

The everyday-life in neanderthal times: a full-immersive Pleistocene reconstruction for the Casal De' Pazzi Museum (Rome)

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Resumen

El Museo de Casal De' Pazzi (Roma) se construyó hace unos diez años en un terreno pleistocénico, en el que hace aproximadamente 200.000 años se encontraba el antiguo cauce del río Aniene. Desde su apertura, el Museo se ha caracterizado por un fuerte enfoque narrativo y comunicativo. El proyecto digital realizado por el CNR italiano (Instituto de las Tecnologías aplicadas a Bienes Culturales) incluye tres aplicaciones: una simulación de las inundaciones, que muestra como se anegó del antiguo lecho del río; una película de animación por ordenador, en la que se presenta al público cómo era el antiguo hombre de Neanderthal y la vida de los elefantes antiguos, y un juego educativo, que fomenta el aprendizaje de los niños, el Plei-sto-station, implementado mediante un sistema dinámico con pantalla de interacción táctil.

Palabras Clave: MUSEO VIRTUAL, PLEISTOCENO, NEANDERTHAL, SIMULACIÓN DE INUNDACIÓN

Abstract

The Museum of Casal De' Pazzi (Rome) is built since about ten years on a Pleistocene floor consisting in the ancient riverbed of the Aniene river, at about 200.000 bp. Since its opening, it has been characterized by a strong narrative approach, and communication effort. The digital project realized by the Italian CNR (Institut for Technology applied to Cultural Heritage) implies three applications: a flood simulation, to show the water refilling of the ancient riverbed; a movie in computer-graphic, to be shown to the public, explaining neanderthal man and ancient elephant's life, and an edu-game, for children's learning, the Plei-sto-station, implemented by touch-screen interaction dynamics.

Key words: VIRTUAL MUSEUM, PLEISTOCENE, NEANDERTHAL, SIMULATION

1. The site and the museum

The Pleistocene Museum of Casal De' Pazzi in Rome is built on a prehistoric floor consisting in the ancient riverbed of the Aniene river, at about 200.000 bp (fig. 1a,b).

It is located at an altitude between 30 and 34 m a.s.l. along the lower Aniene valley. The Aniene is one of the major tributaries of the Tiber river, and in this area is running from east to west, with a valley floor gently sloping down from about 19 m to 16 m a.s.l.

The archaeological site is located in a point where the river crossed rather resistant volcanic formations like the Tufo lionato. On the site of the excavation the Lionato tuff layers are slightly dipping. The portion of the river bed preserved at the site is made up of pebbles with a clear volcanic component, and moreover of sand and silt layers. The protruding and slightly sloping hard tuff layers must have played a decisive role in trapping the river's sediment load.

More than 2000 faunal remains were discovered in the deposit: straight-tusked elephant (*Elephas antiquus*), extinct aurochs, hippopotamus, bear, rhinoceros, horse, wild boar, hyena, wolf, fallow deer, deer, waterfowl, and also fossil leaves of a tree of the

Ulmaceae family. The remains of *Elephas antiquus* stroke the imagination of people already during excavation, because of their size and quantity: some thirty tusks were found, together with molars, skull and basin fragments, as well as some long bones.

The human presence is also attested: in 1983 the fragment of a human parietal bone was discovered under a tuff block; according to the suggested chronology, this is the time when the Neanderthals peopled Europe. Furthermore, more than 1,500 stone tools were collected, made from small pebbles, as it is usual in this coastal part of central Italy.

The value of the deposit relies on many issues: it is exceptionally well preserved, in the heart of the modern city; it allows to reconstruct and depict an ancient landscape as well as identify the animal species; it shows the presence of hunter-gatherer human groups in the territory of Rome since early times; and it is the only Pleistocene site to be preserved and visible today in the lower Aniene valley

The partnership among many institutions made possible the realization of this unusual museum. Many actions were carried out to realize a widespread appreciation of the site.

The archaeological excavation of the 80s brought to light an area of 1200 m². After that, 300 were preserved under a shield of

foamed clay, plaster and wood planks. In the following years, up to 1995, the site was totally neglected. In 1996, the site management was assigned to the Municipality of Rome (Sovrintendenza ai Beni Culturali).

The first project for a permanent shelter, laid out in the 80s, was aimed mainly at protecting the deposit from natural hazards and from vandalism and envisaged a built large canopy. In the year 2000 the new building was completed, and a transparent roof was added over the visitors path.

The deposit was then restored in 2001, in collaboration with the Istituto Centrale per il Restauro, and the finds were replaced in their original location.

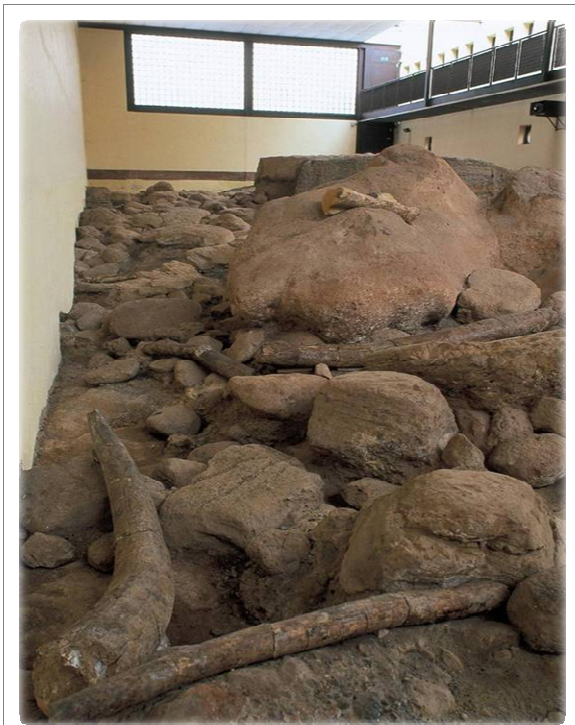


Figure 1 (a-b). The Casal De' Pazzi Museum deposit

Then, museological and museographic actions followed to these works, based on a communication systems that uses textual, verbal, symbolic and technological communication. Nevertheless, in addition to the traditional forms of exhibition, more direct communication tools were preferred, like those of visual and / or interactive type, as well as new educational techniques such as real and virtual reconstructions and hands-on

labs. The aim is to make the visitor interact with the informations and also to keep his/her attention alive.



Figure 2. The outside appearance of the Casal De' Pazzi Museum, with the majolica painted panels

The outside visibility of museum is provided by two large panels of majolica tiles painted with artistic reconstructions of the Pleistocene environment. Many ongoing activities are designed and planned inside the framework of the close relationships established with the urban study and research institutions. Thus the museum has set up contacts with the nearby Rebibbia jail, with local and city environmental associations, with primary school pupils and large groups of university students who carry out their internships there.

2. The digital project

The Museum is, since its origin, a valid example of didactic approach targeted to educational purpose. More recently, a system developed by the Institute of Technologies Applied to Cultural Heritage of Italian CNR, has even enhanced such a dimension, by the spectacular immersive reconstruction of a spot of Pleistocene everyday life.

Starting from detailed studies of the geomorphological and environmental conditions, the virtual reconstruction process led to a highly impressive application, through the most advanced photorealistic terrain generator software and fluid simulators. The whole communication system implies 3 main elements.

2.1. The flood simulation

One couple of projectors targeted to the deposit, aimed to show on the Pleistocene ground, in the darkness and with an immersive audio track, the effect of river refilling (fig.3a,b).

This reconstruction has been obtained through the most updated algorithms for fluid dynamics and waves/splash/foam generation. The model geometry is imported, and is interpreted by the fluid particles as "rigid body" to impact on. Once particles are rendered in an image sequence, on transparent alpha-channel background, it is superimposed in post-production to the fluid movie already rendered by Global Illumination engines, obtaining the final result of flood simulating.

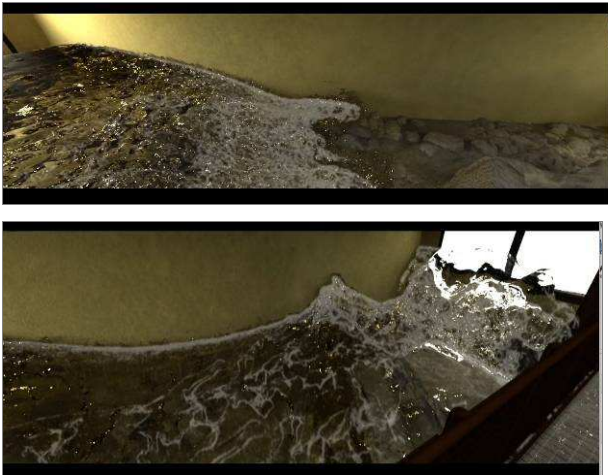


Figure 3 (a-b). The flood simulation on the riverbed

2.2. The movie

A second projectors couple is targeted to the wall in front of visitors platform, and a movie on *Elephas Antiquus* and Neanderthal man's life is projected (fig.4a,b,c).

For this movie, the landscape reconstruction has been created starting from GIS data. The reconstruction of the paleo-valley, apart from the geological map (FUNICIELLO & GIORDANO 2008), has been performed through contour lines series at an equidistance of 10 meters, as well as the known local distribution of the paleolithic sites. The exact correspondence between the real model and the virtual reconstruction allows to perform video transitions by virtual cameras placed in the users position: the museum platform (fig 1a). DEM's are then textured with procedural plants and materials based both on basic software libraries and specific pleistocene plant features (species, height, density, seasonality, etc.); and placed according to terrain slope, proximity to streams, chemical and geological aspects and so on, on the basis of experts' indications. Even shores profiles and single stones have been modelled under geologists supervision. The *Elephas Antiquus* character has been created starting from the photo-restitution of the Casal De' Pazzi Museum's elephant teeth, through *Computer-vision* data post-processing in cloud computing. The result is a hi-poly model placed in right scale in the 3d model of elephant body (both skeleton and external aspect have been validated by paleontologists). Then, the work has been completed with rigging and animation operations.

2.3. The Plei-sto-station

The third creation is the so-called *The Plei-sto-station*: an educational application targeted to childhood's learning, implemented by a touch-screen interaction dynamic (fig.5a,b).

The goal of the four quests is to find the every-day life elements in common between the upper (Pleistocene kid) and the lower (today kid) domain, thus checking couples of objects referring to the same functions (fruits, leaves, elephant teeth, etc.)

The next museum steps, which will be realized soon, consist in setting up the large outdoor space with a thematic garden exemplifying part of the Pleistocene flora. Here new spaces equipped for hands-on labs will also be done, to carry out future

labs of archaeological excavation, stone flaking, use of flint tools, etc.



Figure 4 (a-b-c). Three scenes from the movie on pleistocene life, with the *Elephas Antiquus* character



Figure 5 (a). *Quests of the Plei-sto-station educational application for children*



Figure 5 (b). Quests of the Plei-sto-station educational application for children

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