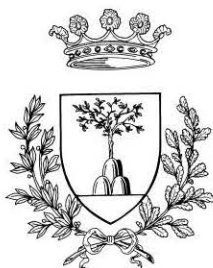


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Mammalian faunas and environment
from the Würmian Glacial Maximum of the Italian peninsula
(approx. 22±2 ka cal BP)

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Abstract

During the Würmian Glacial Maximum (approx. 22±2 ka cal BP) the major marine regression resulted in the emergence of a large part of the Adriatic Basin, forming a very large plain. Many deposits of this period have been dated with ¹⁴C or with human industries referred to the Gravettian (backed points and Noailles burins). Focusing on the ungulates, in the steep coastal areas of Liguria, Amalfitan coast, some localities of Cilento, Adriatic coast, and a narrow pre-Alpine piedmont strip, ibex was the most common mammal together with chamois, and more rarely red-deer. In Po plain and in the hilly strip of Emilia, Romagna and Marche, the steppe bison was the most common together with elk, but red-deer, roe-deer and equids were more rare. In the south of the Adriatic coast the ibex was the most common together with horse, and frequently aurochs and *Equus hydruntinus*. Along the Tyrrhenian coast red-deer was the most common species, together with roe-deer, boar and aurochs, while in the mountain areas ibex and chamois were the characteristic ungulates.

Keywords: mammals, Glacial Maximum, Italy.

Geographic situation, data and methods

During the Last Glaciation, the major episode of climatic stress occurred during the Würmian Glacial Maximum. New data from this period regarding the sea level changes and the palaeogeography of Italy have recently been published (Lambeck *et al.* 2004; Antonioli and Vai 2004). These studies indicate that the major marine regression resulted in the emergence of a large part of the Adriatic Basin, connecting the Italian peninsula with Sicily, and Sardinia with Corsica, and giving rise to a continental setting of the Tuscan archipelago.

Representative mammalian faunal sites from the Glacial Maximum are relatively numerous in Italy;

some of them have been dated by radiometric methods which confirmed an age between 24.000 and 20.000 years B.P.. The following deposits have been dated: Arene Candide (Cassoli and Tagliacozzo 1994; Bietti and Molari 1994), Arma dello Stefanin (Leale Anfossi 1972; Maggi 1995) in west Liguria, Grotta della Paina (Bartolomei *et al.* 1988; Broglio and Improta 1995) and Covolo di Trene (Leonardi *et al.* 1959; Broglio and Improta 1995) in the Colli Berici (Vicenza), Grotta Paglicci (Sala 1983; Azzi *et al.* 1974, 1977) in Gargano (Foggia), and Grotta della Cala (Sala 1983; Azzi *et al.* 1973) at Marina di Camerota (Salerno).

In other deposits the age of the faunal assemblages has been estimated from the presence

of human industries which are referred to the Gravettian (backed points and Noailles burins). In addition the ages of sites have been inferred from the rich stratigraphic sequences in which some levels have been dated. Among these deposits the most important are: Riparo Mochi (Imperia; Kuhn and Stiner 1992; Alhaique 2000), Grotta del Broion (Vicenza; Sala 1980; Zanalda 1994; Colamussi 2002), Riparo Tagliente (Verona; Capuzzi and Sala 1980), **Settepolesini di Bondeno (Ferrara; Sala 2001)**, grotta di Golino o di Talamone (Grosseto; Mochi 1911; Graziosi 1928), Riparo Blanc (Latina; Taschini 1964), Grotta della Calanca (Salerno; Sala 1983). In some areas, the more recent Late Glacial faunas suggest the occurrence of "glacial" species even after the Glacial Maximum, e.g. faunas from the Central Apennine (Fucino; Sala 1983), the Amalfitana coast (Grotta dell'Erica and Mezzogiorno; Sala 1983) and Cilento (Grotta di S. Maria di Scario; Boscato 2000).

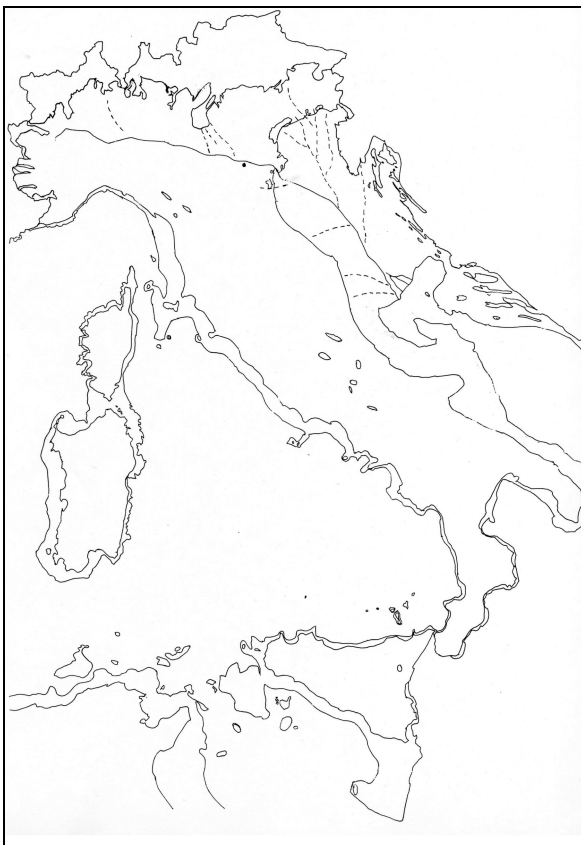


Fig. 1. Map of Italy during the Last Glacial Maximum (modified from Antonioli and Vai 2004).

Some of these sites contain few faunal remains, while others were excavated and studied many years

ago, so that the age determinations and the interpretation of the stratigraphic sequence may be questionable. However, the relatively abundant documentation and knowledge of the diversity in the faunal distribution between the Ligure-Tyrrhenic and Adriatic sides of the Italian peninsula (Sala 2002) make it possible to propose a rather precise picture of the mammalian association during the Würmian Glacial Maximum.

In the present paper the island of Sicily is not considered because of the limited amount of published data. During the Würmian Glacial Maximum, however, Sicily was connected to Calabria by a land bridge; so that some species, usually very rare in the Mediterranean area, were able to colonize the island.

Faunal evidences

This paper focuses on the ungulates as these are considered to be precise age indicators, whereas carnivores receive less attention as they are cosmopolitan or less related to climate.

In Liguria, during the Würmian Glacial Maximum, the ibex (*Capra ibex*) was the dominant species among the large mammals; it was spread over the steep coast which was mainly covered by a discontinuous herbaceous vegetation with few trees or shrubs. In the less steep and more protected parts of the coast, characterised also by the presence of forests, red-deer (*Cervus elaphus*), and more rarely wild boar (*Sus scrofa*) and roe-deer (*Capreolus capreolus*) were present.

The irregular and steep coastal belt of Liguria restricted faunal exchange with southern France but permitted the colonization by some large mammals from the Rodano valley such as reindeer (*Rangifer tarandus*) (Caverna degli Zerbi and Arma dell'Aquila; G. Vicino, pers. comm.), and giant deer (*Megaloceros giganteus*). However, these two were not able to spread east, across the peninsula. The presence of the mammoth (*Mammuthus primigenius*) at this time (Arene Candide; Cassoli and Tagliacozzo 1994) is debatable, as the recent dating of the unique specimen failed because of insufficient collagen (Stuart, pers. comm.).

The faunal population during the Würmian Glacial Maximum is well documented in regions of Veneto and Emilia, in which geographic and climatic conditions were similar to other areas of the Po River Basin. Two different areas were

distinguished: a narrow pre-Alpine, peri-glacial piedmont strip and a large plain area which extended to large part of the Adriatic Sea, the latter was then above sea level as far as Pescara (Abruzzo region). The restricted piedmont Apennine strip of hills was characterised by almost the same conditions as the Po plain, while the area located at a higher altitude but below the snow-line should have been similar to the pre-Alpine piedmont strip. In this latter area, which also included the Colli Berici (Vicenza) and the Monti Lessini (Verona), ibex was the most common ungulate together with chamois (*Rupicapra rupicapra*), and more rarely red-deer.

Among the large carnivores, cave bear (*Ursus spelaeus*) was still present only in the Colli Berici (Covolo di Trene) while the lion is recorded up to the Late Glacial.

From the Middle Würmian the steppe bison was still the most common animal in the plain and in the piedmont strip of Emilia, Romagna, and Marche. Fossil remains of bison from karst and fluvial deposits are preserved in several museums from Piedmont to Marche. The elk (*Alces alces*) was common in the riparian plain, but red-deer, roe-deer, and equids were more rare. Mammoth and giant deer, which were wide spread in the Middle Würmian, were no longer present here, but still occurred in the relatively nearby Danubian valley. Their absence is probably due to the difficulties of the only existing pass under 500 m through central Slovenia; as this is the only open pass to the eastern regions of Europe during the entire Middle Würmian, and through by which some species were able to reach the Karst of Friuli and spread over the plains and the piedmont strip.

Among these species from north-eastern Europe, the following are worth-mentioning: wolverine (*Gulo gulo*), pika (*Ochotona pusilla*), northern birch mouse (*Sicista betulina*), root vole (*Microtus oeconomus*) and the Balkan snow vole (*Dinaromys bogdanovi*). Sometimes these species have also been found in the Po River Basin deposits. During the Glacial Maximum the Slovenian and Dalmatian Mountains, which were widely covered by snow, also obstructed the crossing of the lowest mountain passes.

In the south of the Adriatic coast, in the Apulia, the ibex was still the most common animal together with the horse (*Equus ferus*) and, more frequently, *Equus hydruntinus*; moreover, the bison was

replaced by the aurochs which became quite common.

Along the Tyrrhenian coast, red-deer was the most common species, occurring together with some forest species such as roe-deer, boar, and aurochs, while in the mountain areas ibex and chamois were the most characteristic species. Ibex and chamois continued to be the prevailing species until the end of the Late Glacial period only in the steep coastal areas such as the Amalfitana coast (Grotta dell'Erica and Grotta del Mezzogiorno; Sala 1983), and in some localities in Cilento (Grotta di S. Maria di Scario; Boscato 2000).

In addition to the above mentioned fauna, the rich Middle Würmian faunal associations which were present along the two coastal sides of Italy were also characterised, during different climatic stages, by the **steppe rhinoceros (*Stephanorhinus hemitoechus*)**, **wholly rhinoceros (*Coelodonta antiquitatis*)**, mammoth, fallow-deer (*Dama dama*), leopard (*Panthera pardus*), spotted hyena (*Crocuta crocuta*), and wolverine. During the Glacial Maximum all these assemblages were subjected to a rapid decrease in biodiversity, which became more marked at the end of the Late Glacial when the last individuals disappeared and the reduced present-day fauna was finally established.

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References

- Alhaique F. (2000): Risultati preliminari dell'analisi dei resti faunistici rinvenuti nei livelli del Paleolitico superiore di Riparo Mochi (Balzi Rossi): scavi 1995-96. Atti 2° Conv. Naz. di Archeozool. (Asti, 1997); Abaco ediz., 125-130, Forlì.
- Alessio M., Bella F., Bachechi F., Cortesi C. (1966): University of Rome Carbon-14 dates IV. Radiocarbon 8: 401-412.
- Antonoli F., Vai G.B. (Eds.) (2004): Lithopalaeoenvironmental maps of Italy during the last two climatic extremes. Explanatory notes.

- Museo Geologico "G. Cappellini", Bologna, 80 pp.
radiocarbon dates I. Radiocarbon 15 (3): 479-487.
- Azzi C.M., Bigliocca L., Piovan E. (1974): Florence radiocarbon dates II. Radiocarbon 16 (1): 10-14.
- Azzi C.M., Bigliocca L., Gulisano F. (1977): Florence radiocarbon dates III. Radiocarbon 19 (2): 165-169.
- Bartolomei G., Broglio A., Cattani L., Cremaschi M., Lanzinger M., Leonardi P. (1988): Nuove ricerche nel deposito pleistocenico della grotta di Paina sui Colli Berici (Vicenza). Atti Ist. Veneto Sci. Lett. Arti 146 (1987-88): 111-160.
- Bietti A., Molari C. (1994): The Upper Pleistocene deposit of the Arene Candide cave (Savona, Italy). General introduction and stratigraphy. Quaternaria Nova 4: 9-27.
- Boscato P. (2000): Associazioni faunistiche e adattamenti al territorio durante il Tardoglaciale lungo la costa del Cilento (Salerno). Atti II° Conv. Naz. Archeozool. (Asti, 1997), Abaco Ed., 167-173, Forlì.
- Boscato P., Guerri M., Ronchitelli A. (1998): L'Abri du Romito à Papisidero (Cosenza, Italia) – Couches 4a, 5 et 6 (fouilles P. Graziosi 1965): donnèe préliminaires sur l'industrie lithique et la faune. Proc. 13 Int. Congr. Prehist. Prohist. Sci., Sect. 2: 619-627, Forlì.
- Broglio A., Improta S. (1995): Nuovi dati di cronologia assoluta del Paleolitico superiore e del Mesolitico del Veneto, del Trentino e del Friuli. Atti Ist. Veneto Sc. Lett. Arti, 153 (1954-55), Classe fisiche, matematiche e naturali: 1-45.
- Capuzzi P., Sala B. (1980): Il Riparo Tagliente. Analisi delle faune, biostratigrafia e cronologia dei livelli tardiglaciali. In: "Il territorio veronese dalle origini all'Età romana". Ediz. Fiorini, 130-136, Verona.
- Cassoli P.F., Tagliacozzo A. (1994): I macromammiferi dei livelli tardo pleistocenici delle Arene Candide (Savona, Italia): considerazioni paleontologiche e archeologiche. Quaternaria Nova 4: 101-262.
- Colamussi V. (2002): Studi climatici sul Quaternario mediante l'uso dei micromammiferi. Unpublished PhD thesis, University of Ferrara, 14 Cycle, 154 pp.
- Kuhn S.L., Stiner M.C. (1992): New research on Riparo Mochi, Balzi Rossi (Liguria): preliminary results. Quaternaria Nova 2: 77-90.
- Azzi C.M., Bigliocca L., Piovan E. (1973): Florence
- Graziosi P. (1928): La grotta di Talamone. Arch. Antropol. Etnogr. 58:122-141.
- Lambeck K., Antonioli F., Purcell A., Silenzi S. (2004). Sea level change along the Italian coast for the past 10.000 yrs. Quat. Sci. Rev. 23: 1567-1598.
- Leale Anfossi M. (1972): Il giacimento dell'Arma dello Stefanin (Val Pennavaira-Albenga); scavi 1952-62. La fauna. Riv. Sci. Preist. 27: 312-316.
- Leonardi P., Mancini P., Pasa A. (1959): Il covolo fortificato di Trene nei Colli Berici orientali (Vicenza), stazione preistorica con industria gravettiana. Bull. Paleol. Ital. 67-68: 101-136.
- Maggi R. (1995): Val Pennavaira (Savona). In: 13 Congr. UISPP, "Guide archeologiche, Preistoria e Protostoria in Italia, Toscana e Liguria", 6: 207-218, A.B.A.C.O. ediz., Forlì.
- Mochi A. (1911): L'industria litica della grotta di "Golino" nei monti dell'Uccellina (Talamone, Prov. di Grosseto). Arch. Antropol. Etnogr. 41: 174-187.
- Sala B. (1980): Interpretazione crono-biostratigrafica dei depositi pleistocenici della Grotta del Broion (Vicenza). Geogr. Fis. Dinam. Quater. 3: 66-71.
- Sala B. (1983): Variations climatiques et séquences chronologiques sur la base des variations des associations fauniques à grands mammifères. Riv. Sci. Preist. 38 (1-2): 161-180.
- Sala B. (2001): Le faune e gli ambienti del Ferrarese nel passato. In: "Storia di Ferrara, Vol. I°, territorio e preistoria", Corbo edit., 36-73, Ferrara.
- Sala B. (2002): Le faune quaternarie. In: AA. VV. "La fauna in Italia". Ministero dell'Ambiente e della Tutela del Territorio, Roma, Touring Ed., 382-388, Milano.
- Taschini M. (1964): Il livello mesolitico del Riparo Blanc al Monte Circeo. Bull. Paleol. Ital. 73: 65-88.
- Zanaldi E. (1994): Variazioni nelle associazioni a micromammiferi indicatrici dei cambiamenti climatico-ambientali dell'Ultimo Glaciale. Unpublished PhD thesis, University of Milan, 7 Cycle: 209 pp.

Riassunto

[Le faune a mammiferi e gli ambienti del Massimo Glaciale Würmiano in Italia continentale (22±2 ka cal BP)]

Durante il Massimo Glaciale la regressione marina portò all'emersione della gran parte del Bacino Adriatico, formando un'immensa pianura dal Piemonte all'Abruzzo. Molti depositi di questo periodo sono stati datati direttamente al radiocarbonio o con le industrie umane risalenti al Gravettiano (punte a dorso e bulini di Noailles). Puntando l'attenzione sugli ungulati, nelle aree costiere scoscese della Liguria, della costa amalfitana, di alcune località del Cilento, lungo la

costa adriatica e nelle fasce periglaciali prealpine, lo stambecco era l'animale più comune, assieme al camoscio e più raramente al cervo rosso. Nella pianura padana, nella bassa fascia collinare emiliano-romagnola e marchigiana, il bisonte delle steppe era il più comune mentre alce, cervo e cavallo erano rari. Nella fascia adriatica più a sud lo stambecco e il cavallo dominavano su cervo, uro ed *Equus hydruntinus*. Nella fascia costiera tirrenica pianeggiante o poco scoscesa le forme forestali quali cervo, capriolo e cinghiale erano dominanti, mentre nelle zone montane lo erano stambecco e camoscio.