

Dipartimento di Scienze della Vita

LPP - Laboratorio di Palinologia e Paleobotanica





Humans and environmental sustainability: Lessons from the past ecosystems of Europe and Northern Africa

14th Conference of Environmental Archaeology 2018

Modena, 26-28 February 2018



Edited by Assunta Florenzano, Maria Chiara Montecchi, Rossella Rinaldi

UNDER THE PATRONAGE OF







MUSE





Regione Emilia-Romagna



Contents

Presentation

management

SESSION 1 DETECTING HUMAN IMPACT: THE ABG (ARCHEO-BIO-GEO) RESEARCH	
<i>Mauro Cremaschi</i> Settlements, Crops, Woods. Land use and resources in a changing environment at the time of the Terramare (XVI - XII century BC, N Italy)	2
Stefano Remo Luigi Campana, Ken Saito Emptyscapes: filling an 'empty' Mediterranean landscape mapping the archaeological continuum	8
Ladislav Smejda Recent surveys of ancient human impact on soil chemistry in Messara Plain, Crete	16
Alessandro Panetta, Valentina Pescini, Roberta Cevasco, Nicola Gabellieri, Carlo Montanari, Diego Moreno Towards an Environmental Resources Archaeology, escaping from site (and 'off-site')	19
<i>Petr Pokorný, Petr Šída, Lucie Juřičková, Michaela Ptáková, Jan Novák, Přemysl Bobek</i> 1st millennium BC forest ecosystem transformation in Bohemian sandstone areas: Were humans involved?	22
SESSION 2 DETECTING HUMAN IMPACT: THE ABG (ARCHEO-BIO-GEO) RESEARCH	
<i>Emanuele Vaccaro, Michael MacKinnon, Anna Maria Mercuri Mercuri</i> Cultural landscape and local economy in central Sicily: Philosophiana between the Roman and Middle Byzantine periods	26
Assunta Florenzano Palynological approach to pastoral activities reconstructions in S Italy: a palaeoecological contribution to support biodiversity awareness	30
Mauro Rottoli, Michele Bassetti, Nicola Degasperi, Nicoletta Martinelli, Roberto Micheli Agriculture, forestal resources and Late Neolithic daily life at the pile-dwelling site of Palù di Livenza (NE Italy)	33
Roberto Micheli, Michele Bassetti, Federico Bernardini, Nicola Degasperi, Vanni Lughi, Mauro Rottoli, Lisa Vaccari, Franco Zanini Chewing tar at the Late Neolithic pile-dwelling site of Palù di Livenza (NE Italy)	36
Jitka Kosňovská, Věra Čulíková, Veronika Komárková, Adéla Pokorná, Jaromír Beneš Structure and useful plant dynamics on Prague Castle: archaeobotanical and ethnohistorical perspective	41
SESSION 3 LONG-TERM ENVIRONMENTAL RECONSTRUCTION FOR LANDSCAPE MANAGEMENT	
Yannick Miras, Michela Mariani, Paul M. Ledger, Léo Chassiot, Marlène Lavrieux Holocene vegetation dynamics and land-cover estimates in Auvergne: key tools to landscape	45



Reves Luelmo-Lautenschlaeger, José-Antonio López-Sáez, Sebastián Pérez-Díaz	
A mid-mountain landscape shaped during fourteen centuries in the heart of Toledo Mountains (central Iberia): the Bermú peat bog record	48
<i>Chiara Molinari, Carlo Montanari</i> The disappearance of cultural landscapes: the case of wooded-meadows in the Ligurian Apennines (NW Italy)	51
Alessandra Benatti, Marie Bal, Philippe Allée, Giovanna Bosi, Anna Maria Mercuri The past plant ecosystems of Northern Apennines inferred from soil charcoal analysis	55
<i>Lisbeth Prøsch-Danielsen, Christopher Prescott, Erik Daniel Fredh</i> Land-use change and exploitation of outfield resources at the Høg-Jæren plateau, SW Norway, during the last 6500 years	58
<i>Tomasz Kalicki, Mariusz Chrabąszcz, Igor Maciszewski, Paweł Przepióra</i> Impact of the Lusatian culture on landscape of last glaciations area: a case study from the upper Drwęca river basin (N Poland)	60
SESSION 4	
NORTHERN AFRICA ARCHAEO-ENVIRONMENTAL CHANGES	<i>.</i>
Savino di Lernia, Isabella Massamba N'Siala, Anna Maria Mercuri, Andrea Zerboni Etaghas: an unprecedented evidence for agricultural landuse in the hyperarid central Sahara	64
<i>Kathleen Nicoll</i> "Mind the Gap" to Reconstruct Patchy Records of Archaeology & Environmental Changes in the NE Sahara	68
Rocco Rotunno, Rita Fornaciari, Michela Boscaini, Anna Maria Mercuri, Savino di Lernia Herding Barbary Sheep in Early Holocene Sahara	72
Monika Baumanova (Pre)colonial urban sustainability in coastal Africa: environmental and social aspects	75
SESSION 5 MEDITERRANEAN ARCHAEO-ENVIRONMENTAL CHANGES	
<i>Erica Rowan</i> Adding fuel to the fire: Archaeobotanical evidence for olive pomace use at Roman Utica	78
Carlo Beltrame, Alessandra Forti, Michele Maritan, Antonella Miola, Paolo Mozzi, Alessandro A. Rucco, Andrea Vavasori Multidisciplinary research in naval archaeology: the shipwreck of Santa Maria in Padovetere (Ferrara N Italy)	81
Arthur Glais, José-Antonio Lopez-Saez, Laurent Lespez, Zoï Tsirtsoni, Pascal Darcque Contributions of a multiscalar approach to human-environment relationships reconstruction, around the tell of Dikili Tash (Greece)	83
Goce Naumov Dryland Tells in Wetlands of Macedonia: Pelagonia and the site of Vrbjanska Čuka as case study	86
Jaromír Beneš, Goce Naumov, Tereza Majerovičová, Kristýna Budilová, Ivana Živaljević, Vesna Dimitrijević, Jiří Bumerl, Veronika, Komárková, Jaromír, Kovárník, Michaela	0.1



SESSION 6 RECOSTRUCTING PAST LANDSCAPE: FLORA INSIGHTS FROM ARCHAEOLOGICAL SITES Adéla Pokorná, Petr Kočár, Veronika Komárková, Tereza Šálková, Pavla Žáčková, Zdeněk 95 Vaněček Growing diversity of archaeophytic flora as a consequence of progressive habitat diversification in Central Europe 99 Adriano Stinca, Massimo Ricciardi The wild vascular plants buried by the 79 AD eruption of Vesuvius Alessia D'Auria, Gaetano Di Pasquale 101 The recent history of cypress (Cupressus sempervirens L.) in Italy: archaeobotanical data from the Ancient Campania Claudia Moricca, Laura Sadori, Alessia Masi, Lia Barelli, Raffaele Pugliese 105 Archaeobotanical analysis of a pit in Santi Quattro Coronati, Rome Federica Maria Riso, Rossella Rinaldi, Stefano Vanin, Donato Labate, Giovanna Bosi 107 Multiproxy approach for the analysis of the Roman funerary ritual in *Mutina* (N Italy) Marlies Außerlechner, Andreas Putzer, Klaus Oeggl 110 Bronze and Iron Age pit-fillings of high-alpine burnt offering sites **SESSION 7 INTERDISCIPLINARY** FOR ENVIRONMENTAL ARCHAEOLOGY **METHODS INTERPRETATION** 115 Gianluca Quarta, Lucio Calcagnile AMS Radiocarbon dating for the study of past ecosystems: consolidated tools and recent developments Federico Lugli, Anna Cipriani, Giulia Capecchi, Stefano Ricci, Francesco Boschin, Paolo Boscato, Stefano Benazzi, Annnamaria Ronchitelli 117 Human mobility across the Last Glacial Maximum: enamel Sr isotopes from Grotta Paglicci (S Italy) 119 Pietro Minissale, Saverio Sciandrello Insights on some East/South Mediterranean species in Italian Flora: natural presence or Greek/Phoenician heritage? Marta Mariotti Lippi, Anna Maria Mercuri, Bruno Foggi 121 "Mediterranean forest": towards a better definition for vegetation history 124 Mark Robinson, Jonas de Souza, Iriarte Jose Human-induced spread of 'Araucaria' forest out of their natural range in the southern Brazilian highlands Jose Iriarte 127 What can pre-Columbian polyculture agroforestry systems tell us about sustainable Amazonian futures? Tales from Amazonian Dark Earths and the 'Geoglyph Builders'



SESSION 8

ENVIRONMENTAL SUSTAINABILITY IN A CHANGING WORLD: LESSONS FROM THE PAST	
Scott Mensing, Irene Tunno, Anna Maria Mercuri, Elda Russo Ermolli, Laura Sadori, Edward Schoolman, Gianluca Piovesan Historical ecology and sustainable forest management: revealing key periods in the landscape transformation of the Italian peninsula	131
<i>Filippo Brandolini, Mauro Cremaschi</i> Medieval environmental changes and flood management in the Central Po Plain (N Italy)	133
Mauro Paolo Buonincontri, Pierluigi Pieruccini, Carmine Lubritto, Giovanna Bianchi, Gaetano Di Pasquale The beginning of new farming system (mid-9th century AD): local fire events and vegetation changes in southwestern Tuscany	137
Valentina Pescini, Alessandro Panetta, Nicola Gabellieri, Roberta Cevasco, Carlo Montanari The Environmental Resource Archaeology (ERA) approach: Punta Mesco case study (Liguria, NW Italy)	143
POSTER SESSION	
Mauro Cremaschi, Anna Maria Mercuri, Giorgio Baratti, Federico Borgi, Filippo Brandolini, Stefano Costanzo, Michele Degli Esposti, Ilaria Isola, Elena Maini, Guido Stefano Mariani, Angela Mutti, Noelle Provenzano, Eleonora Regattieri, Paola Torri, Giovanni Zanchetta, Andrea Zerboni The site of San Michele di Valestra: new evidence of Apennines exploitation during the Bronze Age (XV–XII cent. BC, Northern Italy)	147
Anna Maria Mercuri, Assunta Florenzano, Eleonora Rattighieri, Elisa Furia, Paola Torri, Mauro Cremaschi The palaeoenvironmental reconstruction of the Terramara Santa Rosa di Poviglio from the Bronze Age to the XVIth century AD (SUCCESSO-TERRA project)	150
Eleonora Clò, Marta Mazzanti, Paola Torri, Maria Chiara Montecchi, Anna Maria Mercuri, Mauro Cremaschi First palynological data from the "Vasca Inferiore di Noceto", an artificial mire of the Bronze age in the Po Plain	152
Rossella Rinaldi, Barbara Proserpio, Elisabetta Castiglioni, Mauro Rottoli, Marta Bandini Mazzanti, Giovanna Bosi Seeds/fruits data from the "Vasca Superiore di Noceto", an artificial mire of the Bronze Age in the Po Plain	155
Giovanna Bosi, Paola Torri, Anna Maria Mercuri, Rossella Rinaldi, Maria Chiara Montecchi, Assunta Florenzano, Marco Marchesini, Marta Bandini Mazzanti Mutina splendidissima: archaeobotanical data reveal the history of a town	157
Marta Bandini Mazzanti, Giovanna Bosi Wetland plants from archaeological sites of Ferrara (Emilia-Romagna, Northen Italy)	160
Maria Chiara Montecchi, Eleonora Rattighieri, Paola Torri, Assunta Florenzano, Daniele Dallai, Emanuele Vaccaro, Anna Maria Mercuri The environmental perspective from the Late Antique archaeological context of Villa del Casale and Philosophiana (central Sicily)	161
Anna Maria Mercuri, Eleonora Rattighieri, Rossella Rinaldi, Assunta Florenzano, Emanuele Vaccaro, Kimberly Bowes	166



219

The plant landscape of Roman Tuscany and the Peasant Agricultural Strategies in the Cinigiano	
area	

Andrea Bertacchi, Neva Chiarenza, Monica Baldassarri Archaeobotanical finds from the Brina medieval castle in the lower Magra valley (La Spezia - Italy): first results	168
Francesco Ciani, Lorella Dell'Olmo, Marta Mariotti Lippi, Bruno Foggi Land cover and land use change in the archaeological sites of the Prato province (Tuscany, Italy)	173
Ivana Pravcova, Petra Houfkova, Jan Horak, Adela Pokorna, Tomas Besta, Jan Novak, Tomas Klir The dynamics of non-forested area in Ore Mts.: An effect of a short-lived medieval village on local environment	176
Lenka Parvoničová Archaeological evidence of Pinus halepensis, P. brutia and P. pinea in Ancient Thrace	178
Michaela Latkova, Mária Hajnalová, Pavol Eliáš (jun.) On the question of the grapevine cultivation origin in Moravia	180
Mariano Ucchesu, Marco Sarigu, Oscar Grillo, Alessandro Usai, Gianfranco Venora, Diego Sabato, Gianluigi Bacchetta Could seed image analysis be helpful in the archaeobotanical studies? The case of Vitis	184
Marco Sarigu, Mariano Ucchesu, Oscar Grillo, Alessandro Usai, Ignazio Sanna, Carla del Vais, Guy d'Hallewin, Giovanna Bosi, Gianluigi Bacchetta Image analysis technique for the identification of archaeological 'Prunus' fruit-stones of Sardinia	188
<i>Diego Sabato, Leonor Peña-Chocarro</i> New tool for identification of Mediterranean plant diaspores	191
Sławomir Chwałek, Tomasz Kalicki, Marcin Frączek, Paweł Przepióra, Piotr Kusztal Environmental conditions of ancient Paphos and the region - geoarchaeological research in SW Cyprus	195
Cristiano Vignola, Alessia Masi, Laura Sadori Stable isotope analysis between archaeology and palaeoenvironment: the case of Arslantepe (Turkey)	198
Andrea Zerboni, Kathleen Nicoll, Mauro Cremaschi A geoarchaeological perspective on human-environmental sustainability in arid lands of North Africa	201
<i>Rita Fornaciari, Anna Maria Mercuri, Laura Arru, Savino di Lernia</i> Archaeobotany and ancient biomolecules from the Early and Middle Holocene wild cereals in central Sahara	203
List of Authors	207

Keywords	
----------	--

Cultural landscape and local economy in central Sicily: *Philosophiana* between the Roman and Middle Byzantine periods

Emanuele Vaccaro¹, Michael MacKinnon², Anna Maria Mercuri³

¹University of Trento (Italy), ²University of Winnipeg (Canada), ³University of Modena and Reggio Emilia (Italy)

Email address: emanuele.vaccaro@unitn.it

Keywords: integrated approach, longue durée, economic change, farming practices

Introduction

Begun in 2009, the *Philosophiana* Project focuses on the urban-style settlement and *mansio* of Sofiana and on its environs in central Sicily, at only six aerial kilometers from the Villa del Casale at Piazza Armerina, one of the richest and most famous late Roman villa of the western Mediterranean (Vaccaro and La Torre 2015). The project, currently directed by the Universities of Messina and Trento, uses the case study of Sofiana to investigate settlement and economy of the interior of Sicily, which in Late Antiquity became of strategic importance for the grain supply of Rome. The crucial role of inland Sicily as the main wheat supplier of Rome continued in the early medieval period, when the Church owned large land estates in this region. Through the application of an interdisciplinary approach the project tackles the reconstruction of settlement and economic patterns in the long period between the early imperial and the Middle Byzantine period (1st century BC-9th century AD) and aims to investigate the impact of local economic strategies on the cultural landscape (Bowes et al. 2011; Vaccaro 2013, 2017).

Materials and Methods

Initially the project used archaeological field walking and geophysical surveys, integrated with GIS analysis, to define the size of the buried site of *Philosophiana* and reconstruct its phases of expansion and shrinkage in the *longue durée* (Fig. 1). At the same time, field survey was extended to the hinterland of the large site with the aim of investigating the settlement network around it and possible economic relationships between central place and smaller rural sites in the diachrony. Subsequently, in 2012, excavation was begun at *Philosophiana* and focused on the northern district of the site, where continuing occupation between the late 1st century BC and the early 13th century was detected.

Research focused particularly on the architectural, topographic and functional transformations occurred at the excavated area over its long-term use and material culture, with particular emphasis on pottery, was analysed in great detail to reconstruct the site's connections with the local, regional and Mediterranean markets. Ceramic study took also advantage of the application of minero-petrographic and residue analysis to determine the source and content of some of the most challenging amphorae. Indeed, the study of Mediterranean amphorae has been of fundamental importance to understand the extent to which imported foodstuff integrated the local diet.

In 2013, excavation was extended to the immediate environs of Sofiana, in an area east of the site, where part of a Middle-Byzantine (early 8th-mid 9th century AD) large craft-working district specialised in the production of good quality tableware, storageware and small amphorae. Since the beginning of excavation, great importance has been given to the application of the bioarchaeological approaches for the study of local agrarian practices, animal husbandry and, overall, the ways in which the large site of Sofiana impacted on the cultural landscape. Therefore much effort has been done to collect and analyse both archaeobotanical and faunal materials. Archaeobotany has so far focused on pollen analysis from the

uninterrupted sequence of occupation of the site between the Augustan and Swebian periods (see Methods in Mercuri et al. in press). The zooarchaeological datasets cover the same period.



Figure 1 - Aerial view of previous and ongoing excavations at the "monumental" área of Philosophiana

Results and Discussion

Despite the site originated as a small town in the Augustan period, it experienced its largest expansion between the 4th and 5th centuries AD, when it reached 21 ha in size. However, compared to the early and mid Roman periods when the main occupation concentrated in the northern district, the site developed particularly towards south, east and west. At the time of the construction of a large bath-complex in the age of Constantine, part of the northernmost area of the site had already been abandoned. The period between the 4th and 5th centuries also coincided with an increase of small rural sites in the environs of the central place. Their surface features suggest that they are interpreted as outbuildings and small houses rather than actual farms. These may have been seasonal sites used in periods of more intensive farming activities. In the 8th and 9th century AD, when the site shrank to almost half of its former size, it probably lost its

centripetal force as most of the rural settlements in the environs clustered more distantly from it and occupied a new ecological niche, particularly rich in water, and more suitable for intensive agrarian practices.

The palynological evidence shows a landscape characterised by significantly low forest cover in all periods, suggesting a wider availability of cultivable fields than nowadays. The importance of cereal production seems to have been a long-lasting pattern as one would expect for this area of Sicily. However, the impact of crop production progressively decreased from the later 7th century AD onwards; this phenomenon is even more marked in the 10th and 11th century AD. *Olea* is documented in all periods, although its importance seems to have increased from the Middle-Byzantine period onwards. Interestingly, *Vitis vinifera* is first documented in the early/mid Roman period, and again with very low values both in the later 3rd-early 4th AD and between the late 6th and mid 7th century AD. It has not been so far documented in early medieval contexts but reappears in one dated from the 10th-11th AD. The landscape around *Philosophiana*, according to the pollen evidence, was constantly characterised by pastureland with a possible increase after the 7th century.

The study of faunal remains suggests the importance of local mixed animal husbandry and regular access to meat consumption by people living at the site. This emphasis on animal husbandry parallels the impact of pastureland around the site. Pig production reached its apogee in the early/mid Roman period and decreased in Late Antiquity to peak up again from the 10th/11th century AD. Sheep/goat (with an emphasis on sheep), although well documented in the early and mid Roman contexts, increased in Late Antiquity, whereas cattle (mostly used as draft animals) slightly dropped after the Roman period, possibly as a consequence of the fact that agricultural lands were increasingly given over to pasturage into Late Antiquity and the medieval age. The study of butchery age of the three main domesticated taxa shows a higher incidence of young animals being part of the local diet in the early and mid Roman periods then in later times, suggesting more sophisticated eating practices between the 1st and 3rd century AD. The study of material culture allows us to move from the local scale and understand the long-distance economic connections of the site. According to ceramics, Mediterranean connections increased from the 2nd/3rd century AD onwards and during Late Antiquity the site came to play a crucial role as a commercial hub for the redistribution of Mediterranean commodities (particularly from Tunisia) to the island's interior.

Conclusions

The integration of a wide-range of archaeological and bioarchaeological approaches to the study of *Philosophiana* and its hinterland is allowing us to move away from a traditional site-centered analysis towards a more in-depth understanding of the interrelations between local communities and the cultural landscape.

A territory of central Sicily that, on the basis of textual sources, has been traditionally associated to large-scale grain production for Rome is revealing a wider diversification of production activities in which mixed animal husbandry played a major role. At the same time the consistent presence of *Olea* pollen suggests the importance of this cultivation in the hinterland of the site. Moreover, the local economy also took advantage of the integration of *Philosophiana* in the Mediterranean systems of trade and made the site particularly important for the redistribution of maritime imports. When the economic links with Tunisia were interrupted at the end of the 7th century AD, the persisting economic vibrancy of the site is demonstrated by the fact that it developed its own production of good quality ceramics and particularly of small transport amphorae possibly used to trade local surplus of agricultural produce such as olive oil and/or wine.

Acknowledgements

Archaeological research at *Philosophiana* is co-directed by Dr Emanuele Vaccaro and Prof. Gioacchino Francesco La Torre (University of Messina) through an excavation permit released by the Assessorato Regionale dei Beni Culturali e dell'Identità Siciliana (Regione Sicilia). The authors would like to thank Eleonora Rattighieri who carried out pollen analyses in the site, and Maria Chiara Montecchi, Paola Torri, Marta Mazzanti e Assunta Florenzano for palynology in the area. The authors are also grateful to Professor Kimberly Bowes (UPenn) for promoting the project at the very beginning and to all the Italian and English archaeologists and students who made the project possible. Particular thanks to Marco Sfacteria, Elisa Rizzo, Francesco Russo, Marica Sergi, Patrizia Siclari, Viviana Spinella and Rosa Torre who participated actively to both field work and lab research.

References

BOWES, K., GHISLENI, M., LA TORRE, F., VACCARO, E. 2011: Preliminary report on Sofiana/mansio Philosophiana in the hinterland of Piazza Armerina. Journal of Roman Archaeology 24, 423-449.

MERCURI, A. M., MONTECCHI, M. C., FLORENZANO, A., RATTIGHIERI, E., TORRI, P., DALLAI, D., VACCARO, E. in press: The Late Antique plant landscape in Sicily: Pollen from the agro-pastoral Villa del Casale – Philosophiana system. Quaternary International: Doi:10.1016/j.quaint.2017.09.036.

VACCARO, E. 2013: Patterning the Late Antique Economies of Inland Sicily in a Mediterranean Context. Late Antique Archaeology Series 10 (Local Economies? Production and Exchange of Inland Regions in Late Antiquity), 259-314.

VACCARO, E. 2017: *Philosophiana* in central Sicily in the late Roman and Byzantine periods: settlement and economy. In Moreland, J., Mitchell, J., Leal, B. (Eds.): Encounters, Excavations and Argosies: essays for Richard Hodges. Archaeopress, Oxford, 300-313.

VACCARO, E., LA TORRE, G. F. (Eds.): La produzione di ceramica a *Philosophiana* (Sicilia centrale) nella media età bizantina: metodi di indagine ed implicazioni economiche. Archeologia Medievale 42, 53-91.

Scientific Committee

Anna Maria Mercuri – Università di Modena e Reggio Emilia Laura Sadori – Università La Sapienza Roma Marta Mariotti Lippi – Università di Firenze Andrea Zerboni – Università di Milano Mauro Cremaschi – Università di Milano Gianluca Piovesan – Università della Tuscia Savino di Lernia – Università La Sapienza Roma Giovanna Bosi – Università di Modena e Reggio Emilia Assunta Florenzano – Università di Modena e Reggio Emilia Emanuele Vaccaro – Università di Trento Alessia Masi – Università La Sapienza Roma Lucio Calcagnile - CEDAD, Università del Salento Jaromír Beneš - University of South Bohemia Petr Pokorný - Charles University Prague Ladislav Šmejda – Czech University of Life Sciences Prague Yannick Miras – Muséum National d'Histoire Naturelle Paris Katerina Kouli – National and Kapodistrian University of Athens Leonor Peña-Chocarro - Spanish National Research Council Scott Mensing - University of Nevada USA Sabine Karg - Freie Universität Berlin

Made on February 2018

Modena, Laboratorio di Palinologia e Paleobotanica Dipartimento di Scienze della Vita Università degli Studi di Modena e Reggio Emilia