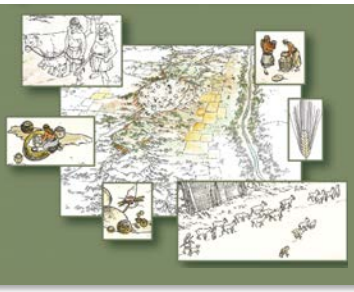


Workshop

Current Approaches to Farming and Food Practices during Late Prehistory

Aproximacions actuals a les pràctiques agroalimentàries durant la Prehistòria recent

4 October Sala de Juntes, 2ona planta
Facultat de Lletres, Universitat de Lleida, Pl. Víctor Siurana, 1, Lleida

5 October EcoCentre "Les Obagues", Partida Secanet s/n, Juneda

Grup d'Investigació Prehistòrica GIP-UdL www.gip.udl.cat workshop.farmfood@udl.cat

PROGRAMME - Abstracts

FRIDAY 4 *DIVENDRES 4* **UNIVERSITAT DE LLEIDA, LLEIDA**

9,30-10,00: Presentation *Presentació*

SESSION: FARMING PRACTICES *PRÀCTIQUES AGRÀRIES I RAMADERES*

10-10,30: Michael Charles (School of Archaeology, University of Oxford)

Functional Interpretation of Weed Floras in relation to Husbandry Practices: cultivation intensity, fallow, crop rotation regimes

Reconstructing ancient farming systems is important for understanding past societies. The way in which land, plant, animal and human resources are utilised to produce food reveals much about the ecology, politics and resilience of a society. While crop species tend to be generalised in their ecological preferences, the weed floras that develop in crop fields provide a highly specific reflection of growing conditions and land management practices employed. Modern weed floras associated with different traditional crop growing regimes have been analysed in terms of the functional ecology of the weed species represented. Contrasting husbandry regimes (e.g. irrigation/dry farming, intensive/ extensive cultivation, autumn/spring sowing) can be distinguished on the basis of weed functional attributes. This talk demonstrates how present-day studies of arable weed ecology, can be applied to the identification of past crop husbandry regimes on the basis of archaeobotanical weed assemblages in a series of archaeological case-studies. The use of crop stable isotopes to further refine models of past-farming systems is also, briefly, considered.

10,30-11: Mònica Aguilera, Jordi Voltas (ETSEA, Universitat de Lleida)

Disentangling the use of stable isotopes of archaeobotanical and archaeozoological remains for past environmental and agricultural reconstructions

Recently the use of stable isotopes of carbon and nitrogen has become widespread in archaeobotanical studies to inferring past climatic and agricultural conditions. In parallel, stable isotopes have been applied to archaeozoological remains for studying the living conditions of animals and to retrieve past diet information. Although a number of methodological aspects should be considered to ensure applicability to archaeological remains, the potential of stable isotopes is nowadays widely acknowledged. As a result of increasing interest in the reconstruction of past climate and crop conditions, recent studies have combined both approaches as they provide complementary information about crop fertility and the use of manure from domestic animals. In

addition, the use of a multispecific approach applied in plants and animals can reveal how cropping systems interacted with animal husbandry. Currently, studies focused on stable isotopes of strontium, oxygen and deuterium have been presented as promising tools in this research field but, simultaneously, new methodological challenges arise that need appropriate consideration.

11-11,30: **Sílvia Valenzuela Lamas, Ariadna Nieto (Archaeology of Social Dynamics, Institució Milà i Fontanals, Consejo Superior de Investigaciones Científicas (IMF-CSIC)**

Livestock mobility in Western Europe in Late Prehistory and Roman times: methodological challenges and preliminary results

The study of animal mobility in archaeology has experienced a huge development in the last few years following the generalisation of chemical analyses (e.g. ancient DNA and isotopic studies). In this presentation we will focus on strontium isotopic data from cattle and caprines (sheep and goats) to provide an insight to the degree of livestock mobility at different archaeological sites and chronological periods from Late Prehistory to Roman times. In addition, we will present the approach we are developing in the ERC-StG ZooMWest (Zooarchaeology and mobility in the Western Mediterranean from the Late Bronze Age to Late Antiquity), as well as the methodological challenges we faced and how we are addressing them.

11,30-12: COFFEE BREAK *PAUSA CAFÉ*

12-12,30: **Emilie Blaise (CNRS-UMR 5140)**

Herding practices during Late Prehistory: An overview and future perspectives of the methods for estimating mortality age and the seasons of birth and slaughter

Domestic herds at the end of the Neolithic were the source of almost all of the animal protein (meat, milk, fat) of the human diet. But there are several ways of managing a flock depending on environmental and climatic contexts, animal physiology, and the requirements and traditions of each human group. A mastery of certain techniques is necessary to ensure animal nutrition, protection, care and reproduction. These are based on knowledge transmitted or acquired by observing animal physiology and behaviour, as well as that of climate and plants. It also implies a certain know-how of demographic management, in particular, to ensure herd renewal.

It is a question of identifying the reasoning behind the slaughter of the each flock based on the types of animal products so as to attempt an approach the nature of the economic system. Analyses of consumption patterns and demographic management of herds also partly reflect the social organisation of ancient human groups.

The birth season determines the pace of breeding and the availability of animal resources. Defining the season of birth renders it possible to estimate the time of the year of slaughter and thus advance hypotheses as to the periods of occupation of seasonal settlements.Estimating the age of mortality from teeth is a key parameter in addressing the question of herd management. Isotopic analyses, in turn, complement these studies by specifying notably man's choices in terms of reproduction and particularly the season of birth.

After a cursory listing of the methods adapted to this area of study, a point is advanced as to the use of current dental and osteological techniques intended to test, validate and improve the methods and on new perspectives that these tools offer.

12,30-13: **Claire Delhon (Université Côte d'Azur, CNRS-CEPAM) & Lucie Martin (University of Geneva, Laboratory of Prehistoric archaeology and Anthropology & EDYTEM, UMR 5204, University of Savoie Mont-Blanc)**

Contribution of the Bioarcheology of the coprogen deposits to the knowledge of ancient pastoralism: the caves sheepfolds in the South of France

In the South of France, many Neolithic and Bronze Age "sheepfold caves" have a sedimentary filling largely composed of fossil dung. These coprogenic deposits carry a wealth of information about the life of the herders and their flocks, and therefore about pastoral systems: site status, mobility systems, seasonality, pastoral practices, etc. These dung levels constitute a record at the interface of fauna, flora and human practices.

Since the early 80's, archaeologists pinned great hope upon these contexts for the improvement of the understanding of ancient pastoral systems, and drew the attention of bioarchaeologists, mainly archaeozoologists and anthracologists on "sheepfold caves".

Few decades later, macroremains analyses, either of plant or animal remains, have accumulated a great amount of data. Nevertheless, integrated, holistic syntheses remain difficult to draw and several aspects of the pastoral systems are still very difficult to apprehend by usual bioarchaeological tools.

Based on this observation, we have recently been developing a whole set of innovative approaches of dung layers from sheepfold caves currently or recently excavated. In addition to the range of "classical" bioarchaeological approaches (archaeobotany: charcoal, macroremains, pollen and archaeozoology), phytolithic analysis, cementochronology, determination of the isotopic composition (C, N) of animal bones and cultivated plant seeds, as well as sedimentary DNA analysis are currently carried out on the site of Pertus 2 (Alpes-de-Haute-Provence, Southeastern France; Middle and Final Neolithic).

Our presentation aims at presenting a survey of the bioarchaeological and biochemical analysis that have been applied so far to coprogen deposits from pastoral sites, either from our past and ongoing research or from published studies. The potential and limitations as well as the scope of interpretation of each method individually will be discussed, as well as the most efficient way to set up multiproxy approaches.

13-13,30: Discussion *Discussió*

13,30-15: LUNCH *DINAR*

SESSION: FOODWAYS *PRÀCTIQUES ALIMENTÀRIES*

15-15,30: **Natàlia Alonso (Universitat de Lleida), Armelle Gardeisen (CNRS-UMR 5140)**

Management of food resources: integrating archaeobotanical and zooarchaeological data

Research on food practices, resources and their daily management requires integrating different related archaeological data. Food practices are part of a "whole" which implies the necessity of resorting to a combination of animal and plant raw materials, and to a combination of conservation and processing techniques. The nature of the species and the parts consumed, and how they were obtained and processed, are key issues in securing a comprehensive approach to food management.

Archaeobotanical and zooarchaeological analyses have traditionally been carried out separately when studying archaeological sites, and rare are the attempts to blend the data. It is complex to integrate the findings

due, above all, to the biases stemming from the problems of conservation and taphonomy of the different types of bioarchaeological remains, as well as to the differing strategies of sampling applied by each of the archaeological disciplines.

This presentation, based on analyses carried out at the Protohistoric settlement of *Lattara* (Hérault, France), a site with a long tradition of interdisciplinary research, offers a bioarchaeological approach to food practices in several of the city's quarters from the perspective of the themes of supply, storage, preparation, consumption and subsequent treatment of waste.

15,30-16: **Marian Berihuete (Universität Hohenheim), Inés López-Dóriga (Wessex Archaeology), Amaia Arranz Otaegui (University of Copenhaguen), Juan Ochoa (Universidad Nacional de Río Negro)**

Neither fruit nor seeds: USOs, the other vegetable foods forgotten by Archaeobotany

Tubers and other underground plant storage organs (USOs) are important staple foods, as well as sources of raw materials, for a multitude of hunter-gatherer groups and farming communities around the world. However, to date the information to assess the extent to which USOs contributed to diet and subsistence activities in the past is limited. The visibility of USOs in the archaeological record is low and severely biased by three main factors: the overwhelming importance given by archaeobotanical studies to other plant resources such as domesticated cereals and legumes; the low number of researchers trained in their identification, and the potential problems of preservation and disintegration of USOs during routine processes of recovery of archaeobotanical remains, such as sediment flotation. We offer a critical view of the state of the question of USOs studies by archaeology, while exploring some of the reasons that explain the current situation. We also suggest some solutions to overcome the most common problems faced by archaeobotanists when analyzing this type of remains and, likewise, we propose alternative approaches that we hope will help to trace future lines of research for these almost invisible plant resources.

16-16,30: **Ferran Antolín with the collaboration of Marguerita Schäfer, Stefanie Jacomet and Jörg Schibler (IPNA, Universität Basel)**

From waste to taste: estimating the caloric contribution of plant and animal resources to human diet in well-preserved waterlogged sites

Prehistoric lakeshore settlements are known for their extraordinary preservation conditions and richness in plant and animal remains, which probably reflect at its best past on-site activities. This advantage, together with their precise dating thanks to dendrochronology, has allowed authors to investigate economic practices to an unprecedented degree of chronological precision, putting forward very specific strategies to cope, for instance, with climatic crises. Pioneer work was done towards the reconstruction of the calorific contribution of plant and animal resources to the diet based on the actual archaeobiological evidence. The major limitation of these contexts is understanding the effects of taphonomy on the type and amount of preserved material as well as some significant preservation biases against certain taxa (e.g. seeds of legumes).

Recent investigations at the lakeshore site of Zürich-Parkhaus Opera (Switzerland, dendrodated to ca. 3165 BC) have allowed a major step forward in the reconstruction of the taphonomic history at the site (SNF Project: CR30I2_149679/1) and consequently, of the diet of its inhabitants. A systematic sampling strategy allowed the recovery and identification of over 200'000 plant remains and 15’000 animal bone fragments. These data were used to estimate the total amount of plant and animal remains found at the site and eventually calculate the calorific contribution of each type of resource to human diet. It is the first time that such calculations are

possible at the scale of a village. More than 30% of the calories seem to have been obtained from wild resources (equally from plants and animals), while domestic animals could potentially provide 2/3 of the calories obtained from domestic resources.

These results will be used to re-evaluate those of other previous investigations in systematically sampled Neolithic occupations in Lake Zürich and nearby regions, in terms of the calorific contribution of plant and animal resources to human diet.

16,30-17: COFFEE BREAK *PAUSA CAFÉ*

17-17,30: Aurora Grandal (Universidade da Coruña)

Human and animal diet during the Late Prehistory through stable isotope analysis

Bone collagen is a protein that gives strength and elasticity to bones and can remain virtually unchanged over thousands of years in skeletal remains if fosildiagenetic conditions are adequate. It is synthesized from the proteins ingested in the diet, so its isotopic analysis will reflect the isotopic proportions present in the proteins of the food ingested, with a predictable variation called isotopic fractionation. Several studies have determined the range of this fractionation, which in humans is relatively broad. This is because other parameters, such as the individual's age and possible physiological particularities (growth, pregnancy, malnutrition...) also play a role in protein metabolism. Another source of variation in isotopic values is climate, through differences in temperature and precipitation, which is already observed from the base of the trophic chain. In order to correctly interpret the isotopic signatures recorded in a human individual, it is necessary to have data from other contemporary animals (wild and domestic herbivores, for example), as well as the physical characteristics of humans (age, sex, possible pathologies...). When all these data are available, isotopic analysis allows not only the reconstruction of the diet of individuals but also their way of life in a more global way.

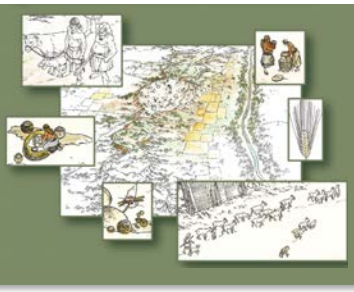
17,30-18: Alejandro Pérez (Universitat de Barcelona)

Dental microwear applied to the study of diet: methods and applications in archaeology and physical anthropology

There are several techniques to interpret the diet from fossil materials of Plio-Pleistocene hominids. Teeth robustness and size are linked to diet composition. However, the analysis of the vestibular microstriation patterns and occlusal texture of teeth reveal different nutritional models than those expected based on their anatomical adaptations. Divergent interpretations have also beed advanced depending on the type of dental microstriation technique put to use that contrast with the results of the stable isotope analysis. The analysis of the correlations between the variables of vestibular microstriation, occlusal texture and concentrations of stable isotopes reveals results that hardly coincide, which renders it difficult to interpret the food adaptation models of human populations. It is necessary to determine in which cases the different methods are applicable and to what extent they offer relevant data.

18-18,30: Discussion *Discussió*

18,30-19,30: Poster session *Sessió de Pòsters*



Workshop

Current Approaches to Farming and Food Practices during Late Prehistory

Aproximacions actuals a les pràctiques agroalimentàries durant la Prehistòria recent

SATURDAY 5 DISSABTE 5 **ECOCENTRE LES OBAGUES, JUNEDA**

SESSION: COOKING PRACTICES *PRÀCTIQUES CULINÀRIES*

9-9,30: **Andreas G Heiss (ÖAI, Austrian Academy of Sciences), Ferran Antolín (IPNA) Marian Berihuete, Hans-Peter Stika (Universität Hohenheim), Tania Valamoti (AUTH)**

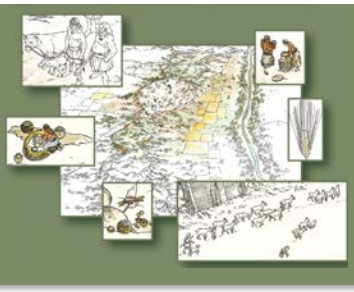
Fifty shapes of Grain: New insights on archaeological cereal products from central Europe

Remains of ancient dishes can contribute significantly to the knowledge of past dietary habits, adding cuisine as the "missing link" between crop and consumption. Charred and fragmented archaeological remains of processed cereal preparations, while long having been neglected as a find category, bear large potential for analysis just as entire archaeological "bread loaves" do. In this presentation, we try to lay out a basic "state of the art" of how such finds can be approached by analysis. Possibilities and limitations encountered in the identification and quantification of ingredients and in the observation of possible traces of food transformation processes are presented and discussed, using examples from central European archaeological finds of bread-like objects.

9,30-10: **Maria Saña, Vanessa Navarrete (Universitat Autònoma de Barcelona)**

Foodways and cooking practices during later Prehistory: an integrated biochemical and archaeozoological Approach

Food and cooking practices are fundamental in the organization of human communities, having a direct impact on the way that daily life is organized. Culinary practices are not limited to cooking alone, but include other facets related to technology and social organization, and therefore have a direct effect on the management of resources. The faunal remains from archaeological context can provide valuable information about the way meal was obtained and prepared. In this way, through the identification and classification of thermoalteration marks on bones could be possible to know how the meat portions was exposed to fire and then, how they were cooked. At the same time, the study of anatomical variability, bone morphology and breakage patterns of faunal remains can approach to differentiate between diverse work processes as narrow extraction or bone grease processing. Some new tools provide an empirical basis for their study, such as infra-red spectrometry. FTIR-ATR technique is able to characterize and evaluate the changes to the elementary composition of the bones after being exposed to heat. In the case of bones altered by heat, it can determine the proportion of organic and inorganic contents in the sample and relate that with the temperature and form of exposure to fire. This allows the cooking methods to be identified. In this communication we present an integrated analysis of faunal remains at macroscopical and chemical level, correlating the changes observed in the bone surface and the changes suffered in the chemical structure of bone. The obtained results permits to better evaluate the efficiency of the FTIR analysis in the study of the burned bones, as well as deepen in the knowledge of changes in the culinary practices and consume habits that took place during late Prehistory in the North East of the Iberian Peninsula.



10-10,30: Miriam Cubas (Universidad de Alcalá de Henares -Universidad de York)

Pottery and culinary practices during the Late Prehistory

Pottery is the main preserved technology related to culinary practices in agricultural and pastoral societies. Since the spread of ceramic vessels their function has been mostly related to processing, storage and transport of food resources. Here we report the last biomolecular techniques applied to archaeological pottery to reconstruct subsistence practices in Bronze Age sites in the north of the Iberian peninsula. Chemical and molecular analysis allow distinguishing among a wide variability of supplies from terrestrial to aquatic and the recognition of different animals fats, offering a new approach for the study of animal exploitation and management.

10,30-11: Alessandra Pecci (Universitat de Barcelona) (ERAAUB, Universitat de Barcelona)

Food production, preparation and consumption: organic residue analysis in archaeological materials

Archaeology provides important data on food practices in ancient times, both when written documents are present and when they are not enough or do not exist at all. Organic residues, trapped in the matrix of archaeological porous materials, provide further data on the theme.

Ceramic vessels, the plastered surfaces of archaeological floors, vats of production installations, earthen floors absorb the substances that came in contact with them and preserve them for centuries and millennia, and can be analysed. Thank to the chemical analysis it is possible to identify the substances that fall on the floors or were contained in ceramic vessels and therefore understand the contents of ceramic vessels, their use and function; understand the use of space and the presence of activity areas in rooms and buildings, and establish whether production installations were for wine, oil or other organic substances. Examples of the application of this research to archaeological sites in the framework of an interdisciplinary approach will be shown.

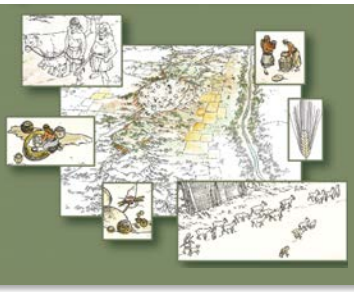
11-11,30: Coffee break *Pausa café*

11,30-12: Anne Marie Curé (Paléotime/CNRS-UMR5140)

Evolutions of pots and tableware at the Iron Age in Mediterranean Gaul: how to interpret them?

During the Iron Age, Southern Gaul is an area marked by technical and social evolutions, linked to the intensification and durability of contacts with the Mediterranean word. The fast changes observed within kitchen and table ware sets mainly result from the adoption of imported ware from the Mediterranean sphere and from the development of regional wheelmade pottery, which entailed a noticeable evolution of the traditional repertoires. Thus, these changes reflect at the same time trade flows, technical evolutions and socio-cultural choices, which must be highlighted to understand the integration of new ware within the indigenous repertoire.

Firstly, we will present an overview of kitchen and table ware in Mediterranean Gaul between the end of the 7th and the end of the 3rd century BC, paying particular attention to regional specificities, permanencies and evolutions. Then we will focus on the mechanisms of introduction of new shapes within the indigenous repertoires of kitchen and table ware: how have these new shapes been introduced, how have they been used, do they indicate an evolution of consumption practices? The analysis will include case studies both upon kitchen and table ware.



12-12,30: López, Andreu Moya, Natàlia Alonso (Universitat de Lleida)

Culinary ovens in the Protohistoric settlements of the north-east of the Iberian Peninsula: toward a socioeconomic reading

This presentation is structured in three sections. The first consists of a catalogue of 30 ovens from 15 different settlements in the north-east of the Iberian Peninsula (Ebro Valley and Catalonia) ranging between the Bronze Age and the Early Iron Age (2100 cal BC-550 BC). It is noteworthy that 10 of these features were excavated by the team making this presention.

The catalogue is followed by a typological classification of the features, highlighting two main types: ovens with chambers capped by a single vault (23 cases) and ovens with trunco-conical sections known as the Tannur type (5 cases). The remaining two cases correspond respectively to an oven with a double chamber and an oven in a large ceramic jar. The different constructive variants are also classified and emphasis is placed on the pre-colonial nature of the Tannur ovens. The presentation then focuses on the question of their function as bread ovens based on findings of interdisciplinary research, their spatial contexts and ethnographical data.

The talk, to conclude, then turns to two socio-economic questions. The first concerns the domestic or communal character of the ovens and the production of bread and, from the point of view of this duality, the potential relationship between these forms of production and the patterns of ownership of the land throughout the different Protohistoric contexts in the north-east of the Iberian Peninsula.

12,30-13: Discussion *Discussió*

13,30-15,30: LUNCH *DINAR*

OPEN ACTIVITIES *ACTIVITATS OBERTES*

16-17: Joan B. López Visit to the Museum of Bronze Age site of Minferri **Place** *Lloc*: Museu Juneda

Visita al Museu del jaciment de l'Edat del Bronze de Juneda (Juneda)

17-19: Iban Yarza **Place *Lloc*:** EcoCentre Les Obagues, Juneda

Workshop-demonstration on baking in experimental ovens in the "prehistoric" way

Taller-demostració d'elaboració i cocció de pa en forns experimentals a la manera "prehistórica"

SUNDAY 6 *DIUMENGE 6* **FORTALESA D'ELS VILARS D'ARBECA**

10-12: Visit to the Iron Age Fortress of Els Vilars (Arbeca)

Visita a la Fortalesa ibèrica d'Els Vilars (Arbeca)