

17th Conference of the International Work Group for Palaeoethnobotany

Paris, France

Muséum national d'Histoire naturelle, Jardin des Plantes

July 4-9, 2016

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ABSTRACTS: LECTURES and POSTERS

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Keywords: Neolithic, Çatalhöyük, Archaeobotany, Organic residues, Parenchyma

Assessing the nature of early farming in Neolithic western Asia: A functional ecological approach to emerging arable weed flora

Explorer les premières pratiques agricoles du Néolithique en Asie occidentale, avec l'aide de l'écologie fonctionnelle appliquée aux flores adventices émergentes

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Research on the origins of agriculture in western Asia has placed great emphasis on the location and pace of domestication. However, much less attention has been given to reconstructing the specific nature and social implications of early cultivation practices across the agricultural transition, and to the potentially varied land management strategies involved. By employing a functional ecological approach to the interpretation of arable weed taxa associated with early cultivars, this research addresses this gap in archaeobotanical research by enabling detailed analysis of the growing conditions and farming methods involved in early plant cultivation in western Asia.

The core methodology analyses the functional ecological attributes (e.g. leaf area and thickness; canopy dimensions; stomatal density and distribution) of the relevant arable weed taxa isolated from archaeological contexts to determine the specific growing conditions of early crops and hence the nature of management practices. Functional attributes are morphological or behavioural characteristics that predict species' potential in relation to major environmental variables, such as soil productivity, disturbance and moisture. Statistical analysis of these attributes will explore variation amongst early cultivation contexts and compare them with weed survey data from relevant (semi-)arid modern regimes, including a recent study of traditional cereal farming in Morocco. With the identification of specific agricultural strategies, the dynamics and innovation of early farming societies will be explored, as well as their resilience and long-term sustainability.

Ecological signatures will be determined from the now substantial weed dataset available from four well documented and contextually rich Pre-Pottery and Pottery Neolithic sites, which have been strategically selected to explore agricultural strategies from its initial stages through to the established Neolithic, as well as taking advantage of detailed sample-by-sample data and extensive in situ deposits. The sites investigated include PPNA Jerf el Ahmar and PPNA/EPPNB Dja'de in northern Syria, PPNB Tell Aswad in southern Syria, and PPN-PN Çatalhöyük in Central Turkey. Refined identification of selected weed genera at these sites enables more accurate indications of their ecological implications. Furthermore, the results of the ecological analyses will be closely explored in relation to other contextual data at the selected sites and will aim to determine the cultural context of specific farming practices and processing regimes.

Keywords: Weed ecology, Agricultural regimes, Early cultivation, Neolithic, Western Asia

Could seed image analysis be helpful in the archaeobotanical studies?

L'analyse d'images peut-elle être utile à la démarche archéobotanique ?

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Application of computer vision techniques in archaeological plant remains, proved to be an effective tool for the identification both of charred and waterlogged seeds. Due to its strategic geographical position, its isolation and climatic conditions, and owing to the existence of many archaeological settlements, perfectly preserved and distributed in the whole island, Sardinia can undoubtedly be considered a wonderful archaeobotanical laboratory.

In this study, the results about seed and endocarp remains, recovered from the archaeological sites of Sa Osa and Santa Giusta (Oristano, Sardinia), respectively dated to the 12th-10th BC and to the 5th-2nd century BC, are presented.

Samples digital images were acquired, processed and analysed applying image analysis techniques. A total of 98 morphometric features were measured on each seed and endocarp. The recorded morphometric data were statistically elaborated using a stepwise Linear Discriminant Analysis, allowing statistical comparisons among archaeological remains, modern wild populations and traditional cultivars.

Considering the importance of a correct remains identification for the comprehension of the history and origin of the domestication processes; and the extreme difficulties to recognize archaeological charred seeds because of the morphological alteration of seeds shape, different carbonisation experiments were carried out on grape seeds. Using both a hearth to reproduce the same burning conditions occurring in archaeological contexts, and a muffle furnace to set and fix experimental conditions, modern cultivated and wild grape seed samples were treated applying different burning temperatures and then compared with archaeological grape seeds.

This analytical procedure allowed to identify the archaeological seeds from the Middle Bronze Age as intermediate forms between modern wild and cultivated grape pips; while, those from the Late Bronze Age showed a high degree of similarity with the modern cultivars.

Furthermore, high correspondence between the archaeological endocarps of *Prunus spinosa* and *P. domestica* and the modern ones, was found, identifying the most similar modern wild populations and cultivated varieties.

The exceptional state of preservation of the waterlogged remains allowed to investigate the domestication process of *Vitis vinifera*, verifying the possibility that primitive grape cultivars might have existed in Sardinia, during the Bronze Age. Moreover, it was possible to hypothesize in Sardinia the earliest evidence of *P. domestica* in the Western Mediterranean Basin, during the Phoenician-Punic period. This method can be considered a valid support for advances in the knowledge and comprehension of agriculture adoption and domestication

processes.

Keywords: Carbonisation experiment, Computer vision, *Prunus domestica*, Seed remains identification, *Vitis vinifera*

Tracing the origin of the early medieval crop spectra in east central Europe. Ex oriente lux ?

Sur la piste de l'origine du spectre des cultures du haut Moyen Âge en Europe orientale et centrale. Ex oriente lux ?

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In Europe the period spanning from the end of the Roman period (through the migration period) until the beginning of the Early Middle Ages is recognised as a time of the prominent changes in arable farming and to it connected economy. It is a moment when prehistoric assortment of "archaic" cereals represented mostly by glume wheats (*Triticum dicoccon*, *T. monococcum*, *T. spelta*) diminished and was replaced by free-threshing wheats (*Triticum aestivum*, *T. compactum*), oat (*Avena sativa*) and rye (*Secale cereale*). This rebirth of farming survived without much damage only barley (*Hordeum vulgare* s.l.) and millet (*Panicum miliaceum*), still favoured in later medieval times.

The switch from "prehistoric" to "medieval" assortment of crops and economy emerges simultaneously in western (France, Netherlands, Germany...) as well as in the east-central Europe (Poland, Bohemia, Slovakia, Hungary, Ukraine...), yet for explanation of this phenomenon national(istic) paradigms are often considered (e.g. introduction of the new crops and techniques by "Slavs", "Germans" or "Celts"). This paper aims for more detailed temporal and spatial description of this phenomenon, and targets also its possible causes.

Keywords: Archaeobotanical methods, Europe, Middle Ages, Agricultural systems, Diffusion, Trade

Ancient desert agriculture systems: The example of the monastery of Kilwa (8th century A.D.)

Agricultures anciennes en contexte désertique : l'exemple du monastère de Kilwa (8e siècle de notre ère)

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Kilwa is a monastic site inhabited by a Christian community around the eighth century A.D. The site is in a physical environment so harsh that the main object of the study is to understand how the community maintained itself in such an environment. The site is located in the northwest of Saudi Arabia, 250 km east of the Gulf of Aqaba in a mountainous region

characterized by an arid environment. The average rainfall is estimated at less than 50 mm/year excluding any dry farming. The research undertaken on the site has raised a number of questions about the subsistence strategies, modes and means of production or supply.

The archaeobotanical analyses performed on archaeological sediment samples, showed exceptional richness. The importance of fruit remains (olive, peach, date, plum stones for example) associated with the presence of olive charcoal and *Prunus*, raises the issue of whether these plants were imported or were grown locally. A multidisciplinary research program (archaeology, geophysics, sedimentology and ethnographic) has identified a number of areas suitable for agriculture and reveals the presence of systems used to harvest runoff rainwater. This research provides an array of presumptions allowing us to hypothesize that local cultivation, despite a very arid environment, was possible during the occupation of the site.

Thus the results presented here allow us to envisage an agricultural vocation for the monastic establishment, which is characteristic of monastic facilities elsewhere in the Middle East and essential to the life of the community. Furthermore, Kilwa is a good example of where agriculture exploits rainwater run-off and floodwaters. Research at Kilwa has enriched our general knowledge about the use of the environment by man and the means implemented to face strong environmental constraints in arid environments.

Keywords: Saudi Arabia, Desert, Monastery, Agriculture, Water management

Processing, Storage and Symbolism of Wild Nuts in the Past and Present: Comparative ethnoarchaeobotanical studies of Japan and California, USA

Préparation, stockage et symbolique passés et présents des "noix" sauvages. Approches ethnobotaniques comparatives au Japon et en Californie (Etats-Unis d'Amérique)

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Recent archaeobotanical research revealed the high significance of wild plant food, particularly nuts, even in early agricultural periods in Chinese rice farming area (eg. Fuller *et al.* 2009). In Japan, significance of wild nuts in prehistoric diet has been discussed for some decades, and now human exploitation of wild food plants is the central issue in discussion of East Asian prehistoric diet.

To develop the discussion, we need to reconstruct not only which plant people exploited but also how they scheduled the uses of diverse resources, and the processing and storage technique, namely routine'. Studying regional diversity and chronological shifts of the routine, we can discuss the East Asian prehistoric subsistence strategies on substantial basis. Recently some new archaeological methods such as ancient starch analyses and carbon/nitrogen isotope analyses to reconstruct food processing techniques have been developed to much contribute the discussion, but at the same time, we need to obtain knowledge about diverse ways to utilize various food resources and their interconnection with social organizations. Ethnographic research of modern traditional culture will provide such knowledge to be usefully referred to the archaeolog-