

PALAEOENVIRONMENT RECONSTRUCTION USING POLLEN AND PLANT MACROFOSSILS: THE ARCHAEOLOGICAL SITE OF VIA NERONIANA (MONTEGROTTO TERME – PADOVA)

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ABSTRACT: Maritan M., Gaudioso B. & Miola A., *Palaeoenvironment reconstruction using pollen and plant macrofossils: the archaeological site of via Neroniana (Montegrotto Terme - Padova)*. (IT ISSN 0394-3356, 2011)

This presentations shows the results of a palaeobotanical research in an archaeological site occupied from the Copper Age to the Medieval time in the thermal area of Euganean Hills. The results of pollen and plant macrofossils' analysis help in the reconstruction of the palaeoenvironment evolution back to the Last Glacial Maximum, with new insight on the thermal water influence on the site and the human presence before the construction of a Roman *villa*.

RIASSUNTO: Maritan M., Gaudioso B. & Miola A., *Ricostruzione paleoambientale tramite polline e macroresti vegetali: il sito archeologico di via Neroniana (Montegrotto Terme – Padova)* (IT ISSN 0394-3356, 2011)

Questa comunicazione presenta i risultati delle ricerche paleobotaniche in un sito archeologico frequentato dall'Età del Rame fino al Medioevo nell'area termale dei Colli Euganei. I risultati dall'analisi del polline e dei macroresti vegetali aiutano a ricostruire l'evoluzione del paleo ambiente fin dall'Ultimo Massimo Glaciale, con nuovi sviluppi sull'influenza dell'acqua termale sul sito e la presenza umana precedente alla costruzione di una villa romana

Key words: palaeoenvironment, Montegrotto Terme, Euganean hills, pollen, plant macrofossils

Parole chiave: paleo ambiente, MontegrottoTerme, Colli Euganei, polline, macroresti vegetali

Archaeobotanical analyses are widely applied to the reconstruction of past landscapes. Recently, the demand for a more detailed information on climate and environmental history, including the impact of man on natural landscapes, has stimulated a multi-proxy approach to the study of palaeoenvironments (BIRKS & BIRKS, 2006).

This approach has been adopted in the archaeological site of "via Neroniana" at Montegrotto Terme (Padova) in the Euganean thermal area. The area is well known since protohistory and exploited in Roman times for leisure and healing. Since the Copper Age the human presence in the site is well documented. Particularly important are the archaeological findings of a monumental Roman villa (I sec. a.D.) and a of a medieval settlement (IX-XI sec. a.D.)(Fig. 1). Huge effort in ground lifting and draining of the site is documented in both occupations (ZANOVELLO & BASSO, 2007; 2008). The almost continuous human presence suggests that the environmental features should be determinant in the reoccupation of the site.

The reconstruction of the palaeoenvironment in a thermal area was approached by means of geomorphological, sedimentological, palaeo-botanical, stratigraphic, soil micromorphological and radiocarbon dating methods. Sediments were collected in several drillings and archaeological open sections. Pollen, plant macro remains and a variety of algal, fungal and zoological micro remains have been

investigated. Biological indicators were selected in the fossil records. The cores' lithology has been studied and used for stratigraphic correlations. The results integrate archaeology in providing a comprehensive framework of human-environment interactions. This presentation shows palaeobotanical results (pollen, macrofossils) from 8 cores, 4 to 10 meters deep, and an open section (Section P in Fig. 1).

On the basis of biological data the natural and cultural landscape can be reconstructed in the following periods:

i) *The Last Glacial Maximum*. The area was waterlogged; pollen and other palynomorphs (NPPs) in a sequence of clay, sand and silt sediments document that a steppe environment was around the basin. The finding of fossil seeds of the alophilous specie *Juncus gerardi* is quite important to reconstruct the palaeoenvironment as the thermal water of Montegrotto is characterized by salinity comparable to marine water (PANICHI *et al*, 1976). *J. gerardi* was abundant around the thermal springs before the urbanization of the Euganean thermal area in 1904, as reported by BEGUINOT (1904). Moreover the presence of fossil thermal diatoms and gastropods indicate that thermal waters fed the shallow basin. A well dated layer of clay defines the geomorphological profile of the basin at the age of about 19,000-18.000 cal yrs BP.

ii) *The beginning of the Late Glacial*. Pollen and macro remains in lacustrine sediments record the

onset of the climatic improvement (rare but constant presence of thermophilous and mesophilous plants and the expansion of pioneering elements as *Pinus*). The findings of *J. gerardi* seeds and an exceptionally high percentage of *Chenopodiaceae* pollen suggest that thermal water still fed the basin and a saline soil developed around. Almost twice the clay sedimentation has been interrupted by alluvial sedimentation in the South Eastern part of

the area. Differently the North Western part was continuously waterlogged and a thicker layer of clay than in the central part of the area was deposited. Very high sedimentation rates produced minerogenic deposits entirely devoid of recognisable plant remains. At the top a soil developed in the entire area (P. MOZZI and C. NICOSIA pers. comm.).
 iii) *The beginning of the Holocene*. In the North Western part of the archaeological area a new

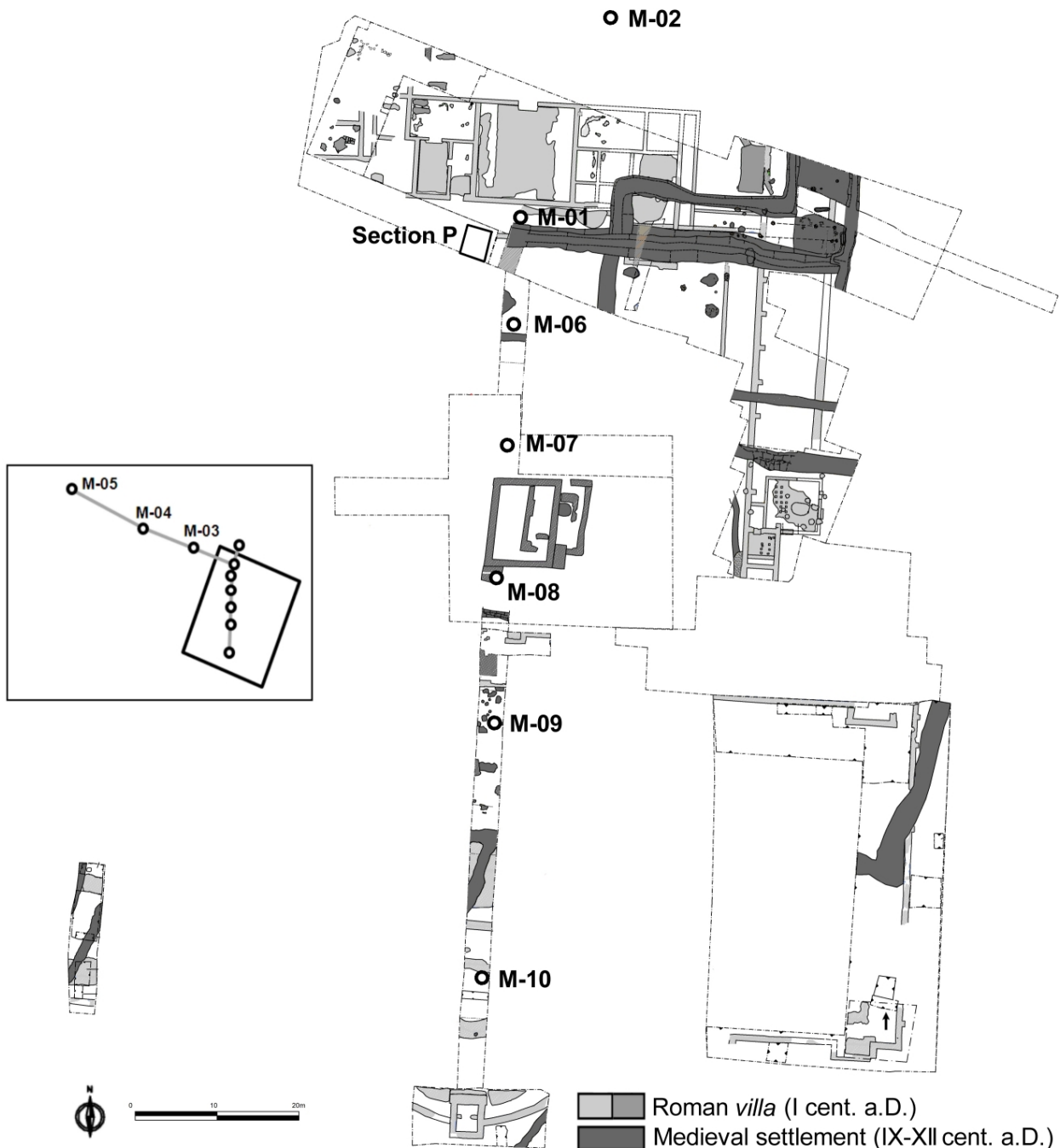


Fig. 1, Map of the archaeological area of via Neroniana with localization of the cores and Section P (MARITAN M., 2010, modified)
 Mappa dell'area archeologica di via Neroniana, con localizzazione dei carotaggi e della sezione P (MARITAN M., 2010, modificata)

brief phase of lacustrine sedimentation preserved pollen associations with increasing *Quercus*. They can be compared with the pollen associations at the base of the Lake of Fimon Holocene sequence (VALSECCHI *et al.*, 2008). The upper part of the pollen sequence is disturbed by human activities.

iii) *The late Holocene before the construction of the villa*. A sedimentary sequence of a shallow water body is well preserved in an open archaeological section under the foundations of the *villa* (section P in Fig. 1). The clay layer at the bottom of the sequence preserved pollen of rye, *Vitis* and of many anthropogenic indicators. The increasing *Picea* and *Abies* and decreasing thermophilous elements suggest a period of less warm and more humid climate respect to the Holocene sequence already described. It could be correlated with the top of Holocene (Iron Age?) by comparison with other pollen sequences in the region (VALSECCHI *et al.*, 2008). The curves of several aquatic and hydrophilous plants, as *Juncus gerardi*, *Typha latifolia/angustifolia*, *Ranunculus* subgen. *Batrachium*, *Chara vulgaris* and *Nitella tenuissima* suggest progressive dryer conditions and the filling up of the water body. Pollen of *Secale*, *Verbena officinalis* and *Poa palustris/P. pratensis* seeds points to cultivation. Thermal springs still fed the water body as it is suggested by the presence of *Juncus gerardi* seeds. In a quite close (3 m apart) core, M01, stratigraphically correlated to the sequence of section P, several pips of *Vitis vinifera* subsp. *vinifera*, with seeds of *Euphorbia helioscopia*, (a common weed of grapevine cultivations) have been found. The seeds have been recorded in Late Glacial sediments and have been interpreted as evidence of a grapevine cultivation over the old Late Glacial soil before the construction of the *villa*.

v) *The Roman Age*. The sediments dated by archaeological findings and analyzed so far did not preserve any plant remains. The hydrological conditions of the area and the attractive thermal springs lead to the building of the *villa*, through reclamation of part of the swampy lake shore by means of 1-2 m thick landfills.

vi) *The Medieval occupation*. A new settlement (IX-XII cent. A.D.) occupies the site of the *villa*. Land reclamation works were done in the area before the occupation. A variety of archaeobotanical findings hint at diversified agricultural and mostly food processing activities, as cereal and legumes cultivation and processing (*Hordeum vulgare*, *Triticum aestivum/T. durum*, *Panicum miliaceum*, *Setaria italica*, *Lens culinaris*), grapevine cultivation and wine making (*Vitis vinifera* subsp. *vinifera*), textile and possibly dying activities (*Linum usitatissimum*,

Reseda luteola, *Sambucus ebulus*).

The most relevant archaeobotanical results are: i) the continuous presence of thermal water springs in the area, since the LGM period. This environmental peculiarity should explain the reoccupation of the site till the modern time; ii) the finding of *Secale* that has been rarely found in Northern Italy before the Roman Age (MERCURI *et al.*, 2006). This is the first record of cultivation of rye in the Euganean area; iii) the new record of an agricultural phase with cereal and grapevine cultivation before the Roman occupation (Imperial Age *villa*). Funds were supplied by the Dept. of Archaeology (University of Padova) in 2006-2008, MURST (ex 60% A. Miola 2005-2010) and by the project PICAR - PRIN 2008FJCEF4. (Scient. coord. A. M. Mercuri).

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