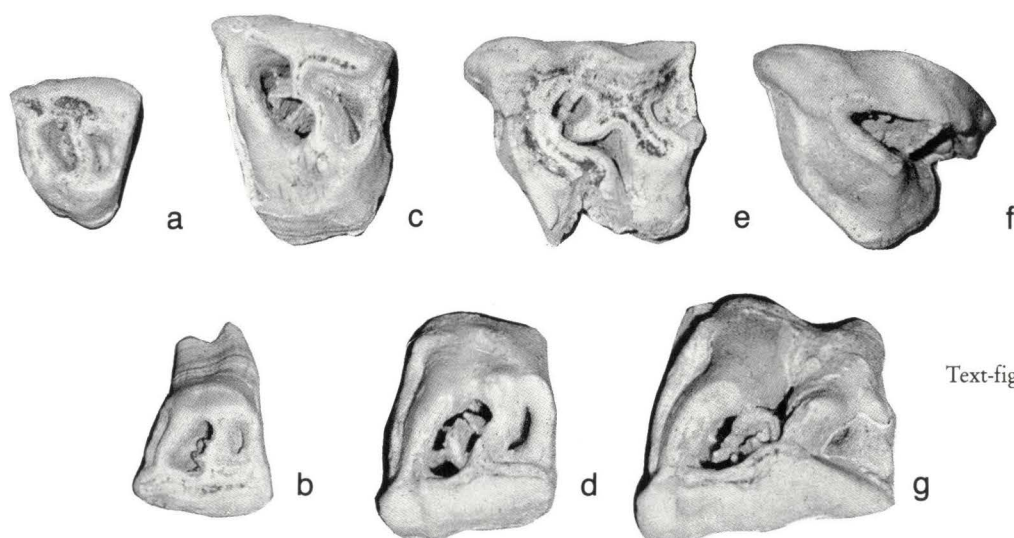
Cervus Linnaeus, 1758

Cervus elaphus Linnaeus, 1758

The remains referred to this species are surely the most numerous (179 findings). The deer population is on the whole constituted in individuals which well fit in the morphometrical limits of the elaphine populations of late Middle



Text-fig. 4 - 1) *Canis lupus* Linnaeus, Grotta Lina, Marina di Maratea (Potenza) Southern Italy, late Middle Pleistocene: P⁴. 2) *Crocuta crocuta* Erxleben: lower carnassial. 3) *Panthera spelaea* Goldfuss: first phalanx of third or fourth finger. 4) *Panthera pardus* (Linnaeus): first phalanx of third or fourth finger.



Text-fig. 5 - *Stephanorhinus* cf. *kirchbergensis* (Jaeger), Grotta Lina, Marina di Maratea (Potenza, Southern Italy), late Middle Pleistocene: a, b, c, d) upper premolars and e, f, g) molars, occlusal view.

Pleistocene and Holocene (Di Stefano & Petronio, 1992). However all the limb bones, the first and second phalanxes seem more stocky and sturdy than as usual. The same features is shown by the few antler and mandibular remains, with particularly hypsodont teeth.

Megaloceros Brookes 1828

Megaloceros giganteus (Blumenbach, 1803)

The remains referable to this Late Pleistocene large cervid are not numerous and they consist mainly in mandibular fragments and isolated teeth. A mandibular fragment with molar row and the fourth premolar are particularly meaning; the fourth premolar is molarized and the molars are generally brachyodont with a great developing of enamel and evident lingual *cingulum*; the third molar shows a remarkable third lobe.

Mandibular remains are very thick and low as in all the megacerine forms.

Capreolus Linnaeus, 1758

Capreolus capreolus Linnaeus, 1758

One third fragmentary phalanx and one mandibular fragment with the second molar are referred to this species.

Bovidae Gray, 1821

Capra Linnaeus, 1758

Capra ibex Linnaeus, 1758

Only one first phalanx shows the particularly morphology of the steinbock.

Bos Linnaeus, 1758

Bos primigenius Bojanus, 1827

Some limb remains and one molar are ascribed to this species.

DISCUSSION

The faunal association referred, does not contain any element with an high biochronological significance: in fact, these elements are diffused in a long time span from the late Middle Pleistocene (isothopic stage 9) to Late Pleistocene (isothopic stage 3/2). It stands to reason, in order to obtain more chronological information, to analyze the stratigraphical relationships between the continental deposit and the lower biocalcarenitic.

It seems evident that the biocalcarenitic layers with *Cladocora* and *Spondylus* are the same recognized by Carobene & Dai Pra (1991) a little towards south at Marina di Maratea Nord (Potenza, Southern Italy) at 10.50 m a.s.l. and at Marina di Maratea Sud at 9.30 m a.s.l. and dated at about 0.208 My.

Moreover, at Marina di Maratea Nord the same Authors recognize at 4.50-5.50 m a.s.l. some breakers furrows, small caves, *Lithodomus* holes and narrow abrasion platforms whose stratigraphic correlation is not reported; these features however should represent the shoreline Z1, correlated with the stage 5a/5c.

At Marina di Maratea Sud, on the other hand, the biocalcarenitic is cut by an abrasion platform at 9.30 m a.s.l., which appears covered by a silty-sandy deposit with numerous fossil remains; the *Astridium* and *Spondylus* fillings of some small caves can be associated with this deposit.

The absolute age obtained by molluscs have

given a correlation with the aminozone E and it can be referred to the isothopic stage 5e (= Tyrrhenian or late interglacial stage).

The whole data allows therefore to correlate the *Cladocora* layer of the Grotta Lina (Marina di Maratea) with the isothopic stage 7, the subsequent continental deposit is strictly correlated with stage 6, as it was deposited during a regression later than the stage 7 and as the *Lithodomus* holes band at 8/9 m a.s.l. piercing it, correspond to a Tyrrhenian shoreline (= stage 5e).

Actually, if the correlation seems to be convincing, some attention on the Carobene & Dai Pra (1991) study must be done. The opinion of the mentioned Authors is that along the Tyrrhenian coast considered, the biocalcarene layers with *Cladocora* form only two shorelines (Y and Y1), the first one at 14-19 m a.s.l. and the second one at 12 m a.s.l., defining all higher deposits, 55 m (terrace W) and 20-25 m a.s.l. (terrace X), as marine «Pre-*Cladocora*» levels.

However, the presence of biocalcarene with *Cladocora* in the Grotta Lina at 35 m a.s.l., that is a protected cave from every possible later erosion, invalidates this reconstruction.

Besides, already Carboni *et al.* (1992) suggested the possibility of a correspondance of the deposit with a 30 m a.s.l. higher shoreline, for a biocalcarene with *Cladocora* emerging at 8-10 m a.s.l. in the area of Praia a Mare (Potenza, Southern Italy) because of considerations about the ecology of *Cladocora coespitosa*. This hypothesis have been rejected by Carobene & Dai Pra (1991), because of morphological considerations; besides the same Authors (1990) had already defined «unreliable» without any scientific discussion the work of Carboni *et al.* (1992).

On the basis of what above mentioned, after the attribution of continental layers with vertebrate remains to a regression later than the stage 7, also pierced by *Lithodomus* holes of Tyrrhenian age and therefore correlable with the stage 6, it is possible to correlate this bed with other late Middle and Late Pleistocene sites of South-Western Italy.

Among these localities, the oldest appear to be Cala d'Arconte, Capogrosso and Calabianca, near Marina di Camerota (Salerno, Southern Italy) (stage 10 with middle Acheulean industry: Gambassini, 1984), Santo Stefano (Praia a Mare, Cosenza, Southern Italy) situated at 70-130 m a.s.l., possibly correlated with the stage 8 (Caloi & Palombo, 1989) and coeval with the site of Rosaneto (same locality) (Biddittu *et al.*, 1984), where many advanced Acheulean tools have been found.

Most of the other localities in this area can be

referred to the Late Pleistocene: Grotta del Poggio near Marina di Camerota (Salerno, Southern Italy) (stage 4/5a) (Palma di Cesnola, 1975; Bartolomei *et al.*, 1976; Sala, 1979), Grotta Tina near Marina di Camerota (layer R, stage 4/3) (Martini *et al.*, 1972; Bartolomei *et al.*, 1976), Grotta di Castel Civita (Salerno, Southern Italy) (stage 3, Cioni *et al.*, 1979), Grotta della Cala near Marina di Camerota (stage 3, Palma di Cesnola, 1971; Bartolomei *et al.*, 1976), Cala delle Ossa (Salerno, Southern Italy) (stage 3/2, Mirigliano, 1946) and lastly Grotta della Madonna near Praia a Mare (Cosenza, Southern Italy) with Holocene fauna.

After the ones with Acheulean industry (Marina di Camerota, Rosaneto and Santo Stefano), Grotta Lina is the oldest site of the area.

CONCLUSIVE NOTES

The faunal remains from Grotta Lina, which can be correlated with the stage 6, belong to the Vitinia Faunal Unit (Roma) of Aurelian Mammal Age (Working Group AIQUA Berlin, 1995) the presence of *Microtus* gr. *arvalis-agrestis*, *Capra ibex*, rhino and large sized deer, confirm a palaeoenvironment with grassland, wide opened spaces particularly abrupt areas in a temperate climate with cold peaks.

OBSERVED MATERIAL (measurement in mm)

Cervus elaphus, Linnaeus, 1758

GL 1	first phalanx	(l 57, tpd 22, appd 24.8, tmd 17, tdd 20, apdd 17.3)
GL 2	first phalanx	(l 53.2, tpd 20, appd 26.2, tmd 21.2, tdd 20, apdd 16.5)
GL 3	first phalanx	(l 54.8, tpd 20.5, appd 25.5, tmd 17, tdd 21.2, apdd 16.4)
GL 4	first phalanx	(l 54.7, tpd 20, appd 24.3, tmd 16.8, tdd 19.5, apdd 16.8)
GL 5	first phalanx	(l 53.3, tpd 18.2, appd 28.2, tmd 17.1, tdd 19, apdd 17.5)
GL 6	first phalanx	(l 57.9, tpd 22.4, appd 27.9, tmd 17.8, tdd 22.2, apdd 17)
GL 7	first phalanx	(l 56, tpd 21.1, appd 26.2, tmd 18.4, tdd 19.3, apdd 16.6)
GL 8	first phalanx	(l 54.2, tpd 23.7, appd 27.8, tmd 18.7, tdd 21.8, apdd 18.5)
GL 9	first phalanx	(l 56.5, tpd 20.8, appd 25.6, tmd 15.7, tdd 19.5, apdd 16.8)
GL 10	first phalanx	(l 54.8, tpd 20.9, appd 24.7, tmd 17.2, tdd 19.2, apdd 17.3)
GL 11	first phalanx	(l 54, tpd 20, appd 24.6, tmd 16.3, tdd 19.5, apdd 17)
GL 12	first phalanx	(l 59, tpd 23.2, appd 27.5, tmd 19.9, tdd 22.2, apdd 20.2)
GL 13	first phalanx	(l 58, tpd 23.5, appd 27.1, tmd 18.4, tdd 21.8, apdd 20.7)
GL 14	first phalanx <i>juvenilis</i>	(tmd 13, tdd 16, apdd 14.3)
GL 15	first phalanx <i>juvenilis</i>	(tmd 15, tdd 18.6, apdd 15)
GL 16	first phalanx <i>juvenilis</i>	(tmd 15.8, tdd 19, apdd 15.7)
GL 17	second phalanx	(l 44.2, tpd 22.5, appd 28.7, tmd 16, tdd 19.8, apdd 27)
GL 18	second phalanx	(l 41, tpd 20.8, appd 24.9, tmd 15.5, tdd 18, apdd 26)

GL 19	second phalanx	(l 44.3, tpd 23.5, tmd 16.2, tdd 28.8, apdd 21.8)	GL 78	humerus fragment
GL 20	second phalanx	(l 42.8, tpd 21.7, appd 27.5, tmd 16.8, tdd 19.3, apdd 25)	GL 66	scaphocuboid
GL 21	second phalanx	(l 46.7, tpd 23, appd 29.7, tmd 17.2, tdd 19.8, apdd 26.8)	GL 67	scaphocuboid
GL 22	second phalanx	(l 44.9, tpd 22, appd 28.8, tmd 17.1, tdd 19.1, apdd 25)	GL 68	scaphocuboid
GL 23	second phalanx	(l 41, tpd 21.2, appd 26.5, tmd 15, tdd 17, apdd 22.4)	GL 69	scaphocuboid fragment
GL 24	second phalanx fragment	(tmd 15.8)	GL 71	tibia distal epiphysis (tdd 52, apdd 38.4)
GL 25	second phalanx	(l 44, tpd 22.5, appd 28.6, tmd 17, tdd 18.8, apdd 25)	GL 72	tibia distal epiphysis (tmd 28, tdd 52, apdd 36.8)
GL 26	second phalanx	(l 42.5, tpd 21, appd 25.5, tmd 15.6, tdd 17.7, apdd 23.5)	GL 73	tibia fragment
GL 27	second phalanx	(l 44.4, tpd 22.8, appd 27, tmd 17, tdd 19.2, apdd 23.5)	GL 79	tibia fragment
GL 28	second phalanx	(l 40, tpd 19, appd 25.7, tmd 14, tdd 16.5, apdd 24.8)	GL 80	tibia fragment
GL 29	third phalanx		GL 81	patella fragment
GL 30	third phalanx		GL 82	pyramidal fragment
GL 31	third phalanx		GL 83	uncinatus fragment
GL 32	third phalanx		GL 84	semilunar fragment
GL 33	third phalanx		GL 85	trapezoid fragment
GL 34	third phalanx		GL 86	scaphoid fragment
GL 35	astragalus fragment		GL 87	tibia distal epiphysis (tdd 50.9, apdd 37.2)
GL 36	astragalus	(lh 56, mh 52.5, apld 28.7, Mapd 31, Mapd 34.5)	GL 88	tibia distal epiphysis (apdd 32.4)
GL 37	astragalus	(mh 51.6, apld 30, Mapd 31, Mapd 38)	GL 89	tibia proximal epiphysis (tpd 57, appd 31, tmd 21.5)
GL 38	astragalus fragment		GL 91	radius fragment
GL 39	astragalus	(lh 52.5, mh 49.6, apld 29.5, Mapd 29.5, Mapd 33.2)	GL 92	femur fragment
GL 40	astragalus	(lh 57.8, mh 53.4, apld 31.4, Mapd 32.7, Mapd 37.8)	GL 93	tibia fragment
GL 41	astragalus	(lh 54.5, mh 51.3, apld 29.1, Mapd 29.1, Mapd 34)	GL 95	cervical vertebra fragment
GL 42	astragalus	(mh 53, Mapd 33)	GL 96	lumbar vertebra fragment
GL 43	calcaneum	(l 124, atd 39, tds 47, apdt 37, tdt 28.2)	GL 97	dorsal vertebra fragment
GL 44	calcaneum	(atd 34, tds 45, apdt 31, tdt 25.9)	GL 98	lumbar vertebra fragment
GL 45	calcaneum	(l 127.8, atd 38, tds 44, apdt 35, tdt 29.1)	GL 99	lumbar vertebra fragment
GL 46	calcaneum fragment		GL 100	dorsal vertebra fragment
GL 47	calcaneum	(atd 35.8, apdt 32.3, tdt 25)	GL 101	dorsal vertebra fragment
GL 48	calcaneum fragment	(atd 34.1)	GL 102	epistropheus
GL 49	metacarpus distal epiphysis	(tdd 40.9, apdd 28.8)	GL 103	metacarpus fragment
GL 50	metacarpus	(l 254.2, tpd 43.8, tmd 27.1, apdd 30)	GL 104	metatarsus fragment
GL 51	metacarpus diaphysis	(tmd 23.8)	GL 105	acetabulum
GL 52	metacarpus fragment		GL 106	scapula fragment
GL 53	metatarsus distal epiphysis	(tpd 39.2, appd 28.8)	GL 107	tibia <i>juvenilis</i> fragment
GL 54	metatarsus fragment	(tdd 47, apdd 29)	GL 108	metatarsus fragment
GL 55	metatarsus diaphysis	(appd 39.2)	GL 109	tibia fragment
GL 56	metatarsus diaphysis		GL 110	sternum fragment
GL 57	femur	(lcf 285.5, tmd 26.8, apdd 88.8)	GL 111	femur fragment
GL 58	femur distal epiphysis <i>juvenilis</i>	(tdd 72.2)	GL 112	epistropheus fragment
GL 59	femur distal epiphysis <i>juvenilis</i>		GL 113	cutlet fragment
GL 60	tibia fragment		GL 114	femur fragment
GL 61	tibia	(l 374, tpd 81.8, appd 81.2, tmd 31, tdd 52, apdd 41.5)	GL 115	dorsal vertebra
GL 62	tibia distal epiphysis	(tdd 47.7, apdd 37)	GL 116	dorsal vertebra
GL 63	humerus distal epiphysis	(tdd 47.7, apdd 37)	GL 117	dorsal vertebra
GL 64	humerus distal epiphysis	(tdd 54.5)	GL 118	lumbar vertebra
GL 65	humerus distal epiphysis	(tdd 58.3)	GL 119	dorsal vertebra
GL 66	humerus distal epiphysis	(tdd 59.8, apdd 56.8)	GL 120	dorsal vertebra
GL 67	humerus distal epiphysis	(tdd 81.2)	GL 121	dorsal vertebra
GL 68	humerus fragment		GL 122	dorsal vertebra
GL 69	humerus fragment		GL 123	dorsal vertebra
GL 70	humerus fragment		GL 124	lumbar vertebra
GL 71	humerus fragment		GL 125	sternum
GL 72	humerus fragment		GL 126	metacarpus fragment
GL 73	humerus fragment		GL 127	metacarpus fragment
GL 74	humerus fragment		GL 128	antler fragment
GL 75	humerus fragment		GL 129	antler fragment
GL 76	humerus fragment		GL 130	antler fragment
GL 77	humerus fragment		GL 131	antler fragment
GL 78	humerus fragment		GL 132	beam fragment
GL 79	humerus fragment		GL 133	antler fragment
GL 80	humerus fragment		GL 134	caput femuris
GL 81	humerus fragment		GL 135	metatarsus fragment

- GL 136 fragmentary mandibula with P_2-M_1 (l 13.9, w 6.8) P_2 (l 18.4, w 9) P_3 (l 18.4, w 12) P_4 (l 22.6, w 12.7) M_1 (l 27.7, w 13.3) M_2 (l 30.1, w 12) M_3
- GL 137 mandibular fragment
- GL 138 mandibular fragment with P_3 (l 17.4, w 10.1) P_3
- GL 139 mandibular fragment with M_2 (l 28.8, w 12.2) M_2
- GL 140 maxillar fragment with $M_2 - M_3$ l 26.9, w 18.1) M_2 (l 27.7, w 17.9) M_3
- GL 141 humerus distal epiphysis (tdd 51.5)
- GL 142 metacarpus distal epiphysis (tdd 41.8, apdd 27.6)
- GL 143 metacarpus fragment
- GL 144 metacarpus proximal epiphysis (tpd 35.6, apdd 28)
- GL 145 metatarsus proximal epiphysis (tpd 37.6, apdd 39.5, tmd 23.7)
- GL 146 metatarsus proximal epiphysis (tpd 33.5, apdd 36)
- GL 147 humerus fragment
- GL 148 humerus fragment
- GL 149 humerus fragment
- GL 150 femur fragment *juvenilis*
- GL 151 femur fragment *juvenilis*
- GL 152 femur fragment *juvenilis*
- GL 153 femur fragment *juvenilis*
- GL 154 femur fragment *juvenilis*
- GL 155 scapula fragment
- GL 156 scapula fragment
- GL 157 atlas fragment
- GL 158 radius fragment
- GL 159 tibia fragment
- GL 160 antler fragment
- GL 161 humerus fragment
- GL 162 metatarsus fragment *juvenilis*
- GL 163 astragalus fragment *juvenilis*
- GL 164 scaphoid
- GL 165 second cuneiform
- GL 166 scaphocuboid
- GL 167 semilunar
- GL 168 semilunar
- GL 169 scaphoid
- GL 170 patella
- GL 171 metacarpus fragment
- GL 172 metacarpus fragment
- GL 173 calcaneum fragment
- GL 174 calcaneum fragment
- GL 175 epicondilar metapodial fragment
- GL 176 epicondilar metapodial fragment
- GL 177 radius fragment
- GL 178 antler fragment
- GL 179 second cuneiform

Megaloceros giganteus (Blumenbach, 1803)

- GL 180 epistropheus
- GL 94 cervical vertebra fragment
- GL 181 mandibular fragment with $M_1 - M_2$ (l 20, w 12) M_1 (l 25, w 14.1) M_2
- GL 182 mandibular fragment with M_1 (l 25, w 14.5) M_1
- GL 183 mandibular fragment with $P_4 - M_1$ (l 26, w 22) P_4 (l 23, w 13.5) M_1

- GL 184 mandibular fragment with M_3 (l 36) M_3
- GL 185 maxillar fragment with M^2 (l 26, w 22) M^2
- GL 186 M^2 (l 24, w 22) M^2
- GL 187 M_2 (l 29.5, w 1) M_2
- GL 188 M_3 fragment
- GL 189 P_3 (l 19, w 11) P_3
- GL 190 mandibular fragment with $P_4 - M_1 - M_2 - M_3$ (l 33, w 15) P_4 (l 20, w 12) M_1 (l 25, w 14.1) M_2 (l 24, w 15) M_3

Capra ibex Linnaeus, 1758

- GL 191 first phalanx (l 60.6, tpd 20.5, apdd 24.9, tmd 15.9, tdd 18.2, apdd 16.1)

Capreolus capreolus (Linnaeus, 1758)

- GL 192 third phalanx
- GL 193 mandibular fragment with M_2

Sus scrofa (Linnaeus, 1758)

- GL 194 radius fragment *juvenilis*
- GL 195 third phalanx fragment
- GL 196 radius *juvenilis*
- GL 197 radius fragment *juvenilis*

Bos primigenius Bojanus, 1827

- GL 198 femur fragment
- GL 199 femur fragment
- GL 200 femur fragment
- GL 201 second phalanx fragment
- GL 202 caudal vertebra
- GL 203 caudal vertebra
- GL 204 M^2 (l 28.4, w 22.2) M^2

Stephanorhinus cf. *kirchbergensis* (Jaeger, 1839)

- GL 205/1 P^2 (bl 38, ll 25, mw 41, dw 39) P^2
- GL 205/2 P^3 (bl 46, ll 39, mw 61, dw 59) P^3
- GL 205/3 P^4 (bl 46, ll 38, mw 62, dw 57) P^4
- GL 205/4 M^1 (bl 59, ll 43, mw 61, dw 62) M^1
- GL 205/5 M^2 (bl 69, ll 52, mw 70, dw 58) M^2
- GL 205/6 M^3 (bl 67, ll 64, mw 55) M^3
- GL 205/7 P^2 (bl 38, ll 25, mw 41, dw 39) P^2
- GL 205/8 P^3 (bl 46, ll 39, mw 61, dw 59) P^3
- GL 205/9 P^4 (bl 46, ll 38, mw 62, dw 57) P^4
- GL 205/10 M^1 (bl 59, ll 43, mw 61, dw 62) M^1
- GL 205/11 M^2 (bl 69, ll 52, mw 70, dw 58) M^2
- GL 206 third metacarpus proximal epiphysis (apdd 51, tpd 60, apdsh 22, tdsh 54)
- GL 217/1 skull fragment
- GL 217/2 skull fragment
- GL 217/3 skull fragment
- GL 217/4 skull fragment
- GL 217/5 skull fragment
- GL 217/6 skull fragment
- GL 217/7 skull fragment
- GL 217/8 skull fragment
- GL 217/9 skull fragment
- GL 217/10 skull fragment
- GL 217/11 skull fragment

Stephanorhinus sp.

- GL 207 anterior medial third phalanx
- GL 208 anterior lateral third phalanx
- GL 209 pisiform (l 62.5, gh 37, ha 33)
- GL 210 third cuneiform (apdd 40, tpd 47, apdd 39.2, tdd 47.5, gh 23.5)
- GL 211 anterior first phalanx
- GL 212 medial first phalanx

- GL 213 medial first phalanx fragment
 GL 214 anterior first phalanx
 GL 215 femur fragment
 GL 216 second metacarpus distal epiphysis

Ursus spelaeus Rosenmueller, 1794

- GL 218 ulna fragment
 GL 219 ulna fragment
 GL 220 radius (l 332, tmd 31, tdd 74, apdd 36)
 GL 221 radius (l 334, tpd 56, apdd 45, tmd 34, tdd 78, apdd 45)
 GL 222 dorsal vertebra
 GL 223 lumbar vertebra
 GL 225 femur fragment
 GL 226 first metacarpus (l 67, tpd 29.5, apdd 36.5, tmd 14, tdd 19.1, apdd 14.6)
 GL 229 fourth metatarsus (l 85.8, tpd 21.5, apdd 31.1, tmd 15.3, tdd 23.8, apdd 19.7)
 GL 230 fourth metatarsus (l 81.2, tpd 20.5, apdd 30.2, tmd 15.8, tdd 22.4, apdd 18.6)
 GL 231 fifth metatarsus (l 89.5, tpd 27.2, apdd 32.5, tmd 13.9, tdd 22.5, apdd 16.80)

Ursus arctos Linnaeus, 1758

- GL 224 scapular
 GL 227 fifth finger fragment
 GL 228 fourth metatarsus (l 87.9, tpd 19.4, apdd 30, tmd 14.1, tdd 21.4, apdd 16.1)
 GL 232 fifth metatarsus (l 90.3, tpd 27.2, apdd 32.5, tmd 13.9, tdd 22.5, apdd 16.8)

Panthera spelaea (Goldfuss, 1810)

- GL 233 first phalanx (l 58, apdd 16, tmd 15, tdd 18, apdd 18.7)

Panthera pardus (Linnaeus, 1758)

- GL 234 first phalanx (l 45, tpd 16, apdd 11.5, tmd 11, tdd 13, apdd 13.5)

Canis lupus Linnaeus, 1758

- GL 235 mandibular fragment with P₁ - P₂ (l 5, w 5) P₁ (l 13, w 6.2) P₂
 GL 236 P₄ (l 15, w 6.8) P₃
 GL 237 P₄ (l 15.2, w 7.5) P₄
 GL 238 P₄ fragment
 GL 243 cervical vertebra fragment
 GL 244 dorsal vertebra fragment
 GL 252 sacrum fragment

Vulpes vulpes (Linnaeus, 1758)

- GL 239 second metatarsus fragment
 GL 240 third metatarsus fragment
 GL 241 tibia proximal epiphysis (tpd 22; apdd 25.5)
 GL 242 humerus proximal epiphysis (tpd 17; apdd 18.5)

Crocota crocota Erxleben, 1777

- GL 245 humerus fragment
 GL 246 P₄ (l 30.8; w 13.8) P₄
 GL 248 metapodial fragment

Elephas indet.

- GL 247 diaphysis fragment indet.
 GL 249 diaphysis fragment indet.
 GL 250 diaphysis fragment indet.
 GL 251 diaphysis fragment indet.

LEGENDA

l	length
tpd	trasversal proximal diameter
apdd	antero-posterior proximal diameter
tmd	trasversal medial diameter
tdd	trasversal distal diameter
apdd	antero-posterior distal diameter
lh	lateral height
mh	medial height
apld	antero-posterior lateral diameter
apmd	antero-posterior medial diameter
Mapd	maximum anterior-posterior diameter
atd	articular trasversal diameter
tds	trasversal diameter at the sustentaculum tali
apdt	antero-posterior diameter of the tuberosity summit
tdt	trasversal diameter of the tuberosity summit
lcf	length of the caput femoris
w	width
bl	buccal length
ll	lingual length
mw	mesial width
dw	distal width
apdsh	antero-posterior diameter of the shaft
tdsh	trasversal diameter of the shaft
gh	greatest length
ha	height articular surface

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