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## **Brick in the wall: an archaeobotanical approach to the analysis of dry stone structures (Puglia - Italy)**

Anna Maria Grasso, Girolamo Fiorentino, Giovanni Stranieri

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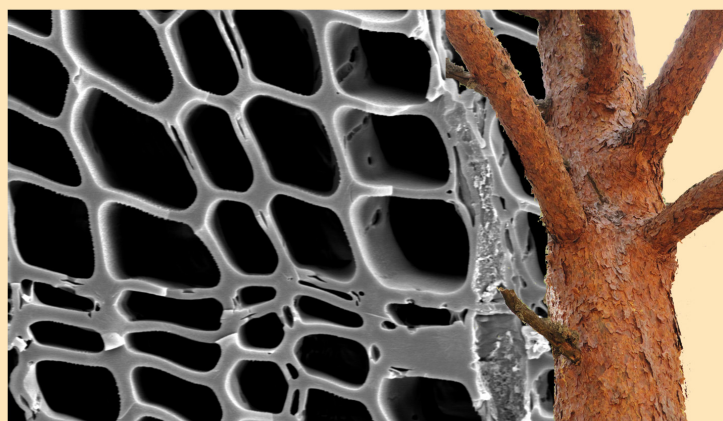
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# SAGVNTVM

PAPELES DEL LABORATORIO DE ARQUEOLOGÍA  
DE VALENCIA  
EXTRA-13

## WOOD AND CHARCOAL EVIDENCE FOR HUMAN AND NATURAL HISTORY

ERNESTINA BADAL – YOLANDA CARRIÓN – MIGUEL MACÍAS – MARÍA NTINOU  
(COORDINATORS)



VNIVERSITAT  
D VALÈNCIA

FACULTAT DE GEOGRAFIA I HISTÒRIA

**Departament de Prehistòria i d'Arqueologia**

2012



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## BRICK IN THE WALL: AN ARCHAEOBOTANICAL APPROACH TO THE ANALYSIS OF DRY STONE STRUCTURES (PUGLIA – ITALY)

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**Summary:** Dry stone constructions are a common occurrence in many Mediterranean landscapes. One of these structures known as Pareto-ne dei Greci (Taranto, Southern Italy), was subject to an archaeological investigation. Soil and sediment material within this wall, as well as those above and below it, were sampled and processed for archaeobotanical studies. In this manner it was possible to understand its building technique as well as to provide a chronological context for it. Through anthracological analysis it was possible to insert the Pareto-ne within the surrounding agricultural landscape, thus better highlighting its function in relation to the history of the territory.

**Key words:** Dry stone wall, Archaeobotany, Middle Ages, Southern Italy.

### INTRODUCTION

In central-southern Puglia, the dry stone building technique is used for linear and boundary structures (walls of various dimensions) and for individual structures such as buildings used for temporary, seasonal, intermittent or permanent habitation (shelters, huts etc.). It is also used to create random or structured piles of stones (*specchie*, *cairns*, *tumuli*) (Ambrosi 1990). Their ubiquitous presence in the region has prompted landscape archaeologists to seek special instruments with which to perform a thorough reading of this rich source of data. Indeed, it is precisely their

frequency – together with their function as the “skeleton” of the anthropised landscape – that makes the systematic study of dry stone structures crucial to our overall knowledge of the history of the environment, of the landscape and the region.

In Puglia, the dry stone walls are mostly of two types. On the one hand there is the dense web of low walls that mark the boundaries between fields. The other type is relatively rare; much taller and thicker, they are known locally as *paretoni* or *limitoni* (the suffix indicating their large size) and in some cases stretch for many kilometres. While the former are to be studied precisely because of their ubiquity, the ex-

ceptional nature of the *paretoni* raises specific questions regarding their origin and function.

This study aims to analyse an exemplary case of the latter type of structure, by means of a field study that began in 2005 of the so-called *paretone di Sava*, in the province of Taranto (Stranieri *et al.* 2009). The *paretone* has been identified by local historians as part of the possible fortified frontier between the Byzantine and Lombard areas of influence, the territory having been a bone of contention between the two powers from the late 7<sup>th</sup> to late 9<sup>th</sup> centuries. The myth of “the Greek dyke” seems however to have been formed in the 19<sup>th</sup> century (Stranieri 2000) and does not seem to be borne out by field data, hence the need to establish the structure’s true historic nature.

Generally speaking, the survey techniques used by archaeologists for this type of artefact are descriptive. Only rarely has there been a thoroughgoing stratigraphic survey of the terrain to establish the context. This study also sought to assess the potential utility of an archaeobotanical study of these dry-stone constructions. Their specific informative potential is based on the following considerations: 1) They rest on top of long stretches of palaeo-soil, which has thus not been affected by ploughing; 2) they themselves constitute long stretches of organic sediment; 3) they represent ecological – and ultimately archaeological – “niches” or rather “corridors”. On the basis of these results it is possible to propose a diachronic model of the evolution of an agricultural landscape, to be integrated with data on the dynamics of settlement.

## THEORETICAL BACKGROUND

This study, part of a wider research project, focuses on the history of the environment and on the evolution of the medieval agrarian landscapes of central and southern Puglia. This project looks at various aspects of the landscape (cf. Sereni 1962; Aston 1985, Caldo 1987; Cambi and Terrenato 1994; Chouquer 2000) such as the structural and interrelated components of a system (Raynaud 2003), some of which have long

been amenable to an archaeological reading while others remain obscure due to a lack of suitable survey techniques. In consideration of this varied legibility, archaeology has tended to rely on settlements, projecting on to the surrounding agrarian landscape an image derived from data gathered in tiny portions of space that are –often erroneously and with no regard to nuance– referred to as “sites”.

In a systemic and holistic framework however (Fiorentino 2004), a suitable characterisation of the agrarian structures would take account of their regional and administrative aspects and their relationship to the road network, the size and ownership of landholdings, palaeovegetation, use of the soil, crop systems and management of uncultivated areas, so as to cover the entire economic system including agriculture. This could be used to complement or modify interpretations that derive from research into settlements, especially when such research is not based on a satisfactory series of data, as is still the case with the early-medieval northern Salento. Indeed, the two types of evidence mutually depend on each other, to the point that the transformations observed in the one may be considered a reflection of those occurring in the other. Knowledge of the history of the fields, pastures and woods (the “living space” and the “places of work”) makes it easier to understand the dynamics of settlement, even when little is known about the settlements themselves.

When the landscape begins to be thought of as an enormous archaeological tableau, readable not just from above but also from within (by means of archaeological excavation), then *all* the evidence necessarily enters the field of archaeology and its transformations can be read as the expression of environmental, economic and social dynamics. In this way, spaces that were not settled –and even spaces that were not cultivated– cease to be considered “marginal” and are therefore studied fully –not merely in search of certain “anomalies” that may be considered evidence of abandoned settlements. In such an archaeology of agrarian systems, each element of the landscape –whether

still functional, no longer functional or fossilised—must therefore be studied and explained before being inserted in a chronological perspective (Chouquer 1996; Raynaud 2003). As well as knowledge of these components, it can also provide new elements for the archaeology of settlements and the history of technology, thus completing the picture in terms of material culture.

Within this tradition of studies and in the wake of the pioneering work of Richard Hodges in the United Kingdom (cf. Hodges 1991), Italy has also seen the development of an archaeology of agrarian and rural property delimitation, by means of rows of stones, ditches, hedges and dry stone walls. The historical development of such delimitation is manifested in the contemporary landscape—with its distinctive geometrical forms, dimensions and physical appearance. It reflects territorial boundaries, the limits of large feudal and ecclesiastical estates, the patchwork of smallholdings and the road network, all stratified in a “collapsed chronology” of thousands of years of human influence on the landscape.

## THE CASE STUDY

The *paretone* studied here is situated in the municipality of Sava, 31 km east of Taranto and 15 km north of the Ionian Sea (Fig. 1). It is cited in archive sources from the 15<sup>th</sup> century onwards. In addition, a trove of coins was discovered by chance in 1953 (Pichierra 1976), in a stretch of the *paretone* that is no longer extant. The trove was composed of an unknown number of silver carlini gigliati, datable to the reign of Robert I of Anjou (1309-1343).

In its current state, the *paretone* of Sava is about 1.3 km long but only the central stretch of about 700 m is still in a good state of conservation. It consists of two parallel walls with fill between them, and is on average about 4 m thick. It is oriented along a north-south axis and the height varies between 1 and 3 m (Fig. 2).

It is made up of small, medium and large stones

from the surrounding fields, which are characterised by numerous outcrops of Altamura (Cretaceous) limestone. Along its east side are numerous ramps up to the top, as well as basic shelters incorporated into the structure of the wall. Such structures are entirely absent from the west side. Again on the east side of

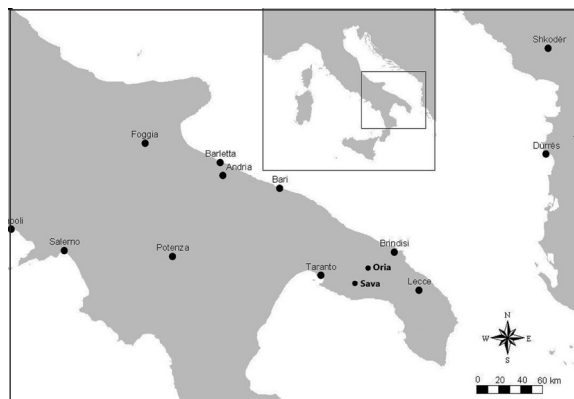


Figure 1. Site location.



Figure 2. The *paretone* of Sava.

the *paretone* are rectangular and semicircular niches, whose functional and chronological interpretation remains problematic. What is certain is that the east side appears to have been the object of greater attention than the other side. To the south and north of this central stretch the *paretone* has a less structured appearance; where the wall is built on a calcarenite substrate (Gravina Calcarenite) (cf. Stranieri and Napolitano 2009), long stretches of it have been invaded by a tall, Mediterranean maquis-type hedge. The boundary marked by the wall continues in a northerly direction in the form of a country lane and rows of stones marking the edges of fields for a total length of roughly 4.3 km.

## METHODS

In choosing which stretch of the *paretone* to excavate we selected a point where a country lane cuts across it, enabling us to make use of an existing cross section. This part of the structure was also characterised by an interesting difference in height between the two outer walls, which is also seen in the DTM. Stratigraphic assays were conducted in an area 3x8 m that was perpendicular to the structure and included its terminal segment, which was entirely dismantled. In addition, two other assays of 1x2 m were conducted adjacent to the wall, one on each side (Fig. 3). The



Figure 3. The *paretone* being excavated.

wall was stratigraphically surveyed in cross section, disassembled and then rebuilt as before.

Systematic archaeobotanical sampling was conducted for each stratigraphic unit. A grid with one-metre squares was imposed on the entire area subject to stratigraphic assays and a 5-litre sample of earth was taken from each of them.

After taxonomic classification, a sample was <sup>14</sup>C-dated with high resolution mass spectrometry at the CeDaD - University of the Salento, thus providing an absolute dating.

Lastly, reconnaissance of the current vegetation was conducted on the wall and the area immediately surrounding it.

## DATA AND RESULTS

The excavation of the structure highlighted a complex archaeological stratigraphy (Fig. 4) and some interesting anthracological data.

The substrate on which the two external sides and the fill between them were built up (SUs 17, 27, 29, 34, 35) is characterized by the overwhelming presence of *Erica* sp. In addition, SU 35 yielded 82 fragments belonging to a ceramic cooking pot, probably of local manufacture. Though highly degraded, these fragments do not exhibit traces of flutiation and may thus be considered primary deposits. The only diagnostic element of the pot is the bottom with umbo, which bears similarities with ceramics from excavations conducted in the province of Lecce datable to the 7<sup>th</sup> to 8<sup>th</sup> centuries.

The most ancient phase of construction is a level made up of two rows of medium to large stones bound with earth and placed directly on the agrarian palaeosoil. In its conserved state, this arrangement is about 3.5 m thick and does not exceed 0.45 m in height. The first row (SU 20) yielded only charcoals of *Erica* sp. The second row, broadly similar to the first in structural terms, is characterised by the presence of *Quercus ilex* L. (Fig. 5 cf. “I structural phase”). From the time it was built, this linear structure functioned as a “dike”

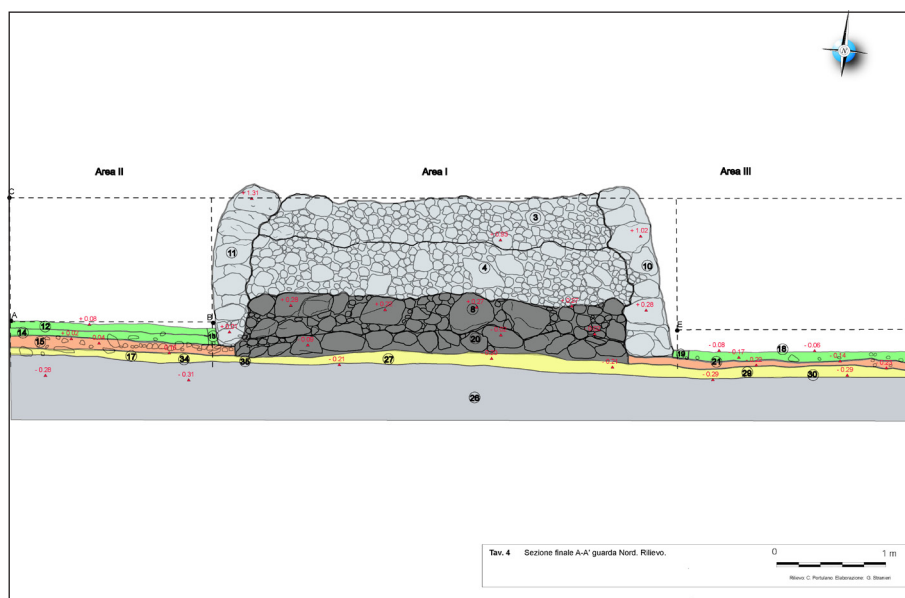


Figure 4. Final section of the *Paretone dei Greci*.

that blocked the eastward movement of colluvium. SUs 15-21, corresponding to these colluvial deposits, were radiocarbon dated to 670-880 cal. AD. They are characterized by the same species found in the earlier phase with the conspicuous addition of *Olea europaea* L. (Fig. 5 cf. “post I structural phase”).

The second row of large stones was covered by a layer of fill, roughly one metre thick, made up of stones of small and medium dimensions (SUs 3-4-10-11). The fill is contained on either side by the two outer walls, which are made of medium to large stones and lean inwards in order to enhance stability. The two outer walls show numerous traces of repairs and reinforcement. For example, below the outer wall on the west side (SU 14) a fragment of etched polychrome ceramics was discovered, datable by its decorative motif to the 16<sup>th</sup> century. The discovery provides a *terminus post quem* for this later building work. The soil beneath the two outer walls (SU 13- 14- 18-19) yielded anthracological remains of *Olea europaea* L., *Erica* sp., *Myrtus communis* L., *Cistus* sp., *Ostrya carpinifolia* Scop., *Sambucus* sp., *Prunoideae* and *Pomoideae* (Fig. 5 cf. “post II structural phase”). The fill (SU 3-4) contained a large quantity of fictile and vitreous fragments, all from modern times.

Currently the area surrounding the *paretone* is mainly used for olive groves. In the immediate vicinity, and often inside its less well-conserved stretches, there are specimens of *Quercus ilex* L., *Punica granatum* L., *Phillyrea* sp., *Myrtus communis* L., *Galium* sp., *Ruscus aculeatus* L., *Crataegus monogyna* Jacq., *Erica* sp., *Calycotome spinosa* (L.) Link, *Rubus fruticosus* L., *Prunus* sp., *Cydonia oblonga* Mill., *Pistacia lentiscus* L., *Asparagus acutifolius* L.

## DISCUSSION AND CONCLUSIONS

The *paretone* today appears to be the result of a single effort of construction. The building techniques and the characteristics of the fill as derived from the archaeological survey do not however entirely clarify its origins and lead rather to two distinct hypotheses. The first is that it was built in a single operation during the early Middle Ages and was perhaps restored at certain points in subsequent periods, as indicated by the presence of ceramics datable to the 16<sup>th</sup> century discovered below the outer wall on the west side. The second is that there were at least two major and distinct structural interventions, possibly separated by a period of use and/or decay of the structure. What is



certain however is that at least the original core of the structure was already present in the 7<sup>th</sup> to 9<sup>th</sup> centuries.

The second issue is the function of this imposing structure. In the absence of documentary sources or clear diagnostic elements, the archaeobotanical approach enabled us to assess changes in the use of the land surrounding it following its construction. However, the proposed approach also entails a reflection on the dynamics of taphonomy in the area of deposition. Due to its inherent design features, this type of structure initially constitutes an “open” basin of deposition: the interstices and gaps between one stone and another allow the passage of sediment and of macro and micro remains of anthropic, animal or plant origin. In time, these spaces fill up, limiting the processes of post-depositional removal. Thus the structure eventually becomes a “closed” basin of deposition. Therefore, from a diachronic perspective, the wall can also be described as “temporarily open”, the processes of input

and removal of material ending either when the basin is full or when it is sealed off by the construction of new, adjacent structures.

The absence of any thermally altered elements near the structure indicates that the charcoal remains entered the context and then settled as a result of depositional and post-depositional processes driven by physical and biological agents. Their basin of origin cannot be far from their place of discovery, because, after a comprehensive visual examination, the charcoals show little sign of rounding. Consequently, since the charcoals are not the result of a single event or process, they indirectly provide information on the evolution of the palaeovegetation of the area. The type and relative chronological horizon of the artefacts and ecofacts discovered in the *paretone* (dated to a period from the 7<sup>th</sup> century to the sub-contemporary period) have also confirmed the validity of considering this type of structure as a “container of information” re-

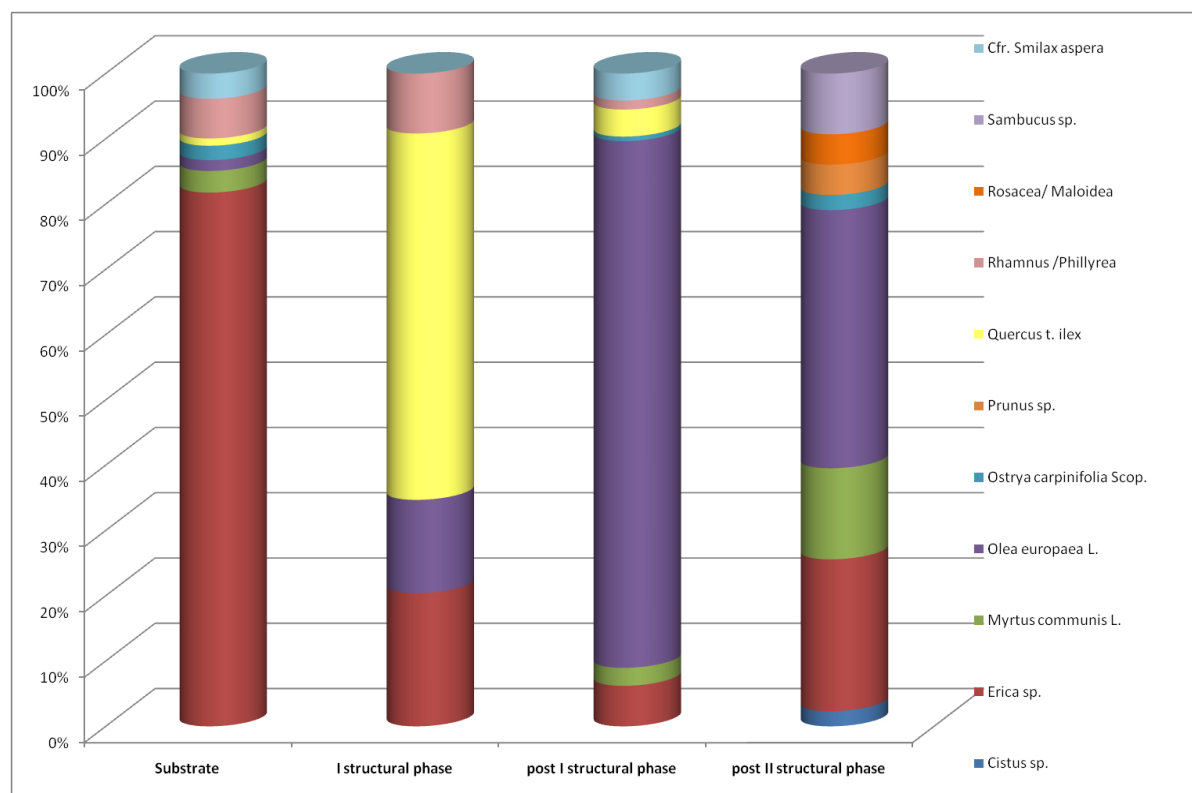


Figure 5. Results of the anthracological analysis (Total fragments: 460).

garding the evolution of the surrounding area.

Thus, the phase preceding the building of the structure is characterized by a landscape of low scrub vegetation, while the first construction phase is linked to a vegetational stage moving towards a mature forest. After this phase (7<sup>th</sup> to 9<sup>th</sup> centuries), the landscape around the *paretone* changed and was probably characterized by olive groves. This was probably not an isolated development but rather was linked to a reorganisation of space and agricultural resources throughout the Salento peninsula. Analyses of pollen conducted near the Alimini Lakes (Di Rita and Magri 2009) indicate an increase in the cultivation of olives in this period and archaeobotanical analyses of the abandoned village of Apigliano seem to confirm pre-eminent role of this resource (Arthur *et al.* 2012). Finally, the soil beneath the outer walls, corresponding to the second stage of construction, contains not only olive, but also plum and apple charcoals, indicating that the landscape had evolved again as a result of increased human exploitation. The results of the anthracological analyses thus seem to provide little backing for a defensive or military interpretation of the structure. Indeed, if that had been the case, it would probably not have been necessary to modify the use of the terrain, for example by planting olive groves. The *paretone* is believed to have originally constituted a field or property boundary which may, in the late Middle Ages, have also become an administrative boundary. In the points where the *paretone* has undergone partial collapse, it has become fossilised due to its colonisation by Mediterranean maquis-type vegetation.

In conclusion, the additional information provided by the archaeobotanical investigation of a dry-stone structure has allowed it to be viewed in the context of its original vegetation. This has provided material for deepening our understanding of the history and function of the artefact and its relationship to the landscape. The importance of the result is enhanced by the consideration that the *paretone* of Sava is situated in a landscape where the nature of the soil and

the depth of the aquifers –unreachable by traditional techniques– make the area unsuitable for settlement. In some periods, such areas play only a minor role in human settlement patterns while in periods of greater demographic and agrarian pressure, they are used as arable land after exhaustive removal of the stones, which are piled up in walls and other structures.

Thus, despite the absence of data on the history of settlement, the knowledge provided by the stratigraphic analysis of this structure and of the surrounding landscape indicates tendencies in terms of demographic pressure and the use of the soil in a given area, phase by phase, over a long period. In the second place, it is legitimate to assume that a better knowledge of the organisation of the agrarian landscape and the use of the soil in successive historical periods will also help to fill the remaining gaps concerning certain phases of the history of settlement, especially the early Middle Ages. Indeed, in a systemic framework, the characterization of the fields, pastures and woods (the “living space” and “places of work”) –by means of studies of this kind– enhances our understanding of the dynamics of settlement, even when the settlements themselves remain obscure due to a lack of diagnostic materials and/or adequate research programmes. Furthermore, the archaeological characterisation of rural settlement patterns and the transformations of the agrarian landscape in the area considered here can improve our understanding of the spatial, regional, economic and cultural dynamics of the northern Salento in the 7<sup>th</sup> to 9<sup>th</sup> centuries. This in turn may shed light on the whether –as has been argued– this area constituted a frontier region between the Byzantine empire and Lombard duchy of Benevento.

The study of the dry-stone walls of central and southern Puglia in accordance with the methods outlined here has thus proved to be a valid approach. It has produced a new series of data that opens up new hypotheses and illustrates patterns in a research context, which for the early Middle Ages had appeared somewhat paralysed due to the lack of data on the history of settlement. When such data become avail-

able, providing a diachronic vision of settlement, the archaeology of the agrarian structures will provide a useful bridge between self-contained approaches to diachronic settlement patterns, uninfluenced by other themes (Brogiolo 1995: 239), and a broader, geo-his-toric overview of the region.

## REFERENCES

- AMBROSI, A. (1990): L'architettura in pietra a secco: costruzione, progetto, tipologie (con riferimento alla Puglia). In: A. Ambrosi, E. Degano, C. Zaccaria eds. *Architettura in pietra a secco. Atti del I Seminario Internazionale (Noci-Alberobello 1987)*, Fasano, 17- 84.
- ARTHUR, P.; FIORENTINO, G.; GRASSO, A. M. (2012): Roads to recovery: an investigation of early medi-eval agrarian strategies in Byzantine Italy in and around the eighth century. *Antiquity* 86 (332), 444-455.
- ASTON, M. (1985): *Interpreting the Landscape: Landscape Archaeology in Local Studies*. London.
- BROGIOLO, G.P. (1995): Conclusioni. In: G. P. Brogiolo ed. *Città, castelli, campagne nei territori di frontiera (VI-VII sec.)*. Documenti di archeologia 6, 239-245.
- CALDO, C. (1987): *Geografia umana*. Palermo.
- CAMBI, F.; TERRENATO, N. (1994): *Introduzione all'ar-cheologia dei paesaggi*. Roma.
- CHOUQUER, G. (ed.) (1996): *Les formes du paysage, Tome I: Études sur les parcellaires*. Paris.
- CHOUQUER, G. (2000): *L'étude des paysages. Essais sur leurs formes et leur histoire*. Paris.
- DI RITA, F.; MAGRI, D. (2009): Holocene drought, defo-restation, and evergreen vegetation development in the central Mediterranean: a 5,500 year record from Lago Alimini Piccolo, Apulia, southeast Italy. *The Holocene* 19, 295–306.
- FIORENTINO, G. (2004): Il bosco di Belvedere a Supersano: un esempio di archeologia forestale, tra archeologia del paesaggio e archeologia ambientale. In: P. Arthur, V. Melissano, eds. *Supersano. Un paesaggio antico del basso Salento*, Galatina, 23-28.
- HODGES, R. (1991): *Wall-to-Wall History. The Story of Roystone Grange*. London.
- PICHIERRI, G. (1976): Il Limitone dei Greci nel territorio di Sava. *Cenacolo* V-VI, 23-29.
- RAYNAUD, C. (2003): Les systèmes agraires antiques: quelle approche archéologique?. In: S. Lepetz, V. Matherne eds. *Cultivateurs, éleveurs et artisans dans les campagnes de Gaule romaine. Matières premières et produits transformés*. *Revue Archéologique de Picardie* 1/2, 281-298.
- SERENI, E. (1962): *Storia del paesaggio agrario italiano*. Bari.
- STRANIERI, G. (2000): Un limes bizantino nel Salento? *Archeologia Medievale* XXVII, 333-355.
- STRANIERI, G.; NAPOLITANO, C. (2009): Un approccio geoarcheologico alle delimitazioni in pietra a secco della Puglia centro-meridionale. In: G. Volpe, P. Favia eds. *Atti del V Congresso Nazionale di Archeologia Medievale (Foggia – Manfredonia 2009)*, Firenze, 95-100.
- STRANIERI, G.; FIORENTINO, G.; GRASSO, A.M.; NAPOLITANO, C. (2009): Organizzazione e trasformazioni dei paesaggi agrari medievali nel Salento. Un approccio archeologico e archeobotanico allo studio di una delimitazione agraria in pietra a secco (Sava – Taranto). *Archeologia Medievale* XXXVI, 259-271.