Pré-Actes

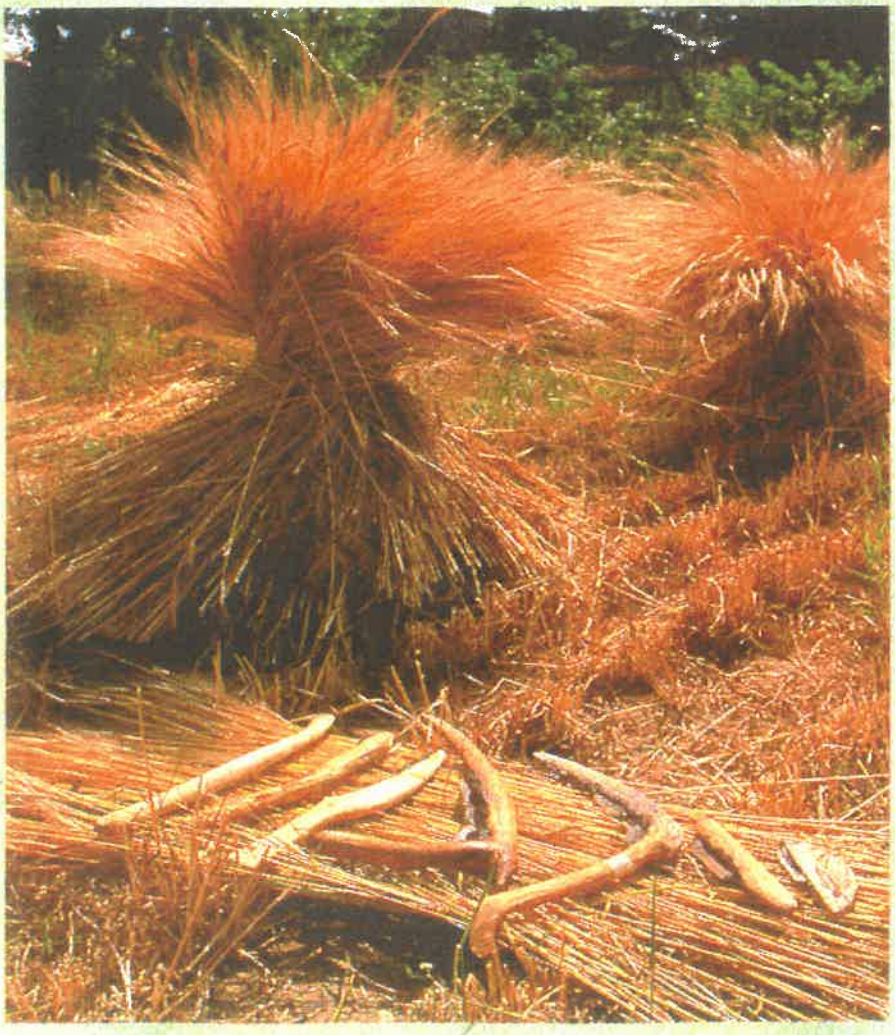
11ème Symposium

du

Groupe International de Recherche en Paléoethnobotanique

18-23 mai 1998

Toulouse, France.



Programme and Abstracts

11th Symposium

of the

International Work Group for Palaeoethnobotany

May 18th-23rd 1998

Toulouse, France.

XIème Colloque /XIth Symposium
International Work Group for Palaeoethnobotany
18 – 23 mai / 18th – 23rd may 1998
Toulouse

Comité scientifique du Colloque

Jean Guilaine (Professeur au Collège de France)
Michel Barbaza (Professeur à l'Université de Toulouse-le-Mirail)
Francis Duranthon (Conservateur au Muséum d'Histoire Naturelle de Toulouse)
Daniel Fabre (Directeur d'Etude à l'Ecole des Hautes Etudes en Sciences Sociales)
Jean-Claude Flamand (Président du Centre INRA de Toulouse)
Daniel Griess (Professeur à l'Ecole Nationale Vétérinaire de Toulouse)
Danielle Stordeur (Directrice de Recherche au CNRS)
Jean Vassal (Professeur à l'Université Paul Sabatier de Toulouse)

Liste des membres du comité scientifique de l'IWGP

C.-C. BAKELS (Prof., Pays-Bas)
K.-E BEHRE (Prof., Allemagne)
G. JONES (Chercheur, Grande-Bretagne)
S. JACOMET (Chercheur, Suisse)
M. KISLEV (Prof, Israël)
H. KROLL (Prof., Allemagne)
L. LEMPIÄINEN (Prof., Finlande)
A. SARPAKI (Chercheur, Grèce)
K. WASYLIKOVA (Prof., Pologne)
W. van ZEIST (Prof., Pays-Bas)

Organisation du XI^{0} colloque de l'IWGP

Philippe Marinval* et **George Willcox****

** Centre d'Anthropologie*
(UMR 150 CNRS, EHESS, Université Paul Sabatier, Toulouse)
56, rue du Taur
F-31000 Toulouse, France

*** Institut de Préhistoire Orientale*
(UPR 7537 du CNRS) Jalès-Berrias
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avec l'aide de / with the help of :

Centre National de la Recherche Scientifique
Ecole des Hautes Etudes en Sciences Sociales
Universite Paul Sabatier – Toulouse
Ministère de la Culture
Ministère des Affaires Etrangères
Ministère de l'Education Nationale
Conseil Général de la Haute-Garonne
Conseil Régional de Midi-Pyrénées.

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Les repas du midi peuvent être pris au restaurant universitaire Notre-Dame (rue Notre-Dame), situé à 10 min à pied de l'amphithéatre du colloque, **prix : 50 F vin inclus.**

Lunch can be taken at the University-restaurant Notre-Dame (rue Notre Dame), situated 10 min by foot from the Colloquium amphitheatre, **price 50 FF wine included**.

Menu

Lundi / Monday
Terrines de St.-Jacques aux deux sauces
Pavé de bœuf aux échalottes – gratin Dauphinois
Assiette de fromage
Bavarois framboise

Mardi / Tuesday
Salade paysanne aux gésiers confits
Filet de loup sauce citron – Gâteau de blé aux poivrons
Assiette de fromage
Tarte Tatin

Mercredi / Wednesday
Salade de tomates mozarelle
Cuisses de canard - pommes sautées aux champignons
Assiette de fromage
Tarte citron

Jeudi / Thursday
Salade de chèvre chaud aux pommes et miel
Magret de canard poivre vert – pommes dauphines – tomates provençales
Assiette de fromage
Fondant au chocolat

Vendredi / Friday
Salade folle aux pois gourmands
Feuillantine de cabillaud – Julienne de légumes
Assiette de fromage
Ile flottante

PROGRAMME

DIMANCHE 17 / SUNDAY 17th

15:00 - 18:00 **Accueil - Enregistrement / Registration at :**
Université de Médecine - 37, Allée Jules GUESDE

LUNDI 18 / MONDAY 18th

08:00 - 09:00 **Accueil- Enregistrement / Registration at :**
Université de Médecine - 37, Allée Jules GUESDE

09:00 - 09:40 **Cérémonie d'ouverture et annonces / Opening address and announcements**

SEANCE THEMATIQUE : METHODOLOGIE / SECTION : METHODOLOGY

Président de séance / Chairperson : Glynis **JONES**

09:40 - 10:00 Angela **SCHLUMBAUM,** Robert **BLATTER** & Stefanie **JACOMET :** *How to study ancient DNA from archaeological wheats : a) Methods.*

10:00 - 10:20 Robert **BLATTER,** Stefanie **JACOMET** & Angela **SCHLUMBAUM:** *How to study ancient DNA from archaeological wheats : b) Results.*

10:20 - 10:40 Martin **JONES :** *Ancient DNA and Ancient Agriculture.*

10:40 - 11:00 Frances **MCLAREN :** *Wheat: The Naked truth.*

11:00 - 11:30 **Pause/Break**

Président de séance / Chairperson : Karen **LUNDSTRÖM-BAUDAIS**

11:30 - 11:50 Amy **BOGAARD**, Glynis **JONES** & Mike **CHARLES :** *The functional ecology of crop weed floras : the recognition of crop husbandry techniques in archaeobotanical assemblages.*

11:50 - 12:10 Hans-Peter **STIKA :** *Approaches towards early Celtic land-use reconstruction in the middle Neckarland (south-western Germany) based on statistical analysis of the data set of archaeobotanical macro-remains.*

12:10 - 12:30 Manfred **RÖSCH :** *Traces of Iron age landscape and economies in Celtic honey remains.*

12:30 - 12:50 Olivier **MERMOD :** *A statistical approach for changes in agricultural systems.*

13:00 – 14:30 **Repas/Lunch**

Président de séance / Chairperson : Hans Peter **PALS**

14:30 - 14:50 Örni **AKERET :** *Analysis of Neolithic dung of cattle and sheep/goat.*

SEANCE THEMATIQUE : ORIGINES & DIFFUSION / SECTION : ORIGINS & DIFFUSION

14:50 - 15:10 Otto **BRINKKEMPER :** *The early Neolithic site of the Hode Vaat (Almere, the Netherlands). The non-diffusion of crop plants ?*

15:10 - 15:30 Ramon **BUXÓ**, Natalia **ALONSO**, David **CANAL**, I. **GONZÁLEZ &** N. **ROVIRA:** *The introduction of new crops in the Mediterranean region of the Iberian Peninsula : oats, millet, rye.*

15:30 - 15:50 Natalia **ALONSO :** *Recherches sur l'agriculture protohistorique en Catalogne occidentale à partir des données archéobotaniques.*

15:50 - 16:20 **Pause / Break**

Président de séance / Chairperson : Daniel **ZOHARY**

16:20 - 16:40 Ruth **PELLING** & Martjke **van der VEEN :** *The origin and spread of viticulture in North Africa.*

16:40 - 17:00 Werner **SCHOCH :** *Flowers for a princess (An early proof of Citrus aurantium in the Czech Republic).*

17:00 - 17:20 Ann **BUTLER :** *Epipalaeolithic and Early Neolithic pulse remains in the Levant.*

17:20 - 17:40 Krystyna **WASYLIKOWA :** *Archaeobotanical contribution to the history of Sorghum in Africa.*

17:40 - 18:00 Jean-Frédéric **TERRAL :** *Diffusion of olive cultivation in the Mediterranean Basin : a morphometric approach.*

MARDI 19 / TUESDAY 19th

SEANCE THEMATIQUE : ORIGINES & DIFFUSION / SECTION : ORIGINS & DIFFUSION

Président de séance / Chairperson : Krystyna **WASYLIKOWA**

09:00 - 09:20 Daniel **ZOHARY :** *Monophyletic vs. polyphyletic origin of the crops that founded agriculture in the Near East.*

09:20 - 09:40 Mike **CHARLES :** *Late arrivals ? The origin of crop plants in southern Turkmenistan.*

09:40 - 10:00 Mark **NESBITT :** *Crops and civilisation on the silk road : new evidence from Merv, Turkmenistan.*

10:00 - 10:20 Joy **MC CORRISTON :** *Archaeobotanical perspectives and agricultural development in northern Mesopotamia.*

10:20 – 10:40 Naomi **MILLER :** *Crops plants in West Central Asia in the Chalcolithic and Early Bronze Age, possible sources and spread.*

10:40 - 11:10 Pause / Break

Président de séance / Chairperson : Martin **JONES**

11:10 - 11:30 Hala Nayel **BARAKAT :** *Archaeobotanical research in Karagunduz : an early Iron age settlement in the Van area, eastern Turkey.*

11:30 - 11:50 Dorian **FULLER :** *Agricultural fusion : Adoptions domestication and the development of agriculture in south India.*

11:50 - 12:10 Margareta **TENGBERG :** *Plant husbandry in the Makran (Pakistan, 4000 BC - 2000 BC.).*

12:10 - 12:30 Reinder **NEEF :** *On the cross-roads between Asia and Europe. Archaeobotany in Thrace.*

12:30 – 12:50 Leo-Aoi **HOSOYA :** *Role of plant food as media of information and value : Methodological development Wicha Japanese case study.*

13:00 – 14:30 Repas/Lunch

SEANCE THEMATIQUE : ETUDES REGIONALES : ASIE - AFRIQUE
SECTION : REGIONAL STUDIES SUBSECTION ASIA - AFRICA

Président de séance / Chairperson : Mordechai **KISLEV**

14:30 - 14:50 Mukund **KAJALE :** *Initial archaeobotanical findings from Wategal (c.2500BC-0 AD) south India.*

14:50 - 15:10 Karl-Heinz **KNÖRZER :** *3000 Jahre Ackerbau in einem Gebirgstal des Hohen Himalaya (3000-4000 m).*

15:10 - 15:30 Danièle **MARTINOLI** & Christiane **JACQUAT :** *Vitis vinifera L. Wild or cultivated ? A study of grape pips from Petra (Jordan 150 BC - 400 AD).*

15:30 - 15:50 Yoel **MELAMED :** *Extinct Plant Species, 780,000 Years Old, Identified at Gesher Benot Ya'aqov.*

15:50 - 16:20 Pause / Break

Président de séance / Chairperson : Mark **NESBITT**

16:20 - 16:40 Orit **SIMCHONI :** *Epipalaeolithic ant-gatherers : Archaeological evidence from Ohallo II, Israel.*

16:40 - 17:00 Ehud **WEISS :** *Spatial patterns of the botanical remnants from hunter gatherers' Huts in Epi-Palaeolithic Ohalo II, Israel.*

17:00 - 17:20 Barbara **EICHORN :** *Charcoals from sites in North-western Namibia.*

17:20 - 17:40 Anat **HARTMANN :** *Botanical and Entomological Evidence from Atlit-Yam Israel, Indicating a cool climate in the PPNC period (8000-7500 BP).*

17:40 - 19:00 Séance de posters et de présentation de matériel archéobotanique
Poster session & demonstration of archaeobotanical material.

MERCREDI 20 / WEDNESDAY 20th

SEANCE THEMATIQUE : D'ARCHEO-ETHNOBOTANIQUE / SECTION : ETHNOBOTANY

Président de séance / Chairperson : Corrie **BAKELS**

09:00 - 09:20 René **CAPPERS :** *Peaches in the desert. Supply and preservation of food in Berenike (Red Sea coast, Egypt).*

09:20 - 09:40 Caroline **VERMEEREN :** *Boats in the desert : the use of Teak in the Roman Berenike (Red Sea Coast, Egypt).*

09:40 - 10:00 Mohamed Nabil **EL HADIDI** & Nahed M. **WALY :** *The Palaeoethnobotany of Abu Sh'ar site (AD 400-700); Red Sea coast; Egypt.*

10:00 - 10:20 Mordechai **KISLEV :** *Ancient Jewish Units of Measure.*

10:20 – 10:40 Ülle **SILLASOO** : *The exotic plant food in late Medieval Estonia (14th-15th century).*

10:40 - 11:10 Pause / Break

Président de séance / Chairperson : Naomi **MILLER**

11:10 - 11:30 Marin **CARCIUMARU :** *Les colliers de semences du Néolithique de Roumanie.*

11:30 - 11:50 Karin **VIKLUND :** *Ritual use of plants in the Nordic countries. Depositions in buildings and graves in historic and prehistoric times.*

11:50 - 12:10 Leonor **PEÑA-CHOCARRO** & Lydia **ZAPATA-PEÑA :** *The cultivation of hulled-wheats and legumes in the Iberia Peninsula.*

12:10 - 12:30 Adam & Aldona **BIENEK :** *Herbal Pharmaceuticals in the Middle Ages on the basis of "the Arab Pliny" Al-Qazwini.*

12:30 – 12:50 Marina **CIARALDI :** *A pharmacy laboratory or a witch's house ? A case study from Pompeii.*

13:00-14:30 Repas / Lunch

14:00 - 14:20

Président de séance / Chairperson : Karl-Ernst **BEHRE**

Ruth **YOUNG :** *Ethnobotanical observations : Finger millet processing in east Africa.*

14:20 - 14:40 Füsun **ERTUG :** *Ethnobotany of bulbs and roots in central Turkey.*

14:40 - 15:00 Pascal **FAVRE :** *Agriculture at Horgen Scheller, a Neolithic lake Shore settlement in the northern Swiss Plateau (3050-3080 B.C.).*

SEANCE THEMATIQUE : ETUDES REGIONALES : EUROPE CENTRALE & DE L'EST
SECTION : REGIONAL STUDIES: CENTRAL & EASTERN EUROPE

15:00 - 15:20 Maria **HAJNALOVA :** *Plant Remains from Liptovska'Mara (Iron Age, Slovakia).*

15:20 – 15:40 Julie **HANSEN :** *Palaeoethnobotanical Research in Albania.*

15:40 – 16:00 Pause/Break

Président de séance / Chairperson : Helmut **KROLL**

16:00 - 16:20 Klaus **OEGGL :** *The Diet of the Iceman.*

16:20 - 16:40 Joanna **JAROSINSKA,** Monika **BADURA** & Malgorzata **LATALOWA :** *Medieval towns in northern Poland in the light of archaeobotanical data.*

16:40 – 17:00 Ursula **MAIER :** *Agricultural activities of a Neolithic settlement in south-west Germany c. 3900 B.C.*

17:00 - 19:00 Séance de posters et de présentation de matériel archéobotanique
Poster session & demonstration of archaeobotanical material.

21:00 Repas de Gala pour le **30° anniversaire** de l'**IWGP** (avec promotion/vente de vins)
Gala supper for the **30th anniversary** of the **IWGP** (with promotion/sale of french wines)

JEUDI 21 / THURSDAY 21st

Président de séance / Chairperson : ~~Lanfredo CASTELLETTI~~

09:00 - 09:20 Mauro **ROTTOLI** : *The Palaeoethnobotany of the Neolithic in north Italy : New results.*

09:20 - 09:40 Felicia **MONAH** : *Quelques considérations phyto-sociologiques sur les mauvaises herbes du Chalcolithique de la Roumanie.*

09:40 - 10:00 Helmut **KROLL** : *Probleme der Romanisierung im westlichen Rheingebiet.*

10:00 -10:20 Jan Peter **PALS** : *Local and imported plant food in a Roman fort north of the Limes.*

10:20 - 10:50 Pause / Break

Président de séance / Chairperson : Klaus **OEGGL**

10:50 - 11:10 Lanfredo **CASTELLETTI** : *Crop plants and subsistence in the Middle Age in north Italy.*

11:10 - 11:30 Galina **PASHKEVICH** : *Archaeobotanical research from the Ukraine.*

11:30 – 11:50 Julian **WIETHOLD** : *Carbonised cereals and crop processing residues from medieval Greifswald, Mecklenburg-Vorpommern, Germany.*

11:50 - 12:10 Karen **LUNDSTRÖM-BAUDAIS** & Marie-France **DIETSCH** : *Farming in the Swiss Alps in the Iron Age : Archaeobotanical Analysis of Bring-glis / Walmatte.*

12:30 - 14:00 Repas / Lunch

Président de séance / Chairperson : Stefanie **JACOMET**

14:00 - 14:20 Marianne **PETRUCCI-BAVAUD** : *How to interpret food furnishings in graves of Roman Switzerland.*

14:20 - 14:40 Irene **SWIDRAK** : *A Celtic trade center in the Ramsau valley at Dürrnberg (Austria): Environment and food plants.*

14:40 - 15:00 Andrea **TORMA** : *Palaeoethnobotanical finds from medieval wells in Hungary.*

15:00 - 15:20 Vlasta **JANKOVSKA** : *Archaeobotany of a Late Medieval water system : Czech Republic.*

15:20 - 15:50 Pause / Break

SEANCE THEMATIQUE : ETUDES REGIONALES : EUROPE DU NORD
SECTION : REGIONAL STUDIES- NORTHERN EUROPE.

Président de séance / Chairperson : Mark **ROBINSON**

15:50 - 16:10 Corrie **BAKELS** : *The Aisne valley (France) in Palaeoethnobotany.*

16:10 - 16:30 Almuth **ALSLEBEN** : *Agriculture in the southern Baltic region during the 8th to 10th centuries A.D.*

16:30 - 16:50 Sabine **KARG** : *Long-term trends in the vegetation development in relation to changing agrarian systems in the southern Netherlands.*

16:50 – 17:10 Janneke **BUURMAN** : *A Struggle for life in the Bronze Age in West Friesland.*

17:10 – 17:30 Lucyna **KUBIAK-MARTENS** : *Plant foods component of the diet at Tybrind Vig, Late Mesolithic Ertebolle settlement in Denmark*

17:30- 1900 Séance de posters et de présentation de matériel archéobotanique
Poster session & demonstration of archaeobotanical material.

VENDREDI 22 / FRIDAY 22nd

Président de séance / Chairperson : Allan **HALL**

09:00 – 09:20 Anne **de HINGH** : *Agriculture in Bronze Age society : intensification or diversification ?*

09:20 – 09:40 Dominique **de MOULINS** : *Weeds in thatch from Late Medieval sites in Britain.*

09:40 – 10:00 Peter Hambro **MIKKELSEN** : *New evidence for Secale cereale as a winter crop, 300-600 A.D., in south-western Denmark.*

10:00 – 10:20 Christine **LAURENT** : *A perçu des résultats carpologiques obtenus pour la Wallonie (Belgique) au cours des cinq dernières années. / Outline of the last five years archaeobotanical results fom the South of Belgium.*

10:20 – 11:10 Pause / Break

Président de séance / Chairperson : Julie **HANSEN**

11:10 – 11:30 Véronique **MATTERNE** : *Données botaniques provenant des sites romains du Nord de la France.*

11:30 – 11:50 Marie-Pierre **RUAS** : *Données récentes sur les plantes exploitées en France du Nord au Haut Moyen Age.*

SEANCE THEMATIQUE : ETUDES REGIONALES : EUROPE DU SUD
REGIONAL STUDIES SOUTHERN EUROPE

11:50 – 12:10 Philippe **MARINVAL** : *Palaeoethnobotanical investigations in two ancien "ligurian" Neolithic sites in Languedoc (France).*

12:10 – 12:30 Laurent **BOUBY** : *Food plants from late Bronze Age lagoon sites in Languedoc : the examples of La Fangade, Sète and Portal Vieih, Vendres (Hérault, France).*

12:30 – 12:50 Carmen **CUBERO i CORPAS** : *Iron Age agriculture in Catalonia.*

12:50 – 14:00 Repas / Lunch

Président de séance / Chairperson : Marike **van der VEEN**

14:00 – 14:20 Ernestina **BADAL**, M. **NTINOU** & S.M. **VALAMOTI** : *Fields and woodlands : charred plant remains and charcoal in the Neolithic site of Makri (Thrace Greece).*

14:20 – 14:40 Girolamo **FIORENTINO** : *New archaeobotanical data from the Apulian region (south-eastern Italy). Crop activity and storage procedures from the Neolithic to the Bronze Age.*

14:40 – 15:00 Núria **ROVIRA i BUENDIA** : *Plant remains from Las Pilas (Majorca, Almeria), a Chalcolithic site in SE Spain.*

15:00 – 15:20 Karl-Ernst **BEHRE** : *A new review on the history of beer additives in Europe.*

15:20 – 16:10 Pause / Break

16:10 – 16:30 Ethel **ALLUE**, Igor **ARTEAGA**, Ignasi **PASTÓ** & Josep **VALLVERDÚ** : *Resource supply among hunter gatherers from a Middle Palaeolithic site (Spain).*

16:30 – 16:50 Elena **MARINOVA** : *Archaeobotanical studies of the early Neolithic site Slatina (Western Bulgaria).*

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16:50 – 17:10 Håkan **RANHEDEN** : *Macrofossilanalysis in heaps av fire-cracked stones - some aspects of seed-occurence in different layers and some stratigrafical considerations.*

17:10 –17:40 Bilan, conclusion et perspectives / Balance, Summing up : Karl-Ernst **BEHRE**

17:40 - 18:10 Conclusion / Conclusion : Jean **GUILAINE (Professeur au Collège de France).**

18:10 – 19:00 Séance de posters et de présentation de matériel archéobotanique
Poster session & demonstration of archaeobotanical material.

SAMEDI 23 / SATURDAY 23rd

EXCURSION / EXCURSION

Dans la région méditerranéenne, dans les environs de la ville de Montpellier (Hérault) :

- Visite du site chalcolithique du Rocher du Causse à Claret, de l'oppidum gaulois et de la ville romaine d'*Ambrussum* à Villetelle.
- Découverte des végétations méditerranéennes et sub-méditerranéennes

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In the Mediterranean landscape, in the Montpellier area (Hérault) :

- Visit to the Rocher du Causse (Claret) a Chalcolithic site and the Gaulish hillfort and Roman town of *Ambrussum* (Villetelle)
- Examination of the Mediterranean and Sub-Mediterranean vegetation

Rendez-vous à / Rendez vous : 08:00 devant / in front of the University, 37 Allée J. GUESDE
Retour à / Return to : Toulouse **20:00** (environ / approx)

POSTERS

Ethel **ALLUE**, Pilar **BRAVO**, Yann de **CACQUERAY**, Marta **FONTANALS**, Angal **LOPEZ**, Santi **MOLERA**, Andreu **OLLÉ**, Pedro **OTIÑA**, Ana **RODRIGUEZ**, Josep Maria **VERGÉS**, Juan Carlos **VIDAL** & Josep **ZARAGAZA** : *Structures and Paleobotanical remains from l'Era del Castell (El Catlar, Spain) : A preliminary report.*

Monika **BADURA** : *Buckwheat (Fagopyrum esculentum) in the culture layers of medieval Kolobrzeg (N. Poland).*

Aldona **BIENEK** : *Early Neolithic agriculture in Poland : A case study from two chernozem areas.*

Anne **Bloch JORGENSEN** : *Understanding the task of grinding grain in Iron Age Denmark.*

Anne **BOUCHETTE** & Manfred **RÖSCH** : *Etudes des macrorestes végétaux d'une enceinte quadrangulaire de La Tène du Bade-Württenberg (Allemagne).*

Christoph **BROMBACHER** & Marlu **KÜHN** : *Cultivation and Use of Hemp (Cannabis sativa) in the Middle Ages in Switzerland and Surrounding Regions.*

Elizabetta **CASTIGLIONI** : *Sorghum in the Italian Middle Ages : Archaeobotanical and historical records.*

Sylvie **COUBRAY-MACCHIARELLI** : *Casale del Dolce : les premières données carpologiques d'un site du néolithique moyen dans la vallée du Sacco (Latium, Italie)*

Sylvie **COUBRAY-MACCHIARELLI**: *Cumes : les données carpologiques d'une cité de la côte campanienne (Italie), entre le VII° et le I° siècle av. J.-C.*

Orsolua **DÁLNOKI** & Ferene **GYULAÏ** : *Viticulture in the Roman Province Pannonia based on the Archaeobotanical Analysis of the samples at the Excavation in Aquincum-Kaszádúló.*

Dominique **de MOULINS** : *Roots and Tubers from prehistoric sites in Britain.*

Kerstin **GRIFFIN** : *Hulled and naked barley (Hordeum vulgare). Carbonised grains recorded from archaeological sites in Norway.*

Jean Nicolas **HAAS**, Ph. **HADORN** & A. **HASENFRATZ** : *Detecting human impact from macrofossils in pollen sample residues at Lake « Nussbaumersee » Switzerland.*

Allan **HALL** : *Evidence for ritual from plant macrofossils from medieval human burials.*

Kirsti **HÄNNINEN** : *Botanical research on an early Neolithic site in the Netherlands.*

Ann-Marie **HANSSON** : *Which plants foods were consumed ? Archaeobotanical investigations at Vendel: East Central Sweden.*

Alexa **HÖHN** : *A tool for charcoal analysis - Comparative wood anatomy of Mimosoid and Caesalpinioid Leguminosae of the west African savannahs.*

Sabine **HOSCH** & Stefanie **JACOMET** : *Archaeobotanical Investigations in the Neolithic lakeshore site Arbon-Bleiche 3 at Lake Constance (3370 BC cal.) Switzerland.*

Joanna **JAROSINSKA** : *Cultivated and collected plants in Medieval Elblag (North Poland).*

Glynis **JONES**, T. **VALAMOTI** & M. **CHARLES** : *A new glumed wheat from Northern Greece.*

Stefanie **KAHLHEBER** : *Archaeobotanical remains from sites in northern Burkina Faso.*

Terttu **LEMPIÄINEN** : *Agricultural systems in SW Finland. New archaeobotanical evidence of a rural settlement dated to the Late Iron Age.*

Sila **MOTELLA de CARLO** : *Aia di Cappitello-Carife (Avellino) : Un exemple de conservation de grains en –*

fosses-silo entre l'âge du Bronze et l'âge du Fer en Italie du sud.

Johanna **ONNELA** & Terttu **LEMPIÄINEN** : *Plant remains from medieval Finnish castles.*

Emel **OYBAK** & Cahit **DOAN** : *Seeds from the late Chalcolithic and early Bronze Age levels from Bakla Tepe and Liman Tepe in Izmir west Anatolia.*

Tzvetana **POPOVA :** *Palaeoethnobotanical analysis in the tell settlement Yunatsite.*

Bénédicte **PRADAT** & Marie-Pierre **RUAS** : *Sorghum (Sorghum bicolor (L.) Mooench) discovery in "La Madeleine" (Dordogne) a french medieval settlement.*

David **ROBINSON :** *Sickness and health in medieval Denmark : An archaeobotanical view.*

David E. **ROBINSON,** Jan A. **HARILD** & Ida **BOLDSEN** : *Danish medieval monastery gradens – the archaeobotanical evidence.*

Marie-Pierre **RUAS** : *Archaeobotanical find of Spelt (Triticum spelta) in Corsica (Western Mediterranean) during the Late Middle Ages.*

Delwen **SAMUEL :** *Microscopy techniques applied to ancient desiccated cereals and cereal foods.*

Eli-Christine **SOLTVEDT :** *Recorded finds of carbonised Triticum spp. in Norway.*

Paloma **UZQUIANO :** *La végétation Cantabrique de 13000 à 9000 BP d'après les analyses anthracologiques. Bois de feu et mobilité dans un milieu changeant.*

George **WILLCOX** & Sandra **FORNITE** : *The use of cereal chaff for daub tempering at Jerf el Ahmar : a Tenth millennium site in northern Syria.*

Hendrik **WOLDRING :** *The origin of plums (Prunus insititia).*

Barbara **ZACH** & Marlies **KLEE :** *Archaeobotanical Research in NE Nigeria, West Africa.*

Résumés des Communications
Lectures Abstracts

How to Study Ancient DNA from Archaeological Wheat - a) Methods

Angela Schlumbaum, Robert Blatter, Stefanie Jacomet
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Authentic DNA was isolated from various organisms including plants up to several thousands of years old. After death DNA is rapidly degraded by biotic and abiotic factors leading to heavily fragmented and damaged DNA, which, under still unknown preservation conditions, can survive. It is a challenging idea to use "ancient DNA" to tackle archaeobotanical questions which cannot be answered by morphological analysis.

The key method for the analysis of "ancient DNA" is the Polymerase Chain Reaction (PCR). Short oligonucleotides, the primers, are designed to target suitable regions in the genome. In multiple temperature cycles the target molecule is amplified up to several millions of copies, allowing to detect a small number of template DNA as expected in "ancient DNA". The PCR products are cloned and sequenced. The ancient sequences are then compared to modern DNA.

We are investigating archaeological charred and dessicated wheat samples up to 6000 years old. Different DNA extraction protocols are used and PCR is targeted against a fragment of the promoter region of the high molecular weight (HMW) subunit genes of glutenin, a major storage protein in wheat. A successful amplification was found in only few samples out of all extractions. Similar results have been obtained in amplifying a fragment of the internal transcribed spacer (ITS2) region in the ribosomal DNA. Sequences of both regions are highly similar to modern DNA. Both regions allow to distinguish between wheat genomes but do not differentiate between species. So far we have to conclude that the possibility to study ancient DNA can be expected in only few samples and is not suited as a general approach in archaeobotany.

How to Study Ancient DNA from Archaeological Wheat - b) Results

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Using the Polymerase Chain Reaktion (PCR) we are investigating "ancient DNA" in mainly Swiss samples of archaeological wheat, 200 to 6000 years old. We succeeded in the amplification of short fragments from different genomic regions from dessicated and charred wheat remains. The results, based on sequence analysis of the HMW glutenin promotor region and the ITS region reveal the genomic constitution of the ancient wheat specimens. In some samples the identified ploidy level agrees with the morphological identification, whereas in others the ploidy level determined by genetic analysis was unexpected from what was assumed by archaeobotany. These findings are especially interesting as they provide a tool to identify grains of naked wheat or other unidentified wheat remains.

Furthermore it was possible to identify different alleles in the glutenin genes of modern and ancient wheat. The comparison of the ancient with modern genes shows little differences in the DNA sequence at the taxon level. This is expected due to the recent domestication and wheat being self pollinating. Sequence information from different regions of the wheat genomes might give insight into the history of wheat, both on a local or regional basis.

Professor Martin K.Jones, Department of Archaeology, University of Cambridge

Ancient DNA and Ancient Agriculture. (abstract)

Since the polymerase chain reaction trasformed DNA studies ten years ago, the emerging field of biomolecular archaeology has undergone a rapid transformation. The first generation of ancient DNA studies were of an almost antiquarian nature, with a focus upon Egyptian mummies, preserved brains and extinct animals. The next generation related both to geological specimens and to more commonplace archaeological materials, in particular bones and seeds. This second phase was furthermore accompanied by considerable optimism about the potential for ancient DNA analysis. The third and current phase is more cautious and realistic. First, it is now understood that ancient DNA is by no means universal. Each of the apparent mismatches between the degree of damage and the conditions of preservation have been resolved. The DNA of geological age has been shown to be illusory, and more recent specimens offering no protection from hydrolysis and oxidation also fail to reveal DNA. What is noteworthy is that even miniscule sites of dry bone within or waterlogged specimen, or of uncharred tissue within a charred seed, may prove to be very good sites for ancient DNA preservation. Furtheremore, the timescale of proven DNA persistence has shrunk to around 50,000 years. Within this shortened timescale, agricultural beginnings have been a major focus of the most recent ancient DNA work.

This paper will review that most recent work on ancient DNA and ancient agriculture as it applies to plant crops. Among the crops considered will be wheat, rice, maize, and sorghum. In the case of wheat, these are usefully amplified by two other contributions to this symposium. While the focus will be the place of ancient DNA analyses, the review of projects will be placed in the context of the complimentary work on modern DNA of these crops.

The functional ecology of crop weed floras: the recognition of crop husbandry techniques in archaeobotanical assemblages

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The goal of the Functional Interpretation of Botanical Surveys (FIBS) approach in archaeobotany is to identify the functional attributes (or, better yet, the 'functional types') of weeds which characterise different husbandry regimes. The functional ecological profiles of modern weed floras developed under traditional husbandry regimes can then be compared with those for different groups of species (i.e. archaeological groups). The functional attributes used are proxy measures of important plant ecological characteristics such as responses to fertility and disturbance, which are difficult and time-consuming to measure directly.

The approach applied to the spanish winter cereal irrigation study (presented at the last IWGP symposium) has been expanded (to include more potential functional attributes) for application to a range of modern weed flora studies: winter cereal irrigation in southern Jordan, crop rotation regimes including a legume and/or bare fallow year (northern Jordan), small-scale, intensive winter crop cultivation (Greece), and autumn versus spring sowing (phytosociological data). Before applying FIBS it is necessary that the husbandry variables under investigation produce floristically distinct weed floras. This separation has been demonstrated within each of the modern weed studies using correspondence analysis, indicating that these husbandry practices do indeed have profound effects on the weed floras which develop.

In addition to the original spanish irrigation study, functional attribute data have been fully assembled for two of the modern studies: irrigation in southern Jordan and crop rotation in northern Jordan. The results gathered so far suggest that, while extreme values for some functional attributes characterise several different regimes, others are specifically associated with certain practices. It is hoped that, by using combinations of functional attributes ('functional types'), it will be possible to differentiate between these different husbandry practices.

APPROACHES TOWARDS EARLY CELTIC LAND-USE RECONSTRUCTION IN THE MIDDLE NECKARLAND (SOUTH-WESTERN GERMANY) BASED ON STATISTICAL ANALYSIS OF THE DATA SET OF ARCHAEOBOTANICAL MACRO-REMAINS

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Archaeobotanical investigations (250 samples) were made on four dry site settlements of the late Hallstatt/early Latène period, when the middle Neckarland in south-western Germany was densely populated. Looking at charred plant remains, we found hulled barley (*Hordeum vulgare*) to be the main crop along with spelt (*Triticum spelta*) and locally broomcorn millet (*Panicum miliaceum*). Of less importance were Einkorn (*T. monococcum*), naked wheats (*T. aestivum/turgidum* s.l.) and emmer (*T. dicoccum*), maybe not grown on seperate fields. Besides cereals pulses (*Pisum sativum*, *Lens culinaris*, *Vicia faba* and *V. ervilia*) and flax (*Linum usitatissimum*) were important. At the burial mound of Hochdorf high-quality textiles made of wool, flax and hemp (*Cannabis sativa*) were unearthed, dyed with the botanical dye-stuff of woad (*Isatis tinctoria*) and possibly of weld (*Reseda luteola*). The identified taxa of wild plants (16520 finds representing at a minimum 212 species) are mainly belonging to today typical arable weeds (71 species) and greenland taxa (59 species), depending on modern agriculture. Some of these grasses and other greenland species are growing today in meadows and pastures typical for favourable soil conditions (*Arrhenatheretalia* and *Trifolio-Cynosuretalia*). Does this indicate continuous greenlands on soils of possible arable land in the early Celtic period? Correspondent analysis was used to get an idea of the distribution of the greenland taxa and typical arable weeds and cereal remains in the analysed samples, grid analysis was carried out for the subsequent grouping of these results. The greenland taxa areshowing similar structures in the data set as arable weeds do. Some greenland species are distributed like cereal remains. We suggest that the plant remains were derived from rotation systems alternating from arable fields to greenlands (*Feld-Gras-Wirtschaft*). Recently iron ard-shares of early Celtic contexts were unearthed in the Neckarland which are fitting to ploughs simply opening a furrow in the soil. Hints for ploughs turning the soil are of younger times as well as finds of iron scythes (Lt D period) useful for haying.

CONCLUSIONS: The more or less permanent cultivation of comparatively non-demanding cereals altering with pulses, these fields being grazed after the harvest, and subsequent fallow phases used as pastures could represent an adaption to scarcity of arable land. The opening of the landscape was high, the utilization comprised beyond favourable field sites marshy lowlands used as moist grassland as well as dry slopes for keeping sheep.

TRACES OF IRON AGE LANDSCAPE AND ECONOMIES IN CELTIC HONEYS

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In recent years, in Southern Germany several undisturbed graves of Celtic princes were excavated and investigated. The sites are Hohmichele/Heuneburg on the upper Danube near Sigmaringen, the grave of Hochdorf northwest of Stuttgart and, most recently, the graves at the Glauberg, northeast of Frankfurt. In the grave of Hohmichele and Hochdorf huge Bronze vats were recovered; in two graves at the Glauberg two Bronze cans. The Hochdorf site was investigated by KÖRBER-GROHNE (1985), the other sites by the author of this text. All these vessels contain on their inner surface, a thick layer of a compact organic material with very well preserved pollen in high concentration. In Hochdorf, the pollen concentration was determined by extracting and weighing pure exine material; at Glauberg with the marker method (Lycopodium spores, STOCKMARR 1971). All these pollen assemblages are dominated by non-arboreal pollen types of non-wind pollinated species, a characteristic feature of honey. Comparing the pollen content with that of recent honey extracted from the honeycombs in an old-fashioned way by pressing or melting allows us to calculate the original amounts of honey. This leads to the conclusion that the vessels were not filled with pure honey and not with a beverage sweetened by honey, but with a mixture of approximately one part of honey and one to two parts of water to get a high concentrated mead. The pollen assemblages of these honeys have a diversity much higher than that of recent honey. One reason for this is a high biodiversity of the Iron age landscape indicated especially by a rich crop weed, ruderal and pasture vegetation. Another reason is the use of honey mixtures originating from a large area including the surrounding mountains as indicated by "exotic" pollen types. This applies not only to the filling up of the huge vats, but also to the cans with a content of less than five litres. This mean that the honey used to fill the cans must have been taken from an already mixed and prepared big honey stock. At the Glauberg, a honey source area of more than 50 km around the site is probable. This corresponds quite well to the distances of about 100 km between the known Celtic centres of Central Europe .

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Statistical approach for changings in agricultural system.

The endneolithic palafittical site of Saint-Blaise/Bains des Dames (canton of Neuchâtel in Switzerland) has been colonised between 3'150 and 2'550 BC (calibrated dendrodata) from people of the cultures Horgen, Lüscherz and Auvernier cordé.
This project is mainly based on analysing fossil plant remains of different waste zones (stoneheaps, lenses of loam) and other structures of the village of the Auvernier cordé culture.
Grains, chaffs and weeds were studied for multivariate analyses.
The following questions are investigated:

- Can PCA, CA and Clusteranalysis reveal changes in agricultural systems or in using crop plants during the lifetime of a culture?
- Is it possible to proof that the Auvernier cordé people used the same fields as the previous culture?
- Is there an increase or decrease of biodiversity during the short settlement period (90 years) of the Auvernier cordé culture?

ANALYSIS OF NEOLITHIC DUNG OF CATTLE AND GOAT/SHEEP

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Dung of domesticated animals from two Neolithic lakeshore sites in Switzerland was investigated: Horgen Scheller (about from 3080 to 3030 B.C.) and Arbon Bleiche 3 (3384 to 3370 B.C.). For Horgen Scheller 213 goat/sheep coprolites were analysed, for Arbon Bleiche 311 goat/sheep coprolites and 4 cattle pats.

The results from Horgen Scheller indicate that even in winter the ovicaprids there found their food in the forests around the settlement and were kept inside the village only at night. Most frequent finds were prickles from *Rosaceae* (probably blackberries, *Rubus fruticosus* s. l.) and sporangia from ferns. At Arbon Bleiche 3, by contrast, additional foddering with hazelnut catkins (*Corlyus avellana*) and with twigs from silver fir (*Abies alba*) took place in times of shortage. Silver fir was the most important timber for house constructions at Arbon and the trees were brought into the village entire, so a great number of twigs were available as a by-product.

In both places most or all goat/sheep faeces are from the winter season; so it is possible that in summer a kind of transhumance took place during the summer months.

The small number of cattle dung pats investigated makes general conclusions very difficult. The fact that two out of the four analysed consisted almost entirely of silver fir leaves and wood, however, shows that additional foddering must have played an important role there too.

The early neolithic site of the Hoge Vaart (Almere, the Netherlands).
The non-diffusion of crop plants?

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The construction of a new motorway necessitated the excavation of an early neolithic site in the Dutch Flevopolder. In 1994-1996, an area of *c.* 1700 m² was excavated in squares of 0.5 x 0.5 m. The excavation yielded 150 surface hearths and more than a hundred deep hearth pits. The finds, mainly flint, some pottery as well as ^{14}C-datings of charcoal demonstrated that the area had been used in the early neolithic (*c.* 4900-4600 cal BC).

Detailed botanical analyses of 176 samples and hand-sorting of 38.200 samples sieved on 2 mm-meshes did not yield one single part of a cultivated plant among the 110 taxa that were preserved (mainly carbonized).

These results are compared with other early neolithic sites studied in the Netherlands, such as Swifterbant and Schokland P14.

The introduction of new crops in the Mediterranean region of the Iberian Peninsula: millet, oats, rye.

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Archaeobotanical studies carried out in the mediterranean area of the Iberian Peninsula show that the most characteristic cereals cultivated between the Vth and the IIIth millenium are naked wheat and naked and hulled barley. In the crops of the same periods one can also find hulled wheats (emmer and einkorn), less important in the plant alimentation.

In the middle of the second millenium a new generation of cereals can be detected mainly represented by millets, but its at the first millenium, in the Iron age and the Romanisation, when oats and rye are mentioned for the first time. Spelt which is wide difunded in the centre and north of Europe, has no presence in the Mediterranean area while its presence is verified in some areas of the north of the Peninsula.

The cultivation of millets begins to be detected in sites of different geographic contexts of the Bronze age. In the north of the Iberian Peninsula there are evidences of the presence of wild foxtail millet (progenitor of the cultivated foxtail millet) in the Institut de Batxillerat de Manlleu site, dated in the Chalcolitic/Bronze age; and in the middle and late Bronze age of Cova de Punta Farisa and Masada de Ratón we can find cultivated millets (broomcorn millet and foxtail millet). These two species have been found in levels of argaric bronze (middle bronze age) in the levant and south-east of the Peninsula: Rincón de Almendricos, Cabezo Redondo, Fuente Álamo, Cerro de la Virgen and Peñalosa.

Cultivated oats can be found in late phases of the second Iron Age (IIIth-IIth century B.C.): Tossal de les Tenalles, Illa d'en Reixac, Puig de Sant Andreu, Mas Castellar de Pontós... The importance of oats as vegetable of main importance was consolidated up to the late-roman and visigotic epoch: Vilauba (middle of the Vth century A.D.) and Roc d'Enclar (VII century A.D.). On the other hand there is no presence of rye till the low imperial and late roman periods when it can be found as a cultivated plant in Vilauba (middle of the IVth century A.D.) and Roc d'Enclar (middle of the VII th century A.D.).

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Recherches sur l'agriculture protohistorique en Catalogne Occidental à partir des données archéobotaniques

Les prélèvements systématiques réalisés pendant les dernières années dans la plupart des fouilles archéologiques de Catalogne Occidental (nord-est de la Péninsule Ibérique) ont permis obtenir une série de fruits et semences datées dès la moitié de l'Âge du Bronze (1.700 cal. BC) jusqu'à l'ibérique plein (200 AC). Il s'agit des premières données obtenues dans la région qui montrent une agriculture basée principalement sur le blé nu et l'orge vêtu, avec la présence secondaire de légumineuses et d'autres cultures.

D'une part le long de l'Âge du Bronze (2.100-750 cal.BC) les céréales et les légumineuses récuperées sont connues aussi dans la reste du nord-est péninsulaire: *Hordeum vulgare* et *Triticum aestivum/durum* sont les cultures principales, suivies d'autres céréales comme *Triticum dicoccum* et *Triticum aestivum/durum* type *compactum*, et ponctoellement par *Lens culinaris* et *Pisum sativum*.

Néanmoins à partir du Bronze Moyen-Recent trois espèces nouvelles sont attestées qui n'apparaissent pas dans la reste de la Catalogne. Il s'agit de *Panicum miliaceum*, *Setaria italica* et *Linum usitatissimum*. Ces premiers millets semblent coincider avec l'apparition dans cette zone des céramiques d'origine alpin (culture de la Polada). Le lin, par contre peut arriver à la Péninsule Ibérique aussi à travers les Pyrenées mais sa chronologie est moins précise.

Pendant l'Âge du Fer (750 cal. BC - 200 AC) l'*Hordeum vulgare* et le *Triticum aestivum/durum* deviennent les céréales plus représentées dans la plupart des sites, mais ne disparaissent pas d'autres espèces comme *Triticum dicoccum*, *Triticum aestivum/durum* type *compactum*, ou *Hordeum vulgare* var. *nudum*. C'est aussi le long de cette époque que *Panicum miliaceum* et *Setaria italica* deviennent plus fréquentes comme cultures et il apparaît une nouvelle céréale: *Avena sativa* (III s.ane). Parmi les légumineuses la culture de *Pisum sativum* et *Lens culinaris* continue et on reconnait d'autres espèces comme *Vicia faba* var. *minor* et *Lathyrus sativum/cicera*. Par contre, la culture de *Vitis vinifera*, bien attestée dans la reste de la Péninsule Ibérique pendant l'époque ibérique, n'a été pas prouvée jusqu'à present dans la région.

Finallement les plantes adventices identifiées comme *Lolium temulentum* et *Lolium perenne/rigidum*, *Agrostemma githago*, *Galium aparine* subsp. *aparine* et *Galium aparine* subsp. *spurium*, *Polygonum convolvulus* ou *Sherardia arvensis*, prouvent aussi l'importance de la culture des céréales.

The Origin and Spread of Viticulture in North Africa

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The grape vine is one of the three classical fruits of the Old World: together with the olive and the fig it represents the oldest group of fruit crops in the Mediterranean basin. The first evidence for the cultivation of grapes comes from the Aegean and by the late Bronze Age viticulture was well established in the Eastern Mediterranean. By the Roman period wine made from the grapes had become an important commercial product which was traded widely all over the Mediterranean and beyond. The origin and development of viticulture have been studied for the Eastern Mediterranean, and especially for Greece, but its spread into the Western Mediterranean and North Africa is poorly researched. The present-day distribution of the wild grape vine covers the northern Mediterranean and the Maghreb, but not Libya, Egypt or Palestine. It has been suggested that the Greeks and Phoenicians introduced viticulture into the Western Mediterranean, but there is insufficient archaeobotanical evidence to corroborate that suggestion at present.

Grape pips recovered from five different sites in Libya and Egypt were found to show clear differences in their overall shape and size. When using the distribution of the length:breadth index of Stummer (1911) one assemblage (i.e. Euesperides, Libya: 600–300 BC) falls within the range of wild grapes, while others (i.e. Zinchecra, Libya: 900–400 BC and Mons Claudianus, Egypt: 100–250 AD) fall within the range of cultivated grapes, or show slightly intermediate distributions (Libyan Valleys, Libya: 100400 AD and 500–700 AD). The presence of morphologically wild grape pips at Euesperides came as a surprise to us, especially as morphologically cultivated grape pips had already been found in Libya at an earlier site, i.e. Zinchecra. In this paper we will present the results of our analysis and offer suggestions to explain these results.

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Flowers for a Princess

The Analysis of Botanic Macro-remnants from Eleonora's Grave

Textiles taken from the grave of Eleonora (b. 1568, d. 1580), daughter of Emperor Maximilian II, located in St. Vitus' Cathedral in Prague, have been restored in the workshop of the Abegg Foundation at Riggisberg in the canton of Bern, Switzerland. Having been relocated several times in the past, the grave was opened a final time in 1991 in the context of an anthropological investigation. In the process, the contents of the grave seem to have been separated from the skeletal remains very carelessly. In the resultant "confused heap" of textiles (in the main a silk garment), leaves were also found, but no conclusive statement was made as to their relationship and relevance to the burial. The leaves were in a severely crumpled and folded state. It was only after meticulous preparation that their original shapes and any anatomical details could be ascertained.

The initial examination sufficed to determine that all of the 13 leaves, that is, leaf fragments, were of the identical variety. As they could not be identified as the leaves of a native tree or shrub, it seemed reasonable to assume that they represented the remnants of a flower bouquet or perhaps those of an herb-like healing plant. Due to the absence of any stems or twigs, a determination as to the relative position of the leaves to one another (alternating or opposing) on the sprouts was rendered difficult. At this point in the process of analysis, a second series of samples was taken under examination. After the grave had been opened and cleared, a final gathering of the remnants had yielded two leaf stalks as well as two small twig fragments which allowed for the definitive determination that the leaves were in fact of citric origin. A comparison of macroscopic and microscopic features finally pointed to Citrus aurantium, the bitter orange, as the original bearer of the leaves found in Eleonora's grave. In comparison with other citrus varieties, this particular plant is more robust and is more likely to be able to survive occasional bouts of colder temperatures. Consequently it seems certoin that the bitter orange was grown and cultivated at the court of Emperor Moximilian in the middle of the 16th century.

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Archaeobotanical contribution to the history of sorghum in Africa

8000 years old charred seeds and fruits of about 85 wild plant species were found in the Early Neolithic site Nabta Playa, south Egypt, dated to c. 8000 BP. At least 15 species were probably collected for food. A considerable number of grains and a few fragments of sorghum spikelets belonged to morphologically wild sorghum. The analysis of the in-site distribution of remains allowed to suggest that sorghum belonged to a special kind of food, being either collected and processed separately, or even cultivated occasionally. Sorghum was reported from about 40 archaeological sites in Africa, the remains from Nabta belonging to the oldest ones. Other records of comparable age included few impressions from three sites in Sudan. The oldest in Africa, well documented remains of domesticated sorghum came from Qasr Ibrim, c. 100 AD, in Egypt and Jebel et Tomat, 245 AD, in Sudan. It is still uncertain if the long time span between the oldest occurrence of wild sorghum and the first evidence of its cultivation is the matter of state of archaeological research or of late domestication of that cereal.

Diffusion of olive cultivation in the Mediterranean Basin : a morphometric approach.

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Abstract

This study aims to apply a new morphometric approach to the study of the history of olive tree (*Olea europaea* L.), in relation to the origins, the development and migrations of human societies in the Mediterranean. The investigations are performed simultaneously on olive stones from modern wild populations, and cultivars from various mediterranean countries as well as on material from northwestern archaeological sites (Spain and France). Changes in shape of stones from archaeological sites related to inter-subspecific and inter-cultivar divergences of modern olive forms are assessed. Clear patterns of morphological variations of olive stones are correlatively established according to the geographical origin of modern forms and to their chronological occurrence. These results allow us to reconstruct the historical " pathways " by which the cultivated varieties and agricultural practises travelled, during the diffusion of olive cultivation from east to west, before being finally introduced in north western mediterranean areas by classical cultures.

MONOPHYLETIC VS. POLYPHYLETIC ORIGIN OF THE CROPS THAT FOUNDED AGRICULTURE IN THE NEAR EAST

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The following comparisons between crops and their closely related wild relatives provide clues for discriminating between monophyletic and polyphyletic origins under domestication: (i) Presence or absence of indicative patterns of founder effects in the cultivated genepool, compared to the amount of variation present in its wild progenitor. (ii) Uniformity or lack of uniformity (within crop) in genes governing principal domestication traits (traits which were automatically selected for once the wild progenitor was introduced into cultivation). (iii) Species diversity: The number of closely related (congeneric) wild species with similar potential for domestication, native to the area under consideration; and how many of them entered cultivation. The present paper evaluates the information available on the eight crops which founded Neolithic agriculture in the Near East; and arrives to the conclusion that emmer wheat Triticum turgidum L. subsp. dicoccum Schübler, einkorn wheat T. monococcum L., pea Pisum sativum L., and lentil Lens culinaris Medik. were very likely taken into cultivation only once or - at most - very few times. Also chickpea Cicer arietinum L. , bitter vetch Vicia ervilia (L.) Willd., and flax Linum usitatissimum L. seem to have been domesticated in a similar way, but the evidence concerning them is much scarcer. Only for barley Hordeum vulgare L. there are indications that it has been domesticated more than once - but again just very few times.

Late Arrivals? The Origin of Crop Plants in Southern Turkmenistan

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Analysis of charred plant remains from the neolithic settlement of Jeitun in southern Turkmenistan has revealed a crop spectrum largely restricted to einkorn and barley. At the same time sites in western Asia and Europe were typically exploiting a much wider range of crops, and the dominant form of wheat was emmer rather than einkorn.

What were the reasons behind the limited spectrum present at Jeitun? Did the crops originate locally or were they introduced into the area? If these crops were brought in do they represent a selection from a wider range of types chosen particularly to match the crop-growing environment of the area or were they, perhaps, the only ones to make the journey?

The archaeobotanical evidence from Jeitun and other sites in the area are examined, along with that for the natural distribution of the progenitors of these cereal crops, to consider the origins of crop plants in the region.

Naomi **MILLER**

Crop Plants in West Central Asia in the Chalcolithic and Early Bronze Age, Possible Sources and Spread

This paper lays out archaeobotanical evidence from 5th-2nd millennium BC sites in Turkmenistan (Anau, Gonur) and Uzbekistan (Djarkutan, Sapalli). A few sites in Turkmenistan show that there is a continuous cultural sequence between the Jeitun period ("Neolithic") and later Anau I period ("Chalcolithic"), but except for the current work at Jeitun, they have no plant remains or inadequately reported ones. The earliest plant remains from the site of Anau (Anau IA) contrast with those reported from Jeitun. At Anau and later Bronze Age sites, Triticum monococcum (einkorn) is either absent or unimportant, and the plump grains of Hordeum vulgare var. hexastichum (6-row barley) and Triticum aestivum s.l., reminiscent of a more eastern assemblage, are a significant presence. Fruit pit remains make their first appearance in Bronze Age levels.

Archaeobotanical research in Karagunduz : an early Iron age settlement in the Van area, eastern Turkey.

Hala N. BARAKAT

The papers presents and discusses the results of the identification of plant macroremains from an early Iron age settlement : Karagunduz, in the Van area, eastern Turkey. The remains were recovered through the flotation of 500 litres of sediment obtained from the limited excavated area within the settlement during the 1997 excavation season. The main crops identified are Emmer wheat and Barley. The presence of weeds and other wild plant species is discussed with special reference to the large number of water-loving species as indicators of past habitat.

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Plant Husbandry in the Pakistani Makran Region, c. 4000 BC - 2000 BC

Since 1987 a French team under the direction of Dr Roland Besenval has been carrying out an archaeological program in the Makran region in southwestern Pakistan, including prospections, soundings and excavations. Two stratified sites situated in the alluvial Kech-valley, Miri Qalat and Shahi Tump, have been excavated and they have also been studied from an archaeobotanical point of view. The analysis of material from Miri Qalat has been completed but as excavations are still going on at Shahi Tump the results from this site have to be considered as preliminary.

During the successive digging seasons samples were obtained from a large number of different archaeological contexts such as occupational floors, ovens, silos, pits etc. Plant remains were retrieved by a flotation machine installed near the site and then packed and sent to France for study. Charcoal samples have mainly been analysed at the Botanical Institute in Montpellier, seed remains and impressions in mudbrick at the laboratory of Oriental Prehistory at Jalès.

The results from these studies show the presence of a well developed agricultural system, based on the Old World cereals wheat and barley, at least from the beginning of the 4th millenium BC. The range of species remains more or less the same until a major hiatus in occupation occurs, at the sites in the Kech-valley as well as in the entire Makran region, by the beginning of the 2nd millenium.

Analysis of more than 3000 fragments of charcoal indicate the presence of a vegetation of nubo-sindian type, much like the vegetation of the region today. The occurrence of more hydrophilous species such as *Populus* sp. and *Dalbergia sissoo* during the earliest occupational periods could however indicate that the climate was slightly moister until the end of the third millenium when a generalaridification is observed in the Middle East.

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On the crossroads between Asia and Europe. Archaeobotany in Turkish Thrace

The results from two excavations in Turkish Thrace, the first being sampled on botanical remains in this area, are presented. Both excavations are carried out as a joint project between the Archaeological Institute of Istanbul (Prof. M. Özdoğan) and the D.A.I. in Berlin (Prof. H. Parzinger). They lie in the direct neighbourhood of the province capital Kirklareli. Kirklareli lies at the edge of the flat Thracian plateau; north of the town the spurs of the Istrança Dağlari appear. These mountains form the natural border between Turkish and Bulgarian Thrace. Kirklareli lies in a sub-mediterranean climate zone, with 600-800 mm precipitation a year. Over a short distance precipitation reaches a level of more than 1000 mm in the Istrança mountains. Still densely forested areas can be found here. In the center of the Thracian plateau precipitation levels do not exceed 400-600 mm. The natural vegetation on the plateau, which is completely under cultivation nowadays, was probably a forest with transitions to a forest steppe.

Although the European part of Turkey is of highest interest, because of its geographical position bordering Anatolia, the Aegean and the Balkan, hardly any archaeological research has been done in this part of former Thrace. The number of archaeological excavations was mainly limited because this area, specially its north-western part close to the border with the former Eastern block, was a military security zone.

The tell Aşagi Pinar was occupied from the early Neolithic until late Neolithic onwards (earlier?, Karanovo I - Karanovo IV). This is typical for Turkish Thrace, where the dwelling mounds were deserted in the Karanovo IV period at the latest. Afterwards only camp-and other sites without large accumulation of material exist. This is in stark contrast to inner Thrace (South Bulgaria) were we find huge tells, settled upon until the Early Bronze Age. The ceramics of Aşagi Pinar show as well Anatolian influences (Haçilar, Ilipinar) in the earliest Karanovo levels as well as parallels with East-Hungarian ceramics in the Karanovo IV period.

Especially the older Karanovo levels in Aşagi Pinar are very rich in botanical remains, particularly emmer wheat (*Triticum dicoccum*) and einkorn (*T. monococcum*). The only other cereal appearing in larger numbers is two row hulled barley (*Hordeum distichum*). Striking is the total lack of naked barley and wheat. Pulses found are lentil (*Lens culinaris*), pea (*Pisum sativum*), bitter vetch (*Vicia ervilia*) and relatively high numbers of grass pea (*Lathyrus sativus*). Notable in the younger Karanovo levels is the presence of carbonized acorns (*Quercus* sp.). The wood spectrum is dominated by deciduous oak.

From the other site near Kirklareli, Kanligeçit, so far only little botanical remains were recovered. The main cultivated plants, retrieved from Early Bronze layers, were emmer, lentil and grass pea.

The excavations around Kirklareli are still in progress and it is hoped that they will provide new information about the spread and synchronization of Anatolian, Balkan and Aegean cultural phases and developments.

Vitis vinifera L.: Wild or cultivated?
Study of grape-pips at Petra (Jordan; 150 BC - 400 AD).

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This study examines the carbonised grape-pips discovered during the excavation of Nabataean and Roman private dwellings at Petra in Jordan (150 BC - 400 AD).

Did the Nabataeans already cultivate grape-vines, in spite of their own interdicts, or did one have to await the Roman influence to consume grapes or to drink home-grown wine?

The calculation of Stummer's index and the more recent formulae by Mangafa and Kotsakis were used to distinguish wild grapes *(Vitis vinifera sylvestris)* from cultivated grapes *(Vitis vinifera vinifera)*. According to these studies, the pips found at Petra may belong to wild or cultivated grapes (it was not possible to distinguish between the two with Stummer's index), or to wild grapes according to the pip measurements (Mangafa and Kotsakis), or to cultivated grapes according to the beak.

The ecological requirements of wild grape-plants and their natural geographical distribution would indicate that we are in the presence of a primitive form of cultivated grape-plants. Therefore, the methods currently available to distinguish wild from cultivated grape-pips must be used prudently.

Extinct Plants Species, 780,000 Years Old, Identified at Gesher Benot Ya'aqov

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Seeds and fruits of 100 taxa were identified at the Gesher Benot Ya'aqov archaeological site. This site lies on the banks of the Upper Jordan River, North Israel. Archaeological excavations carried out between 1989 and 1997 exposed a 35 m thick profile. These layers apparently represent a stratification process that occurred over tens of thousands of years. The Gesher Benot Ya'aqov layers, dated around 780,000 BP, are consistent with the stage 19 of the temperature curve made by oxygen isotope analysis, which means that the climate prevailed at that time was interglacial. Some layers contained remnants of the human Acheulean culture. Remnants of animals were also found at the site, including some that are now extinct in Israel, such as elephants, rhinoceros and deer. Wood remnants and pollen grains were also found.

In the course of this study, we had to overcome the difficulties of identifying plant of species that grew outside their present range of distribution or are extinct. When our reference collection could not help, we used seed atlases of extant as well as extinct plants. Altogether, about 14 species, out of 100, do not grow in Israel today. These species included immersed or floating water plants such as *Euryale ferox*, *Potamogeton coloratus/polygonifolius*, *Najas foveolata*, *Nymphoides* cf. *peltata*, *Trapa natans*, cf. *Sagittaria sagittifolia*, and *Stratiotes tuberculatus*, which had become extinct as well as the extinct terrestrial plant - *Prunus*. The patterns of extinction of some of the above mentioned species are discussed.

Epipaleolithic Ant-Gatherers: Archaeological Evidence from Ohalo II, Israel

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It is suggested that ants were a part of the diet at Ohalo II. A complete, charred head of an ant was found in locus 1, which may be the harvester ant - Messor, which collects large quantities of seeds from different plant species. Seed and fruit remains of some plant identified at Ohalo II are known to be commonly found in nests of that ant.

For example, thousands of grains of Bromus brachystachys, scores of mericarps of Malva parviflora, and 23 achenes of Silybum marianum were found. The ant's head, together with the accompanying plants, especially the concentration of Silybum achenes, provide sound evidence that ant nests could have been active in the close vicinity of Ohalo II. It is suggested that the people of the site included ants in their diet, although the practice was not handed down to modern, succeeding populations in the Near East. The reason for that could be a taboo which prevented their use as food. Nevertheless, the possibility that the hunter-gatherers of Ohalo II were also ant-eaters cannot be excluded, as this item is well-known in tribal diets in the Americas, Australia and India.

Spatial Patterns of the Botanical Remnants From Hunter Gatherers' Huts in Epi-Palaeolithic Ohalo II, Israel

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About 30,000 charred seeds and fruits' remains had been identified from the Epi-Palaeolithic site of Ohalo II, Sea of Galilee, Israel, by O. Simchoni. The preserved plant remains in Ohalo II exceeds that of any other hunter-gatherers' site, both with regard to quantity and quality of preservation. Spatial analysis of the botanical finds gives us a unique opportunity to study some aspects of hunter-gatherers' everyday life.

The site, dated by large set of ^{14}C samples to around 19,300 BP, consists mainly of three huts (Loci 1, 2 and 3). Locus 1 is the largest structure and contains three successive floors.

The results show that the finds are distributed unevenly in the site. There is a significant difference between the loci and among the huts. Also, we can distinguish between successive floors in the same hut. For example:

1. Notable differences can be found between loci 1 and 3. The main food plants of Locus 1 are Suaeda fruticosa/palaestina 5823 seeds and Bromus brachystachys 3072 seeds, which were probably collected in the saline area south of the site, while the main plants of Locus 3 are Alopecurus utriculatus/arundinaceus 1497 seeds and *Hordeum* spontaneum 1128 seeds, which came from the mountain slopes west of the site. 2. The first floor of Locus 1 contains 78% of Suaeda fruticosa/palaestina, while the second floor had only 41%. 3. 113 seeds of Nitraria shoberi out of 208 in Locus 3 and 295 in the whole site were found concentrated in single 0.5 m2 square, maybe a sign to specified collection.

Botanical and Entomological Evidence from Atlit-Yam, Israel, Indicating a Cool Climete for the PPNC Period (8,000-7,500 B.P.)

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Atlit-Yam is located 300-400 m west of the present Israel's Mediterranean coastline, 8-12 m below sea level. The botanical material, mostly waterlogged, was excavated from single well and includes thousands of seeds and fruits remnants belonging to about 90 plant species. One insect pest, was also identified.

^{14}C dates of the site (not of well) fall between 8,140±120 and 7,550±80 B.P. (uncalibrated). It is assumed that the well was used as a garbage dump after the inhabitants stopped using it as a water source, so, the material age should be closer to the younger date, i.e. the end of the PPNC (Pre-Pottery Neolithic C) period.

Some of the species found no longer grow in the Carmel coast plain, but in somewhat northern and colder habitats outside the country, i.e. *Papaver somniferum* and *Cuminum cyminum*, as well as remains of *Sitophilus granarius*, a pest beetle which infests contemporary cereal grain stores in temperate regions of the world. In addition, four plant species, namely *Vitis sylvestris*, *Pistacia atlantica*, *Pinus halepensis* and *Alisma plantago-aquatica*, grow today only in colder regions of Israel.

This species list produces evidence that the climate during the occupation of Atlit-Yam was a little colder than prevalent today. It is assumed that these species are relict from the "Younger Dryas" cold period that prevailed some 2,500 years before the site occupation.

Boats in the desert: the use of Teak in Roman Berenike (Red Sea Coast, Egypt)

In the South-East of Egypt, on the Red Sea coast near Sudan, a Roman harbour is being excavated by an American/Dutch team. During three campaigns research is being done on desiccated wood and charcoal. So much material is found that not all could be analyzed. The charcoal studies concentrated on the huge layers found in an activity area just outside the settlement, small hearths from one of the trenches and contents of wooden bowls found in the back chamber of one of the temples. The wood analysis focussed on the worked objects. They were described and investigated on woodworking methods before the species was identified.

The results show three dominant species: acacia (*Acacia tortilis*), mangrove (*Avicennia marina*) and teak (*Tectona grandis*). In the charcoal, acacia is dominating, especially in the hearths and in the bowl contents. Acacia is nowadays the common tree growing in the vicinity of Berenike and is highly valued by the local inhabitants, especially as fire wood. This tree represents a group of cultivated local plants.

In the wood, mangrove and teak are the dominating species. They do not grow locally nowadays. The nearest mangrove vegetation is mainly situated around Wadi Gimal, about 80 km to the north of Berenike. It will be argued whether in Roman times this wood was transported to Berenike because it was highly valued or that it was growing abundantly around Berenike and was easily available.

Teak is native to the tropical deciduous forests of India, Burma, Thailand and Laos. The Roman connection between Berenike and India was already known from written sources (Periplus) and has been confirmed so far by archaeobotanical material: several traded food plants discovered by R. Cappers and the already mentioned teak wood. This is an example of the imported plants. Other species originate from Sudan, the Nile Valley, the Mediterranean Area and Central Europe. Whether they were cultivated locally by the Romans will be discussed. In the case of teak there are indications that it concerns the re-use of a dismantled ship.

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The Palaeoethnobotany of Abu Sha'ar site (AD 400-700), Red Sea coast; Egypt.

2-Worked, non-worked wood material & charcoal .*

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Abu Sha'ar Fort, ca 20 km north of the Red Sea resort of Hurgadah, is the only Roman fort thus identified along the Red Sea coast of Egypt; with at least two distinct phases of occupation during the period AD 400-700.

Using comparative anatomical methods, it was possible to identify specimens belonging to 20 woody perennial species. These comprised worked-wood appliances, non-worked wood fragments, branches and charcoal.

The identified plants included 17 indigenous species and three of foreign origin viz. Cypress (*Cupressus sempervirens*), Cedar (*Cedrus libani*) and Box wood (*Buxus sempervirens*). Among the 17 indigenous species, 10 species were known to Ancient Egyptians who gave them hieroglyphic names and were highly esteemed for millenia of years. These include: Sycamore (*Ficus sycomorus*), Maerua tree (*Maerua crassifolia*), Nile acacia (*Acacia nilotica*), Desert acacia (*Acacia tortilis* subsp *raddiana*), Balanos tree (*Balanites aegyptiaca*), Nile tamarisk (*Tamarix nilotica*), Athel tamarisk (*Tamarix aphylla*), Olive (*Olea europaea*), Date palm (*Phoenix dactylifera*) and Dom palm (*Hyphaene thebaica*).

Materials for the other seven species seem to have found application because of their local abundance around the site. These included the xerophytic-halophytic *Calotropis procera, Suaeda monoica, Salsola imbricata, Capparis decidua, Zygophyllum album* and *Salvadorea persica*. toothbrush tree

Numerous remains of the white mangrove (*Avicennia marina*) were recovered from the site denoting a richer growth of the plant during Roman time. The intensive exploitation of the plant seem to be the reason for its present day rarity in Abu Sha'ar Bay, few hundred metres from the fort.

*Continued from *Taeckholmia* **16:** 31-44 (1996).

Ethnobotany of Ancient Jewish Units of Measure

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Traditional Jewish units of measure have been contiuously in use for thousands of years, despite the Jews' being exiled and spread over many parts of the world. In the Greaco-Roman times, these units were used in commerce as well as in other aspects of life, while today they are restricted to religous observances. These Jews units as common are derived from the size of human limbs, such as the cubit, handbreadth and fingerbreadth. Volume units are of common fruits and seeds, such as olive, pomegranate, dried fig, barley kernel, lentil (as well as the chicken egg), all standards representing the average size of their natural equivalents.

The advantages of such a system unit are: 1. The natural equivalents are common; 2. they are available everywhere, in every season and in all times; 3. they do not change from place to place or from time to time; 4. the user is not obliged to collect and to measure the largest and the smallest fruits of a species in order to calculate their average, but he can rely by visual memory on what people consider to be its average size. Consequently, contrary to modern measurement systems, the user does not have to rely on standard units. Therefore, this system was more practical, but not as accurate as the modern unit systems.

However, about two hundred years ago, some scholars concluded that one of the basic assumptions, e.g. that a volume of a fruit does not change in time, is no longer valid. This was because they had found that the ratio between certain two natural equivalents is actually twice that of the traditionally assumed units.

The enlargement of some crop grains during the last millennia and their consequences for the Jewish measurement system are discussed

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The exotic plant food in late medieval Estonia (14th-15th century)

This paper presents Estonian finds of exotic plants principally from late medieval latrines in the context of late medieval recipes and eating habits. By exotic the plants are meant which neither grow naturally nor are cultivated in Estonia, and thus must have been imported. This list includes plant species as follows: *Elettaria cardamomum, Coriandrum sativum, Ficus carica, Juglans regia, Oryza sativa, Piper nigrum and Vitis vinifer*. There are historical sources which record the presence and the origin, sometimes also the consumer of certain plant food Only few of them, for example cookery books, explain how plants were practically used in food. The investigation of late medieval historical sources of food is under process in Estonia. There are no known cookery books surviving. However, when considering that the towns in Old Livonia used to be inhabited by citizens of German origin, German eating habits are expected to have been practised there. Therefore it seems reasonable to use for the analysis of archaeobotanical finds German cookery books. In my investigation I have used two of them to reconstruct late medieval eating habits in Tartu, for example the Middle High German and the Middle Low German cookery book. In Tartu, also Russian eating habits are expected to have been practised. It would be also interesting to carry out a comparative analysis based on Russian late medieval historical sources of food, for example regarding *Cucumis sativus*, *Fagopyrum esculentum* and *Panicum miliaceum*.

Les colliers de semence au Néolithique de roumanie

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La mise en valeur, en 1985, de l'inventaire livré par un vase de type Gumelnita, découvert à Ulmeni (dép. de Calarasi) attirait l'attention des spécialistes sur l'importance du "mobilier mineur" et du rôle que celui-ci avait joué dans la vie matérielle et spirituelle des communautés préhistoriques.

En revenant au contenu du vase de Ulmeni, précisons que l'on en a récupéré 2940 grains de ***Lithospermum purpureo - coeruleum,*** dont la plupart non traités, de dimension allant de 2,9 à 3,5 mm de long et de 2 à 3 mm de large; une série de petites pièces en argile, de forme ellipsoidale, brûlées au rouge, ayant parfois les nuances de l'ocre, la composition de la pâte pourrait même inclure une certaine quantité d'ocre - rouge, mais dans la majorité des cas ces pièces sont peintes en blanc; environ 200 éclats microlithiques de quartzite et des restes de résine.

Parmi les grains de ***Lithospermum purpureo - coeruleum,*** 95 exemplaires avaient été perforés aux deux extrémités, alors que 14 ne présentent qu'un seul orifice.

A Izvoare (dép. de Neamt), dans un couche appartenant à l'étape Cucuteni A_2 a été découvert un vase avec 8000 grain calcinés de ***Lithospermum purpureo - coeruleum,*** 40 petites perles en argile, 13 imitations de canines de cerf preforées, 25 grain de ***Triticum dicoccum,*** 10 de ***Hordeum vulgare nudum*** et restes de résine. Un grand nombre de grains de ***Lithospermum purpureo - coeruleum,*** a été perforés, qui pouvaient être employés à la confection de colliers.

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RITUAL USE OF PLANTS IN THE NORDIC COUNTRIES.

Depositions in buildings and graves in historic and prehistoric times.

In the Nordic countries, cereal grains and other botanical remains are often found in cremation graves dating to the Bronze Age (ca. 1500-500 BC), and to the Late Iron Age (ca. 600-1100 AD). Some graves in central Sweden have also yielded charred bread which has been examined archaeobotanically. Such finds, and also some finds from buildings, e.g. deposits of grain, placed under hearths and floors indicate ritual offerings and magic beliefs rather than functional usage. Interpreting such plant remains is not straightforward, but may be enhanced by the study of similar practices recorded in these regions in recent times. In many parts of Sweden, seeds of for example flax and pulses have been used in burial rituals until the 19th century. At least to some extent, these practices are believed to date back to ancient religions and ceremonies intended to promote fertility, prosperity and regeneration. A common trait for the ritual uses of plants in Sweden, in ancient as well a recent times, is that many species are often involved. Sacred numbers may play an important role, just as they do today in the still vivid Swedish tradition of collecting flowers on Midsummer Night.

Since deliberate selection seems to have been involved in the ritually deposited plant materials, the implications of using such material for the study of ancient crop cultivation are also discussed.

Traditional cultivation of hulled-wheats and legumes in the Iberian Peninsula

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The importance of ethnobotanical approaches has been widely recognized in the archaeobotanical literature. In order to obtain ethnobotanical data useful to interpret the type of remains that currently we document in archaeobotanical deposits (i.e. cereals and legumes), several ethnobotanical projects have been carried out in Spain over the past few years.

The cultivation under traditional methods of hulled wheats (*T. monococcum*, *T. dicoccum* and *T. spelta*) as well as of several legumes (e.g. *Lathyrus sativus*, *Lathyrus cicera*) in mountain areas of the Iberian Peninsula is still practiced. Data have been collected allowing us to understand better the way these minor crops were cultivated and managed in the past.

This paper presents data on:

1) Agronomic practices

2) Harvesting techniques

3) Crop processing sequences

4) Uses

References will be made to on-going projects outside Spain where some of these crops are also under cultivation.

Herbal Pharmaceuticals in the Middle Ages on the basis of 'Arabic Pliny' - al-Qazwînî.

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Zakariyâ` ibn Muḥammad al-Qazwîni (1203-1283 A.D.) was the writer of the first systematic Arabic cosmography entitled '*Ajâ`ib al-makhlûqât wa gharâ`ib al-mawjûdât*' (marvels of created things and their singuliarities). Apart from much mythical and legendary material, the book also includes a large number of descriptions of plants, minerals, animals, etc. The main body is a compilation of previous Arabic scientists (often lost or forgotten), but there seems to exist a lot of original material as well. As the age of al-Qazwîni (XIII century) was the time of the decline of science in the Middle East, '*Ajâ`ib al-makhlûqât*' is considered as one its last masterpieces. In the book al-Qazwîni describes more than 160 plants (the exact identification of some of them is still very complicated) and their medical use along with some opinions of eminent scholars like Avicenna or al-Bîrûni.

A PHARMACY LABORATORY OR A WITCH'S HOUSE? A CASE STUDY FROM POMPEII (NAPLES, SOUTHERN ITALY)

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In 1996 a farmhouse (*villa rustica*) was excavated near Pompeii (Naples, Southern Italy). The *villa* was similar to many other buildings of the same period (79 AD) in the area. It was a poor farmhouse with features clearly related to agricultural activities, such as a storage area with big vats (*dolia*), an open area interpreted as a threshing floor or courtyard etc. The *villa* was located in a low lying area which becomes waterlogged for many months during the year. These conditions were responsible for the excellent preservation of the organic material contained in some of the *dolia*.

The content of one of these *dolia* is here discussed and an interpretation of the assemblage is provided.

The deposit found at the bottom of this storage vat produced a high percentage of seeds of plants known for their "active" properties (such as *Papaver somniferum* and the Solanaceae). Associated with this residue there were also bones of small reptiles and amphibians.

I believe that this assemblage represents the residue of the preparation of some kind of pharmaceutical product. Its contents are similar to the ingredients mentioned in the preparation of ancient drugs called *mithridatium* and *theriac*. Further indirect archaeological evidence seems to support this hypothesis and will be also discussed.

ABSTRACT - APPROCHE ETHNOBOTANIQUE

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Ethnobotanical observations: Finger Millet Processing in East Africa

Although archaeobotanical sampling and recovery programmes are a relatively recent implementation in East African archaeology, results from sites where they have been carried out follow a similar trend. This is one of abundant recovery of wood charcoal, but very little in the way of other plant macroremains. Restricted archaeological evidence and ethnographic interviews attest to the importance of grains, in particular finger millet (*Eleusine coracana*), for the Bunyoro people of Uganda in pre-colonial times. It has been suggested that one of the possible reasons why finger millet is not being recovered in quantity from archaeological contexts is because the processing of this crop does not involve charring and hence is not being deposited in charred form in the archaeological record.

Recent ethnographic work on finger millet processing in Uganda shows that it is exposed to heat and potential charring during cleaning and preparation of the grain for either storage or cooking, and this regime is discussed in terms of its activities and products. These findings reinforce the need for archaeobotanists and archaeologists working in this region to look for other possible causes of the scarcity of plant macroremains, and also the importance of considering integrated evidence for agricultural activity on pre-historic sites.

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ETHNOBOTANY OF BULBS AND ROOTS IN CENTRAL TURKEY

In an ethnoarchaeological and ethnobotanical study, I recorded the use of about 250 plants by villagers in the Melendiz Area of Aksaray province, Central Turkey. Among these are 25 plants with underground parts that are used either as food, gum, tea, medicinal, glue or dye. Recent archaeobotanical research enables identification of the underground parts of plants, and perhaps in future, the remains of leaves. It is therefore appropriate to consider the various uses of plants besides that of food. Underground parts of plants used for fodder, fuel and tinder are not discussed here, as the focus is the direct use of the underground parts of these plants.

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Agriculture at Horgen Scheller: Neolithic Lake Shore Settlements in the Northeastern Swiss Plateau (3050-3080 B. C.).

Branchwood and animal bone analyses on the lakeshore settlements excavated at Horgen Scheller suggest that gathering and foraging practices played an important role in the economy - a more important role than at other known prehistoric settlements. One explanation is that the settlements of Horgen Scheller were specialized in the provision of wild plants and animals. We therefore want to assess the role of agriculture at Horgen Scheller and how important cultivated plants were for the human diet. Investigation of cultural plant and weed remains found in the two cultural layers should help to answer these questions. It will be of particular interest if the results support our hypothesis of a specialized economy in the fifth millenium B. P.. The concentration, frequency, and spatial distribution of plant remains will be discussed and compared with previously published data for the Lake Zürich region of the same cultural period.

Palaeoethnobotanical Research in Albania

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The Late Bronze - Iron Age site of Sovjan in east central Albania is being excavated by a team lead by Dr. Gilles Touchais of the French School in Athens and Dr. Freno Prendi of the Institute of Archaeology in Tirana. Plant remains were recovered from four horizons, the earliest of which, dated to the 13th century B.C., is a lake dwelling with both carbonized and waterlogged remains.

The most abundant seed type is emmer wheat *(Triticum turgidum dicoccum)* while einkorn wheat *(Triticum monococcum)*, barley *(Hordeum vulgare)*, millet *(Panicum miliaceum)*, and a small amount of bread or hard wheat *(Triticum aestivum/durum)* are also present. The bulk of the material was recovered from the Late Bronze Age level (5C) of trench 5A which has been dated between 1386 and 870 BC. Other remains from this deposit include lentils *(Lens culinaris)*, peas (*Pisum* sp.), bitter vetch *(Vicia ervilia)*, fig *(Ficus carica)*, and flax (*Linum* sp.). These plants all most likely represent crops grown around the site, although at this time it is difficult to determine if they were grown separately or mixed in various ways.

A number of species are represented by seeds that appear to be mineralized. These include raspberry-type (*Rubus* sp.), knotweed-type (*Polygonum* sp.), elder (*Sambucus* sp.), cf. *Physalis* sp., Compositae, and bedstraw (*Galium* sp.). The first four of these produce edible fruits. Here the contextual information for the samples containing these seeds will be important in determining if these might be remains of foods that had been eaten. A latrine deposit, for example, would produce such remains. It is also possible, however, that these remains are more recent than the deposit from which they come.

Several large acorn meats (*Quercus* sp.) were identified from deposits dated to the Middle Bronze Age (Touchais 1996 and personal communication) in Trench A7 level 7, as well as Trench A9 level 7. It is possible that these represent human food resources and the pollen data from the site (Denèfle, n.d.) indicates a high percentage of oak (28%) pollen, greater than all other species.

Future analyses of plant remains from Sovjan will aim to address the questions of agricultural processes, wild resource exploitation, and wood utilization. A great deal of both waterlogged and carbonized wood has been recovered from the structures excavated and it will be possible to determine what species were primarily used in the construction of these buildings.

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THE DIET OF THE ICEMAN

Plant macrofossil and pollen analyses were investigated in a 40 mg specimen of food residue from the Iceman's colon. The results show the composition of his last meal, and contribute to knowledge of Neolithic diet, the reconstruction of his environment and the season of his death. His last meal consisted of cereals, vegetables and meat. The farinaceous dish was made mainly of Einkorn (*Triticum monococcum*), but stone cells and vessel elemnts prove that he ate also other vegetables. This is in congruence with the palaeoethnobotanical investigations of soil samples from archaeological excavations, which have shown that Einkorn (*Triticum monococcum*) and Barley (*Hordeum vulgare*) were grown in the inneralpine areas during the Neolithic. Besides these crop plants wild fruits and seeds were gathered and eaten. The microfossil content of the colon residue is rich in pollen (30 types, 2 types of spores), diatoms, mineral particles, charcoual fragments and ova of intestinal parasites. Taxa from the more demanding deciduous forests (*Querco-Fagetea*) predominate among the pollen. The most registered *Ostrya*-type indicates the warmth demanding Hop Hornbeam (*Ostrya carpinifolia*) and gives unequivocal evidence the he came from the valley-bottoms south of the main range of the Eastern Alps. The taxa-rich pollen flora from the colon residue was ingested most probably by drinking water, as the occurrence of diatoms shows. From the flowering times of the pollen taxa and from the unique preservation of cellular gametophytes in the pollen of both Hop Hornbeam (*Ostrya carpinifolia*) and Birch (*Betula*) the deduction is made that the Iceman's last journey took place in spring or early summer at the latest.

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MEDIEVAL TOWNS IN NORTHERN POLAND IN THE LIGHT OF ARCHAEOBOTANICAL DATA

Plant remains from the two medieval towns - Elbląg and Kołobrzeg, located in the southern Baltic coastal zone are the main subject of the presentation. Both towns are similar as concerns environmental conditions, their history and methods of the recent archaeobotanical investigatious. A number of botanical samples from different categories of sites including cesspits, refuge deposits, yards, houses and a fair revealed mostly waterlodged remains and sometimes mineralised or charred. The fossil flora is analysed in respect to the questions concerning economy and natural environment of medieval towns.

Although charred remains are rare in the material, different groups of cultivated plants were identified; among them exotic species are of special interest. The indirect information on arable land come from numerous remains of segetal weeds, which were brought together with crops from the fields situated outside the towns.

The ecological spectrum of wild growing plants indicates various types of natural and semi-natural habitats exploited by man for different purposes.

The comparison of archaeobotanical data from both towns illustrates how precisely fossil flora can reflect even minor differences in local environmental conditions.

THE PALAEOETHNOBOTANY OF THE NEOLITHIC IN NORTH ITALY: NEW RESULTS

Mauro Rottoli - Laboratorio di Archeobiologia of Musei Civici di Como

When in 1971 EVETT and RENFREW published a little study on cereal cultivation in Neolithic Italy (*L'agricoltura neolitica italiana: una nota sui cereali*, Rivista di Scienze Preistoriche, 26 (2), 403-409. Firenze), they assumed that in Italy the introduction of cultivated cereals had been progressive From the beginning Neolithic people cultivated barley (*Hordeum sp.*), einkorn (*Triticum monococcum*) and emmer (*Triticum dicoccum*). Still in 1987, on the base of available data, researches assumed that in North Italy the naked wheat were introduced later and only in the Middle Neolithic (Square Pottery) the economy was definitely based on agriculture.

The analysis carried out in the last ten years on some settlements of ancient Neolithic in North Italy strongly modified the previous hypothesis and demonstrate an early and full neolithization of the peoples in the Po plain and in Friuli (north-east of Venice). In these settlements appear at the same time the hulled and naked cereals (*Hordeum vulgare/distichum*, *Triticum dicoccum*, *Triticum monococcum*, *Triticum aestivum/durum*, perhaps even *Triticum spelta*), various pulses (*Pisum sp.*, *Lens culinaris*, *Vicia faba minor*, *Vicia sp.*, *Lathyrus sp.*), and fruits that are harvested or cultivated (*Corylus avellana*, *Cornus mas*, *Prunus spp.*, *Quercus sp.*, *Rubus agg. fruticosus*, *Sambucus spp.*, *Vitis vinifera*, etc.). The cultivation of flax (*Linum usitatissimum*) and poppy (*Papaver somniferum*) is instead documented only later in the waterlogged settlements. The number of botanical remains recovered from "dry settlements" is however extremely reduced (few unit for one litre) and the documentation of a major number of species depend on size and number of samples.

These new data put new questions about the processes of cultural transformation and relationship between Mesolithic and Neolithic people in North Italy and the other Neolithic cultures from Balkan peninsula, Adriatic sea and Central and South Italy.

Quelques considérations phyto-sociologiques sur les mauvais herbes du Chalcolithique de la Roumanie

par Felicia Monah (Iaşi - Roumanie)

Les principales civilisations chalcolithiques sur le territoire de la Roumanie évoluent durant la période d'entre 5 000 - 3 500 B.C., étant les créations de populations qui ont comme principale occupation la culture des plantes, et notamment des céréales.

Au fil des années on a récupéré plus de 157 de lots à macro-restes végétales provenant de 31 sites chalcolithiques. Les plus grands dépôts sont constitués de céréales carbonisées où prédominent les espèces: Triticum dicoccum, T. aestivum, Hordeum vulgare, Panicum miliaceum. Ce qui ne veut pas dire qu'on n'y trouve aussi Triticum monococcum, T. spelta, Secale cereale, Avena sativa. Les dépôts de céréales qui appartiennent à une seule espèce sont très rares.

À côté des céréales on a découvert aussi quelques dépôt de Pisum sativum, Vicia ervillia et Vitis vinifera. On n'est pas en état d'affirmer avec certitude si les dépôts identifiés constituaient des stocks de semences ou de réserves alimentaires. Dans la plupart des dépôts on constate aussi la présence d'un très petit nombre de graines de mauvaises herbes. Le conspect floristique de celles-ci compte 19 espèces. La majorité des espèces sont caractéristiques pour Cl. Secalietea suivies des espèces caractéristique pour la Cl. Chenopodietea et enfin de celles appartenant à la Cl. Bidentetea .

Le petit nombre des graines de mauvaises herbes ou leur absence totale de certains dépôts s'explique par la manière de récolter les céréales, ou plutôt de les glaner, de même que par la fréquent changement des champs de culture.

Probleme der Romanisierung im westlichen Rheingebiet

Von Helmut Kroll, Kiel

Die Deutsche Forschungsgemeinschaft finanziert ein Schwerpunktprogramm über Romanisierung. Von Kiel aus werden Untersuchungen links des Rheins, in der Eifel, im Moselbereich, auch in Luxemburg und in angrenzenden Gebieten betreut, es sind sowohl archäologische Ausgrabungen als auch palynologische Vorhaben zur Klärung der Vegetations- und Siedlungsgeschichte.

Das Schwergewicht der archäobotanischen Arbeiten liegt in vorrömischer Zeit. Der römische Ackerbau ist hinlänglich bekannt, doch in der Kenntnis der Wirtschaft in vorrömischer Zeit klaffen noch beträchtliche Lücken. Dies Lücken zu füllen, um den römischen Ackerbau im Vergleich zum vorigen bewerten zu können, ist das Ziel der Untersuchungen. Gibt es eine spezifisch keltische und eine spezifisch germanische Landwirtschaft? Gibt es überregionale Kulturpflanzeninventare, deren Anbau großräumig Landschaften prägt und die eine ethnische Zuweisung ermöglichen? Liegt der schnelle und nachhaltige Romanisierungserfolg im keltischen Siedlungsgebiet auch in den landwirtschaftlichen Voraussetzungen begründet? Warum war es im Gegensatz dazu so schwierig, die germanischen Siedlungsgebiete rechts des Rheins langfristig ins Römische Reich zu integrieren?

Untersuchungen in Wallendorf, auf dem Martberg an der Mosel, in Wierschem bei Koblenz, in der Villa von Borg im Hochland und in Gräberfeldern (zum Beispiel im Gräberfeld von Hoppstädten) haben zum Teil reiches pflanzliches Fundgut ergeben, das Antworten auf manche Frage ermöglicht. Es hat den Anschein, daß geringe Unterschiede vom keltischen zum römischen Ackerbau bestehen, ganz im Gegensatz zu den großen Veränderungen, die die eigentliche Hortikultur der Gemüse und Gewürze und die der Gehölze betreffen und die wirkliche Neuerungen darstellen.

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LOCAL AND IMPORTED PLANT FOOD IN A ROMAN FORT NORTH OF THE LIMES.

Archaeobotanical studies of the Roman fort 'Flevum' near Velsen (prov. Noord-Holland) revealed that plant food consisted of a mixture of wild plants, products typical for local Iron Age farming and luxury goods imported from the Mediterranean.
Food supply of the fort will be tentatively explained in view of its excentric location and relatively early dating (14-28 AD).
Roman plant imports from other military contexts in the NL will be briefly discussed.

CROP PLANTS AND SUBSISTENCE IN THE MIDDLE AGE IN NORTH ITALY

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The researches carried out by Laboratorio di Archeobiologia (Como-Italy) in the last twenty years, but particularly in the last decade, increase considerably the knowledge on environment and economy of the Middle Age in North Italy. The archaeobotanical analysis (on seeds and charcoals) regard a lot of sites with different typology: fortifications, urban and rural settlements, churches, necropolis and other isolated structures (wells, cesspits, kilns). These sites are placed in the Po plain, in the piedmont areas, and in the alpine valleys. The chronology ranges from late roman age (IV-V century A.D.) to XV century, but the most important sites date from V to VIII century A.D., during the occupation of Goth and Longobard people in Lombardy.

These data provide a base to understand some specific problems like the transformation of cereal and pulse cultivation from roman age to early Middle age, the diffusion of *Castanea sativa* and *Juglans regia* in the plain and in the hills, the introduction or reduction/disappearance of species from roman age to Middle age (*Vigna unguiculata*, *Sorghum bicolor*, *Oryza sativa*, *Ziziphus jujuba* etc.), the production and distribution in northern Italy of species (and their derived products) with mediterranean (*Olea europaea*, *Prunus amygdalus*, *Pinus pinea*, etc.) or exotic (*Phoenix dactilyfera*, *Oryza sativa*) diffusion.

The analysis of these problems, and the punctual comparison with excavation data, permitted a first discussion of some general questions, like for example: the relationship between man and environment in the Middle Age, the comparison/integration between archaeobotanical and archivistic data, a valuation of possible economical models for urban and rural areas especially in the early Middle Age.

Archaeobotanical research from the Ukraine

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This paper gaves a first full overview of the cultivated plants of the Ukraine beginning from the Neolithic up to the Medieval Ages. Systematic investigations for archaeobotanical analysis started in 1976. Over the years plant remains /charred grains, seeds and its impressions on pottery and clay/ from about 300 sites have been examined and determined. Some carbonised remains have been obtained by means of flotation during the excavations. The distingvished assemblages are divided into phases according to the archaeological chronologies. This material has given evidence for cultivation of plants in Ukraine through a continious period of about 5000 years. The main results are as follows. In the Neolithic and during followed periods the plant records indicate that the great majority was cereal such as hulled wheat *Triticum dicoccon* and burley *Hordeum vulgare var. coeleste*.. The less important cereals *Triticum monococcum*, *Triticum spelta*, *Panicum miliaceum* occur more or less regularly. Plant remains recovered from Ukraine indicate that cereals were exploited together with pulses. Seeds of *Pisum sativum* and *Vicia ervilia* were very friequent. Radical changes in plant compositions began in the last centuries BC and connected with appearance greak colonists in the North of Black Sea.. Bread wheat *Triticum aestivum s.l.* was the most common with hulled barley. Rye, as a new cereal crop, has been observed there. Naked barley, common millet, oats, pulses being next in importance. Hulled wheats declined. This list add founds seeds of grapes. The highest concentration of archaeobotanical materials come from the Old Russ settlements. The most common cultivated plants of this period were bread wheat and rye on the North part and wheat and millet in the forest-steppe zone. In charred remains there were also *Hordeum vulgare*, *Avena sativa*, pulses - *Pisum sativum*, *Lens culinaris*, *Lathyrus sativum*. Flax, hemp and oppium poppy were cultivated also. The spectrum of recorded wild plants species consisted mainly of common weeds and ruderals. Gathered wild fruits include *Corylus avellana*, *Sambucus nigra*, *Rubus idaeus*, *Prunus*. All cereal finds are now being loaded into the Palaeoethnobotanical database /PEB/.

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Carbonised cereals and crop processing residues from medieval Greifswald, Mecklenburg-Vorpommern, Germauy

During rescue excavations in the town center of Greifswald, Mecklenburg Vorpommern, in 1994 remains of a wooden timbered building were recovered next to the medieval town-wall. The building Kuhstraße 23 can be dated to the second half of the 13th century. According to dendrochronological dating of timbers from the wooden construction, it had been destroyed by fire in 1290 or few years later. Thick layers of carbonised cereals and other plant remains survived in the building on surface of the burned clay floors. They give evidence to various agricultural activities like crop processing, storage and maybe straw used for cattle.
Seven samples contained extraordinary high numbers of well preserved carbonised plant remains.
The results of archaeobotanical research show stored lax-eared six-row barley already prepared for consumption (sample No. 1), hulled oats (*Avena sativa* and *Avena strigosa*; sample No. 6) and residues containing rye, hulled barley and various weeds of the crop (sample No. 7). Samples No. 2, 3 and 4 yielded high amounts of weeds, f. e. *Rumex acetosella* agg., *Spergula arvensis*, *Lolium temulentum*, *Centaurea cyanus*, *Agrostemma githago*, fragments of cereal stems and small, untypical cereal grains. These remains are obviously residues from crop processing activities like winnowing and coarse seeving of oat. Maybe cereal waste and weeds were used as straw for cattle.
The weeds of sample 4, dominated by oat grains and weeds, especially *Spergula arvensis*, *Rumex acetosella* agg. and *Lolium temulentum*, represent the weed flora of the medieval oat fields. High representation of small weeds prove already harvesting next to the ground. *Avena sativa* and *Avena strigosa* must have been maslin crop grown on sandy and nutrient-poor soils in the surrounding of medieval Greifswald. Serious infestation with *Lolium temulentum* and *Agrostemma githago* is documentated. *Agrostemma githago* is a typical weed of winter-grown rye in medieval times, but may have also infested summer grown oat.

This extraordinary find of different cereals and crop processing waste can be used to separate different activities and storage areas in a medieval building. It is evident that the building Greifswald, Kuhstraße 23, must have been used for agricultural activities like trade in cereals and/or cattle. The example of Greifswald shows how archaeobotanical research can give additional help to the archaeological interpretation of excavation results.

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How can we interpret food furnishings in cremations in Roman Switzerland?

Many findings in graves tell us not only that people in Roman times north of the alps buried their dead in a simple manner, but also that they put various furnishings into the graves. Since we have no written records for this region about burial practices and the ideas that lie behind the traditions, only the remains of grave furnishings can help us further. They provide the means to approach questions about burial rituals, afterlife beliefs, ethnic origin, the function and meaning of the furnishings and their relation to sex, age, and status of the deceased in addition to regional differences.

In the archaeobotanical laboratory in Basle we are working on cremations from three gallo-roman graveyards from the 1st and 2nd centuries A.D.: Augusta Raurica Cito AG (BL) and Vindonissa-Dägerli (AG) are in the north of Switzerland and Arconciel (FR) is in the western part of Switzerland. While we investigate the plant remains, the archaeozoological laboratory in Basle analyses the animal bones. Both laboratories are in close collaboration with archaeologists who look at the ceramics and metalwork etc. In this way, we obtain a most complete picture of the furnishings.

Excavations have shown that the dead bodies were either cremated or inhumed. In both types of graves, all inorganic material and bones are well preserved but organic plant material only persists, in charred condition, in the cremations. Therefore in this work, only cremations were taken into consideration.The remains of the furnishings predominantly comprise pottery vessels, metalwork and personal possessions. Food remains, e.g. animal bones and charred seeds, are less frequent. The results show that the graves were very variably furnished, but we have to bear in mind that many investigations are unfortunately very fragmentary. It is mainly small remains such as seeds and bones from birds and fish that are not found. The furnishings of many graves are therefore incomplete. Besides this methodological problem, which can be solved relatively easily, we have to find out how we can interpret the furnishings and especially the food furnishings in relation to the other finds. We can make a list of the furnishings and catalogue the differences between the graves, but what do they mean and how should we judge them? Which furnishings tell us for example about the status or degree of prosperity of the dead? Is it the quantity of dishes, personal possessions or food, or do we have to consider all the items together? In my report I want to show a selection of different grave furnishings and give an example of how an interpretation can look and with what problems it is associated.

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A Celtic Trade Center in the Ramsau-valley at the Dürrnberg (Austria) – Environment and Food Plants

In several archaeological excavations samples have been taken from a Latène age trade-settlement at the Ramsautal, a high-valley, placed nearby Hallein, County of Salzburg. Due to the prehistoric salt-mining and some other branches of trade, like metal-processing (bronze, iron), wood manufacture, pottery and textile production, an outstanding position as a prehistoric economic center has to be assumed for this place.

The settlement, which is situated at about 750 m a.s.l., was established in the fifth century BC. Within a period of about 350 years building activity and constructions changed three times, caused by flood disasters and high water-levels. Wood analysis confirm the natural vegetation characterized by spruce, fir and beech (Abieti Fagetum).

Cereals, mainly millet (*Panicum miliaceum*) and barley (*Hordeum vulgare*) represent the basis of nutrition as the results of palaeoethnobotancical analysis show. Emmer (*Triticum dicoccum*) and spelt (*Triticum spelta*) appear in lower quantities and less regularity. In contrary to the low number of charred cereals the big part of plant remains is composed of non-charred seeds and fruits as expected for waterlogged sites. Their habitat is the closer surrounding of the site.

According to the physical-geographical preconditions the main part of species belonging to the group of small sedges, swamp swards and persistent nitrophilous ruderal communities are dominant. These plants characterize habitats which are unsuitable for cultivating cereals, sustained by a lack of species commonly growing in weed communities of cereal fields, glumes and rachis fragments. Prosperity due to a capable trading system allowed a departure from the modell of a self-contained community. It has to be suggested that crop-plants mainly derived from the planes of the alpine foreland.

Andrea Torma

Archeobotanical assemblages from mediaeval wells in Hungary

Abstract

This study is a review of archaeobotanical finds from mediaeval wells in Hungary available to date. Althrough only relatively feww such assemblages are know, wather-logged layers have preserved the possibly richest botanical materials. They are especially significant since, in addition to remains of cultigens, they also contain a relatively great quantity of vegetation elementscharacteristic of the natural flora. This offers good opportunities for environmental reconstruction.

Archaeobotanical remains from the medieval wells discussed in this study provide information on medieval agriculture and environment in various regions and also represent different social strata (royal seats, monastic *latifundia*, rural towns, fortification and villages). The study is aimed at analyzing the function of these features, the circumstances of preservation and reviews the methods of archaeobotanical sampling.

The sites presented in the paper include the 13-14th c Royal Palace in Buda, the 14-15th c Royal Garden of the Visegrád Palace, the 15-17th c Franciscan Monastery in Visegrad, the 14-15th c Kereki Fehérfő Castle, the 16-17th c Cumanian village at Szentkirály as well as the 16-17th c rural towns of Szécsény. Botanical remains from these settlements are kept in the Archaeobotanical Collections of the Hungarian Agricultural Museum in Budapest.

The Aisne valley (France) in Palaeoethnobotany

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The river Aisne belongs to the drainage basin of the Seine in northern France. Its source lies between Verdun and Reims, but the sector of the valley under study stretches from the small town of Neufchâtel in the east to the confluence with the Oise, near Compiègne in the west. A quarter of this distance the river flows through the rolling chalk landscape of Champagne. For the remaining distance the valley cuts through Tertiary limestone plateaux, forming a flat-bottomed corridor with steep sides. The valley floor is covered by gravel terraces which were the focus of settlement from the Early Neolithic through the Early Middle Ages. The plateaux are characterized by very little open water and a low water table; even today, they are sparsely settled. The Aisne gravels are of great value for concrete manufacture and road building, and large-scale gravel extraction is destroying the landscape. From the seventies onwards, rescue excavations carried out by, mainly, the CNRS Equipe de Recherche Archéologique no 12 ,the University of Paris and the Centre de Recherches archéologiques at Soissons, try to record as much of the past as possible.
For more than fifteen years I have been studying seeds from the excavated sites. Most of them are carbonized. They cover the period from the Neolithic Bandkeramik Culture up to and including the Early Middle Ages. Only the Bronze Age is not represented. The local sediments seem not to be very well suited to the preservation of carbonized matter and Neolithic sites are not as rewarding as, for instance, sites in loess-covered areas. Preservation is good from the Iron Age onwards. Nevertheless, the research provides an insight into the (pre)history of crops and weeds in the Aisne valley. A synopsis of the long-term developments will be presented during the meeting.

Agriculture in the Southern Baltic Region during 8th to 10th century A.D.

von Almuth Alsleben, Kiel

After the turbulent period of migration, slavonic settlers spread out in Middle Europe and reached the Baltic coast around the 8th century A.D. During the golden age of slavonic settlement in the 9th/10th century, the area in the north extended from Ostholstein (northern Germany) with the stronghold „Starigard"/Oldenburg to north-west Russia with the fortified settlement Rjurikovo Gorodišče, the predecessor of Novgorod.

The nutrition economy of the early slavonic strongholds is well known. The investigations of their fossil plant material gave us information about the variety of the cultivated plants. It is not only barley, rye, oats, bread wheat and celtic bean but also club wheat, emmer wheat, spelt, millet , lens and pea. Also typical, but scarcely detected in carbonised plant material, are sour cherry and cucumber. But less is known about the agriculture of the first slavonic settlers in the Baltic region.

Questions are: Does it exist an inventory of culture plants which is similar in all early settlements? How does it look like? And does it differ from those of the neighbouring cultures, the Scandinavian in the north and the Saxonian-Frankonian in the west? These questions are part of our investigations of rural settlements in the southern Baltic region. This paper will present the archaeobotanical results of four excavated settlements: **Göhl**, a rural settlement in the vicinity of the stronghold „Starigard"/Oldenburg (Ostholstein), **Groß Strömkendorf**, a trade centre at the Baltic near Wismar and **Georgij** and **Rjurikovo Gorodišče**, two settlements near Novgorod.

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Oral presentation IWGP 1998, abstract

Long term trends in the vegetation development in relation to changing agrarian systems in the Southern Netherlands

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The present study is part of a multidisciplinary, 4 year running research program between archaeologists and palaeoecologistss which aims at understanding time-related changes within prehistoric agro-pastoral communities: settlement patterns, social organization, food economy, burial rituals, trade and others. The main goals are to combine and interprete palaeoecological and archaeological results from a dia-chronical perspective and within the setting of a changing natural and social environment in the southern part of the Netherlands (Province North-Brabant). We focus on the time span Middle Neolithic Period to Late Medieval Ages. By the help of information from archaeological macroremain analyses, pollenanalytical data and the settlement patterns we evaluate the economic importance of agriculture in several microregions for selected time periods.

The first results show that

- During the Neolithic Period an interrelationship between the use of different food resources and landscape patterns must be conceived.
- The transition from hunter-gatherers to farming might have been a long term process in regions were fertile soils are rare.
- Continuity of landscape use in terms of agriculture can be seen in several microregions from the Bronze Age Period onwards.
- The increase in diversity of crop plants followed a long term trend and collected food plants played an important role during all prehistoric periods.

STRUGGLE FOR LIFE IN BRONZE AGE WEST-FRIESLAND

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The Eastern part of West-Friesland was very densely inhabited in the Middle and Late Bronze Age. In this former tidal flat and salt marsh area tidal activity ceased about 3450 BP. Differential compaction caused inversion of the relief. The people that colonized the area in the Middle Bronze Age about 3300 BP found a very attractive 'fresh', fertile landscape, a paradise. On the sandy and loamy ridges the arable fields were laid out and the lower laying clayey basins were very suitable as pastures and meadows. The large scale archaeological investigations of a number of sites showed that in the first centuries of occupation farmer's life was very succesful and the population expanded fast. However, in the course of the occupation, there were important changes in the structure of the settlements, crop cultivation, animal breeding, and in environmental conditions. There are numerous palaeoecological indications for the area becoming increasingly wetter. This was due to the impeded drainage of the area following the closure of the tidal inlet and the rise of the sealevel, and an abrupt climatic deterioration around 850 BC. Stress was generated by population pressure on the one hand and the increasing lack of space because of the rising ground water table. Arable farming and animal breeding became problematical.

The settlement areas eventually became so wet that no further adaptations were possible as the limits of technological knowledge and socio-economic organisation were reached. The area was abandoned about 800 BC.

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Plant food component of the diet at Tybrind Vig - Late Mesolithic Ertebølle settlement in Denmark

The evidence for use of plant foods in pre-agrarian subsistence has been recovered from the Late Mesolithic submerged settlement at Tybrind Vig on the West Coast of Fyn. These included charred remains of sea beet (*Beta maritima*) root parenchyma, fragments of acorn (*Quercus* sp.) parenchyma, grain of mannagrass (*Glyceria fluitans*) and hazelnut (*Corylus avellana*) shell frgments. The charred stem fragments and culm nodes of reed (*Pragmites australis*) may point to the use of this plant as a food source. The charred fragments of sea beet roots are of special interest because they are relatively abundant and frequent in comparison with most of the other charred remains of plant foods that are recovered from hunter-gatherer sites in Europe. Sea beet roots must have been collected to a greater extent than other plant foods at Tybrind Vig, though perhaps with the exception of hazelnuts. The presence of charred acorn fragments provided not only the evidence for their use as a food source in past diet, but also possibly reflect evidence for processing of acorn food. The gathering of plants such as *Malus sylvestris*, *Rubus caesius*, *Crataegus monogyna*, *Cornus sanguinea*, *Viburnum opulus* and *Frangula alnus* for their fruits/berries by the people at Tybrind Vig is very probable.

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Agriculture in Bronze Age society: intensification or diversification?

In the archaeology of northwestern Europe, the Bronze Age (i.e. the period of c. 1800-700 BC) is considered as a period of major social, cultural, and economic transition. In the course of this period important shifts took place in agriculture as well. Archaeologists and archaeobotanists, when attempting to describe and explain changes in agriculture, have often leant heavily on Boserup's well-known model of agricultural intensification (Boserup 1965). This model is based on the assumption that demographic pressure leads to an increase of the frequency of cropping, an evolutionary technological progress and the intensification of agricultural production. Although sometimes of great help to archaeological interpretations, Boserup's model is too unilinear and deterministic to satisfactorily explain the agricultural intensification in prehistoric society.

As Morrison (1994) shows, diversity and variability are critical aspects of the process of agricultural intensification. Agricultural intensification (a process by which the yield per unit of land and/or labour is augmented) might include increased investments in such practices as ploughing, weeding, and manuring, or an increased frequency of cropping. Strategies of diversification, too, play a major role in this process of intensification, e.g. the coexistence of various fallowing regimes, the use of spatially fragmented field locations (e.g., an infield-outfield system), a wider variety of crops, maslins, mixtures, etc.

Botanical data from Bronze Age and Early Iron Age excavations in the Netherlands, Luxemburg and Lorraine (northern France) support the hypothesis of an agricultural intensification through diversification in Bronze Age and Early Iron Age. The archaeobotanical study of numerous excavated settlement sites in this region shows a wide variety of cultigens, the presence of crop mixtures and maslins, a, possibly systematic, practice of manuring and a relatively important role of gathering of wild plants.

Weeds in thatch from Late Medieval English cottages. Dominique de Moulins (English Heritage)

In this paper, weeds from a number of thatched roofs from Southern England are investigated. The thatch is dated to the Late Medieval period and has been preserved by the smoke from hearths in open halls. The main component of the thatch is usually cereal crops but mixed with the straw are other plants, the weeds from the fields. This represents an exceptional sample of plants reflecting a known environment accurately . The study of these plants provides us with the opportunity to increase our knowledge of the change in habitat preference of some plants, of agrarian practices and of thatching. A comparison with the documentary evidence is also enlightening. In addition, these assemblages have important archaeological implications as, until now, most of the weed seeds component of archaeological plant assemblages have been interpreted as being part of the by-product of post harvest crop processing. However, this explanation may only be a partial one and the likelihood of the plants coming on site as part of the structure of buildings needs investigating.

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New evidence for Secale cereale as a winter crop, 300-600 AD. in Southwestern Denmark

Archaeobotanical information from the Late Roman and Germanic Iron Age periods in Denmark, (200-700 AD.), is sparse both in terms of the number of sites investigated and the data available.
However, the analysis of a quite new, or a hitherto rather overlooked, category of archaeobotanical material, has been able to shed new light upon crop husbandry practices in southern and western parts of Jutland during these periods. The carbonised material in question is that found in slag pits from shaft furnaces used in iron smelting. The pits beneath the furnaces were stuffed with fresh unthreshed straw uprooted from the field just prior to melting the bog ore iron. Consequently, large samples of straw complete with grains and weeds can be recovered during excavation, together with imprints of straw in the solidified slag.
The analysis of the contents of 50 slag pits has revealed the presence of either barley or rye, while only a small number of pits had a mixed composition. The weed seeds recorded represented a comparatively small number of species; the 10 most commonly occurring of these were subjected to correspondence analysis. The analysis performed solely on these weeds showed a marked difference in the composition of the barley and rye furnaces. The barley-furnaces are linked with *Chenopodia album*, *Polygonum laphatifolium/ ersicaria, Ra hanus ra hanistrum, Stellaria media* and *Spergula arvensis*, while the rye-furnaces are characterised by *Lolium perenne*, *Tripleurospermum inodorum, Rumex acetosella* and *Polygonum aviculare*. Accordingly, the differentiated association of the weeds to barley and rye samples from the fields is interpreted as showing two different sowing periods; summer barley and winter rye, while the mixed samples strongly suggest crop rotation with barley as first crop, followed by rye. This mode of rotation is in accordance with written sources from the 18th. century.

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APERÇU DES RESULTATS CARPOLOGIQUES OBTENUS POUR LA WALLONIE AU COURS DES CINQ DERNIERES ANNEES.

Le présent exposé aura pour objet un bref survol des résultats d'analyses carpologiques obtenus, ces cinq dernières années, sur des échantillons provenant de sites archéologiques fouillés par le Service des Fouilles de la Région Wallonne (D.G.A.T.L.P.), ou sous sa direction.

Nous envisagerons notamment les remplissages de silos et de fosses d'extraction, respectivement datés du Bronze final (Tourpes / Fraide-berte) et des périodes protohistorique et gallo-romaine (Remicourt / Fond de Lantremange et Waremme / « Quatre - Abias »). D'autres sites seront considérés de manière plus globale, tels les villae de Meslin l'Evêque - Ghislengien et Bruyelle, ainsi que les relais routier de Fexhe , théâtre de Blicquy et zone portuaire de Pommeroeul, tous gallo-romains. Nous toucherons également un mot des silos à fruits médiévaux trouvé à Huy.

Les résultats étant encore peu nombreux, nous n'envisagerons un premier essai de synthèse que pour la période gallo-romaine, tous types de sites et structures confondus.

OUTLINE OF THE LAST FIVE YEARS ARCHAEOBOTANICAL RESULTS FROM THE SOUTH OF BELGIUM.

This communication will be a short outline of the last five years archaeobotanical results coming from archaeological excavations directed by The Walloon Excavations Service. We will especially talk about the filling of storage and extraction pits from protothistoric and roman times (Tourpes / Fraide-berte, Remicourt / Fond de Lantremange et Waremme / « Quatre - Abias »). Some other sites will be consider more globally : the Meslin l'Evêque - Ghislenghien and Bruyelle villae, the road relay of Fexhe, the theatre of Blicquy and the Pommeroeul 's portuary zone. We will also have a word about the medieval fruits' s silos of Huy.

As the results are still too few, the communication will just propose a first attempt of synthesis for the Gallo-Roman Time, regardless the sites and structure 's types.

Données botaniques provenant de sites romains du Nord de la France

V. Matterne

Nous présentons les résultats de l'étude botanique d'une vingtaine de sites datés de l'époque augustéenne au Bas Empire. Tous les sites sont localisés au nord du sillon Seine-Marne ou en région parisienne.

Nous aborderons un ou plusieurs des thèmes suivants :

- évolution du spectre d'espèces cueillies et cultivées sur la période de temps prise en compte.

- distribution géographique de certains produits et notamment, du blé épeautre.

- comparaison des espèces attestées en contexte urbain et rural.

- comparaison des espèces mentionnées dans quatre sites urbains, de statut non comparable : exemples de Rouen, Amiens, Melun et Jouars-Ponchartrain. Le type de conservation des semences dans ces contextes est identique : le matériel est en partie imbibé et en partie minéralisé.

Données récentes sur les plantes exploitées en France du Nord au Haut Moyen Age

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Le développement des fouilles de sauvetage en France a permis l'étude de plusieurs dépôts carpologiques issus de sites ruraux et dont l'occupation a été datée principalement de la période carolingienne (IXè-Xè siècle).

L'exposé présentera les résultats obtenus sur un ensemble de 11 sites de la France septentrionale : à Paris, dans le nord de la région parisienne, en Normandie et en Bretagne. Les céréales (*Triticum aestivum/compactum*, *Triticum spelta*, *Secale cereale*, *Avena sativa et A. strigosa*, *Panicum miliaceum*, *Hordeum vulgare*) et les légumineuses (*Vicia faba var. minuta*, *Pisum sativum*, *Vicia sativa*, *Lens culinaris*) sont les principales plantes attestées. D'autres cultures comme *Linum usitatissimum*, *Cannabis sativa*, *Humulus lupulus* et plusieurs fruits sont apparues ; leurs restes sont moins fréquents dans ces contextes. Nous discuterons du témoignage relatif au type d'agriculture qui a pu être pratiqué à l'époque carolingienne par rapport à celui des sources écrites en évoquant les cas intéressants de *Avena strigosa*, *Triticum spelta* et *Vicia sativa*.

Palaeoethnobotanical investigations

in two ancient "ligurian" Neolithic sites in Languedoc (France).

Philippe Marinval

A few years ago, a second ancient Neolithic has beeb discovered in the Southern France. It is independent of the Cardial complex which is quite common. This Neolithic present obvious affinities with Ligury (Italy).

During the excavations of two openair sites of this Neolithic near Béziers (Hérault) some macro-remains have been collected. They permit us to reconstruct the vegetable resources of these poeple. It is therefore possible to compare these foundind with the data concerning Cardial vegetable economy.

The ancient "ligurian" Neolithic can be distinguished from Cardial economy by the culture of hulled wheats (*Triticum dicoccum* and *T. monococcum*) while Cardial societies seem not to have been using them.

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Economie végétale de deux sites du néolithique ancien "ligurien"

en Languedoc (France).

Il y a quelques années, un second courant du Néolithique ancien a été reconnu dans du Midi de la France. Il est indépendant du complexe Cardial qui est très largement répandu. Ce Néolithique présente des affinités manifestes avec la Ligurie (Italie).

Lors de la fouille de deux sites de plein air de ce Néolithique près de Béziers (Hérault), des paléo-semences ont été recueillies. Celles-ci permettent de retracer une partie des ressources végétales exploitées par ces populations. Une confrontation de ces données à celles disponibles pour l'économie végétale cardiale est donc envisageable.

Le Néolithique ancien "ligurien" se démarque de l'économie cardiale par l'emploi des blés à grains vêtus (*Triticum dicoccum* et *T. monococcum*) alors que les sociétés cardiales semblent totalement les ignorer.

Food plants from late Bronze Age lagoon sites in Languedoc :

the examples of La Fangade, Sète and Portal Vielh, Vendres (Hérault, France)

Laurent Bouby[1]

During the late Bronze Age II (1150–950 BC), lake-shore settlements appear on the lagoons lining the Mediterranean coast in Languedoc (southern France). They develop into the late Bronze Age IIIb (roughly 850–725 BC) while hilltop villages appear in the hinterland and cave sites continue to be occupied. The vicinity of these two types of settlements during this last period has led M. Py (1992, 1993) to the hypothesis that they could have been economically complementary, the main settlement and agricultural production taking place in the hinterland villages, the lagoon sites being devoted to more seasonal activities (principally fishing, cattle grazing and maybe hunting).

Hinterland settlements (hilltop villages and caves) have already provided palaeoethnobotanical information but food plants from lagoon-shore settlements were still unknown.
Although the sampling was not carried out in perfect conditions, the sites of La Fangade, Sète (late Bronze Age II) and Portal Vielh, Vendres (late Bronze Age II and III) are providing new data on this subject. La Fangade being totally submerged, it represents the first waterlogged assemblage for French Mediterranean prehistory.
The cultivated and gathered plants exploited by the lagoon people will be compared with those of the hinterland sites, the main result being the evidence of *Papaver somniferum* exploitation in the lagoon settlements. The problem of the origin of the cultivated plants on the lagoon sites will be discussed.

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Iron Age agriculture in Catalonia.

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We consider the subject of Iron Age agriculture in the area covered by Catalonia (NE of Spain) on the basis of the studis that have been undertaken of seed and fruits finds.

Has been synthesized the information provided by published studies together with the results of more recent works. The methodology used to carry out the studies is varied and reflects very different conditioning factors.

From a geographical point of view several groups can be noted: the Empordà region (comarca), the Segrià region, the Osona region and the coast sites.

The period in which the settlements were occupied covers from the 9th century BC to the 1st century BC. In some cases settlements can be assigned to one particular century, while in others it reflects longer periods. It is not possible to differentiate zones on the basis of the specific chronological period.

The paleobotanical material includes seeds, fruits and parts of carbonized spikelets, there are also some mineralized remains and, excepcionally, plans impressions and braided pieces. Parasite remains or evidence for their effects on seed have not been noted.

The cultivated species that have been traced are: barley, naked barley, lentil, flax, common millet, pea, pearl millet, wheat, eikorn, emmer, brod bean, broad bean (small seed), and vetches. Oats and grass pea may also have been grown.

The technology necessary for grafting and multiplication may have been developed for fig and olive trees as well as vines.

In the Iron Age both wild and cultivated species of *Setaria*, *Avena*, *Lathyrus* and possibly *Vitis* can be found alongside in paleobotanical samples.

Fields and woodlands: charred plant remains and charcoal in the neolithic site of Makri (Thrace, Greece).

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The seeds, fruit, nuts and charcoal recovered in the neolithic site of Makri present us with a unique opportunity to study the prehistoric vegetation and plant use in an area that has never so far been investigated in this respect. The prehistoric material studied corresponds to the neolithic cultural periods Makri I and II.

The objective of the archaeobotanical study is to investigate the role of plants in the neolithic economy of the settlement. A wide range of species, cultivated and wild has been identified, providing the basis for determining prehistoric crops at the site and inferring their intended or possible uses. These data also provide some idea about the vegetation in the vicinity of the site thanks to the wide range of wild species represented in the samples.

Parallel to this information, the analysis of charcoal from the same site, aims to determine the palaeoenvironment, the palaeoecological sequence as well as the distinct use of arboreal vegetation surrounding the site. The results demonstrate the existence of a mosaic of deciduous tress, bushes or shrubs in the settlement's catchment area. The deciduous oak woodland and its components provided fuel for domestic fires and timber for building purposes. Gathering of firewood and fruit or nuts such as wild pistachos, figs, almonds, grapes, acorns and cornelian cherrys is documented by the carpological and charcoal analysis as well.

Carpological and charcoal analysis data are armonious; the neolithic economy is established in a rich environment and the human groups make profit of the surrounding vegetation in various ways. The combined examination of charcoal charred plant remains contribute towards a more complete picture of the ecological zones surrounding the site of Makri.

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NEW ARCHAEOBOTANICAL DATA FROM APULIAN REGION (SOUTH-EASTERN ITALY). PALAEOENVIRONMENT AND CROP ACTIVITY FROM NEOLITHIC TO BRONZE AGE

We carry out new archaeobotanical analysis in a series of archaeological Apulian sites with sequences from Early Neolithic to Bronze age.

For particular sedimentation environment in Mediterranean region, only carbonized remains of wood texture and seeds and fruits was considered for palaeoenvironmental reconstruction and early crop processes activity.

Anthracological analysis was utilized for investigating arboreal vegetation characteristics during the Holocene as from the passage to Pleistocene, in a region of important geographical collocation, between western and eastern Mediterranean.

A conspicuous data bank of seeds and fruits remains was utilized to known the modality of vegetal food production as from local Neolithization to proto-historical organization of territory.

By isolation of elements in archaeobotanical records and analogy with experimental and ethnobotanical experiences it was possible to reconstruct different phases in processes of cereals from field to storage and food consumption.

New data about the management of natural resource for food and the beginning of fruit-growing during Bronze Age was carry out, in relation to new modality of political organization of territory and change in landscape.

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Plant remains from Las Pilas (Mojácar, Almería), a Chalcolithic site from SE Spain.

In this paper we present the results of the carpological analysis applied to the site of Las Pilas (Mojácar, Almería), a Chalcolithic settlement from SE Spain. This site is situated in the Vera basin, one of the actual more arid regions in Europe. Our results, related to other analysis done in the area, help us to demonstrate that climate was not as dry as nowadays in that period.

We can also provide new archaeobotanical evidences wich increase the number of plants exploited in this period. We discuss the role of the diferent crops, as well as the wild plants, in the diet and economy of the society of Las Pilas, trying to demonstrate the increase of agricultural practices compared to previous periods and the establishment of the basis for the next Bronze Age agricultural economy.

Finally, we present the domestic structures and artifacts found in Las Pilas related to the conservation and manipulation of vegetal products, with the purpose of characterize them and analyse their function in the daily life of people.

Karl-Ernst Behre

A new review on the history of beer additives in Europe

From the very beginning of brewing the taste of beer has been improved by flavouring ingredients. During the Middle Ages and early modern times a great variety of plant species were used for this purpose, most being aromatic species and others being medical. Two species also acted as preservatives, hop (Humulus lupulus) being the main species, but sweet gale (Myrica gale) was also used. Both can be traced in the archaeobotanical record, as has been shown in the first compilation of their finds that was made some 15 years ago.

With the increase in archaeobotanical research into medieval sites during recent years, many new records are now available. New maps have been drawn to show in which this information has been incorported.

In addition to the archaeobotanical records, a large number of written sources on these beer additives have been researched. They give additional information on the history of the use of hop and sweet gale, and on the competition on their use in brewing them. Apart from these species, a large number of other plants are mentioned in old herbals and other books on brewing. Not all were nor good for the health tasty, some were even poisonous but were regarded as having medicinal properties. Nowadays all these ingredients are not no longer used in most European countries as a result of various regulations relating to the production of good quality beers.

Resource Supply Among Hunter-Gatherers From A Middle Paleolithic Site

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Charcoal records from Middle Paleolithic sites seem to show that fuel wood selection was conditioned upon the environment. Although there are other facts that could also influence resources supply, such as the quantity of wood needed related with the length of the stay and the availability of the different species. Moreover, the comparison with other resources such as lithic raw material clarify in some cases the strategies carried out by hunter-gatherers.

The aim of this paper is to consider some vegetal remains that have been collected during the last few years in Abric Romaní (40-70 Kyrs. B.P.) site located in the North East of the Iberian Peninsula. The are two main aspects to consider, on one hand, how hunter-gatherers managed their environment, and, on the other hand, how they organize their space during their occupations conditioned upon the site resources. Some aspects such as wood selection and space organization are discussed on the basis of charcoal and hearths analysis and in comparison with other raw material supplies.

Abric Romani's archaeological levels are characterized by short term occupations. During these occupations pine wood was the basic fuel wood used and it was supposedly collected nearby the rock shelter.

The remains that have been recorded are hearths with different typologies, charcoal ashes and charred wood travertine casts. Some of the analysis results have already been published (ALLUE, E *et al.* et al. 1996; ALLUE, E *et al.* e.p.) and further analysis obtained from levels excavated during the last years seem to corroborate these data.

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Archaeobotanical Study of the Early Neolithic site Slatina (Western Bulgaria)

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Preliminary results of an archaeobotanical study of the Neolithic site Slatina in Sofia are presented. Carbonised seeds and fruits are recovered from four occupation layers related to the second part of the Early Bulgarian Neolithic - 5700-5500 BC. The most important cultivated plants seem to be *Triticum monococcum* and *Tr. dicoccum*. Usually they occur in almost equal quantities in the samples. The found barley is only hulled and in extremely small quantities. A few samples are rich on legumes (most common are *Lens culinaris* and *Lathyrus sativus/cicera*). *Linum usitatissimum* is presented with a few well preserved seeds. The wild fruits occur frequently in the samples, especially *Rubus fruticosus* s.l. and *Cornus mas*.

Macrofossilanalysis in heaps av fire-cracked stones - some aspects of seed-occurence in different layers and some stratigrafical considerations.

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Macrofossilanalysis on material from different heaps of fire-cracked stones (deriving from the Bronze Age) will be discussed. The heaps were divided in four sections (cardinal points) and each section were sampled at every 10 cms.

From the analysis it was clear that a different degree of contamination by uncharred seeds, mainly from Rubus idaeus and Urtica dioica, have occured into the layers. These seeds were found in very high frequences in some of the levels and they seemed to be concentrated to these levels, probably because the materials were more or less dense. Seeds of Rubus idaeus from a lower part of one of the heaps were ^{14}C-dated with accelerator-technique showing that the seeds really were modern.

A similar phenomena have been observed by pollenanalysis from fossil arable lands. In samples form such layers pollen from e.g. cereals can be found principally in the underlaying till.

Thus, it seems obvious that a slight difference between layers can be secondarely accentuated by contamination of different substances.

The lecture will focus on contamination and the aspect of stratigraphy within different kinds of heaps and the meaning in doing e.g. pollenanalysis on such materials.

Résumés des Posters/ Posters Abstracts

Structures And Paleobotanical Remains From l'Era Del Castell (El Catllar, Spain) : A Preliminary Report

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The aim of this poster is to present the preliminary report of the record recovered during the first excavation term of *l'Era del Castell* that took place on 1997 spring. The site is located in the center of El Caltllar village on a slope near the Gaià river, at 6 km from the sea side and 74 meters over de sea level.

The excavation was carried out covering 250 m^2 which it was supposed to be one third of the whole surface of the site. The good preservation of the main structures of the village announce an important record on paleoethnobotanical data.

According to the excavation structures and the remains that could be recovered, three different stages have been described. The relative chronologies of these three stages are final Bronze age, final Bronze age to Iron age and Iron age (VII B.C.- V B.C.).

The archaeological structures such as the silos associated to instruments related to cereal processing such as mills, pestles and mortars are very well represented. At the same time a systematic sampling of macro and microremains was carried out. Flotation of an important percentage of the sediment was undertaken and many macroremains such as charcoal and seed were collected.

The large record obtained contribute to the knowledge on the socio-economic organization of these societies during this chronologies over this region which is fairly unknown.

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BUCKWHEAT (*FAGOPYRUM ESCULENTUM*) IN THE CULTURE LAYERS OF MEDIEVAL KOŁOBRZEG (N. POLAND)

Medieval Kołobrzeg was established on the right bank of the Parsęta river, about 2 km to the south from the river estuary at the Baltic Sea shore. In 1255 Kołobrzeg received civic rights and in a short time became one of the important economic centres on the European map of that time.

Archaeobotanical studies cover the area of the former medieval centre of the town. The samples were taken from culture layers which represent sites of different function. Among them several samples containing numerous remains of *Fagopyrum esculentum* (buckwheat) were found. All of them were taken from a moat dated to the second half of the 14th century. Apart from buckwheat, in the samples single charred grains of cereals as well as diaspores of some wild plants of different origin were found. Judging from the samples composition, the remains of the buckwheat probably come from the local farming.

EARLY NEOLITHIC AGRICULTURE IN POLAND: CASE STUDY FROM TWO CHERNOZEM AREAS.

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In Poland the introduction of agriculture began along with the affluence of the Linear Pottery culture settlers from the south about 8 thousands years ago. Early Neolithic settlements were assembled mainly on fertile soils, in neighbourhood of easily accessible fresh water. In the Kuyavian Plain (middle Poland) and the Małopolska Upland (south Poland) mainly some chernozem areas were colonised. The author has studied charred plant remains and imprints in daub derived from the sites at Osłonki, Miechowice and Zagajewice, near Brześć Kujawski (the Kuyavian Plain) dated to the Linear Pottery culture and the Lengyel culture, and from the site at Donatkowice, near Kazimierza Wielka (the Małopolska Upland) dated to the Funnel Beaker culture. Plant remains pointing to agriculture and gathering were preserved on the mentioned sites. Hulled wheats, einkorn (*Triticum monococcum*) and emmer (*T. dicoccum*), and hulled barley (*Hordeum vulgare*) were the main cultivated plants. The barley is decidedly more scarcely represented than wheats. In the Kuyavian Plain, apart from these crops, some traces of pulses (*Pisum sativum* or *Vicia sativa*) and flax cultivation (*Linum usitatissimum*) were found. The presence of a form of naked wheat, probably bread wheat (*Triticum aestivum*) in the Kuyavian Plain (one rachis fragment) and rye (*Secale cereale*) in the Małopolska Upland (one grain) requires further study and certain documentation. These specimens are strongly damaged, but even if their identification were certain, their sporadical presence in the Neolithic settlements could not point to their cultivation. Apart from the cultivated plants a certain number of wild ones, probably used by man, were found.

Understanding the task of grinding grain in prehistoric and early historic Denmark

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Quern stones represent an important link in the agricultural economy - the step from harvested crop to food; from grain to flour and meal. In prehistory, producing flour with a rotary quern was one of the most time consuming daily tasks, at least for women (or slaves), and quern and mill technology can be seen as an expression of the basis technological level which a society had attained.

In order to study this important subject in detail I began looking at archaeological finds of querns from Denmark; primarily rotary hand querns from Iron Age and Viking times.
A limited series of investigations has now been carried out and the results form a basis on which a more comprehensive project is now being planned.

The intention is to focus on several technological "leaps" which occurred in conjunction with the introduction of new quern types at various times in prehistoric and early historic Denmark, and investigate the links between these changes in technology and changes in society as a whole.

The introduction and development of the rotary quern is central to the project as an understanding of this process is the key to finding the reasons behind more general changes. One of the most important questions in this respect is why did rotary querns take so long to reach Denmark? The introduction of the rotary quern brought with it a great rationalisation; it was 4-5 times more efficient than its predecessor the saddle quern. Why then was the rotary quern first introduced to Denmark in the Roman Iron Age (about 200 AD), when it was in widespread use less than 100 km further south in northern Germany some 2-300 years earlier?

In order to answer questions such as this it is essential to adopt an interdisciplinary approach involving archaeological analysis, archaeobotanical studies and practical experiments combined with information from a range of other research areas:

Ethnology, ethnography and anthropology	Written sources and history of technology
Engineering studies	Geological/petrological studies
Chemical/ physical analyses	Wear pattern studies

The work carried out so far, which forms the basis of this poster, has given a first insight into the production and use of prehistoric rotary querns. Much research still needs to be done, however, before we have a comprehensive understanding of the function and use of the rotary quern and its social significance and implications in prehistoric and early historic Denmark.

Botanische Untersuchungen aus einer keltischen Viereckschanzen aus Baden-Württemberg (Deutschland).

Anne Bouchette*, Manfred Rösch**

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Der Fundplatz Riedlingen liegt am nördlichen Rand des oberen Donautals südlicher der Schwäbischen Alb ungefahr fünfzig Km südwestlich Ulm. Es handelt um eine Viereckschanze aus Latène-Zeit. Mehr als 350 Proben aus Grubenkeller, Erdkeller und besonders aus einen 14 m tief Schacht wurden entnommen. So stellt dieser Fundplatz eine der wichtigsten archäobotanischen Probenserien für Südwestdeutschland aus dieser Periode.

Die bisherigen Ergebnisse handeln über Landwirtschaft, Nährung und Umwelt. Bei den Kulturpflanzen überwiegen die Getreide, vor allem mehrzeilige Gerste *(Hordeum vulgare)*, Dinkel *(Triticum spelta)*, Nacktweizen *(Triticum aestivum/durum)* und Kolbenhirse *(Setaria italica)*. Ganz überraschend fehlt die Rispenhirse *(Panicum miliaceum)*. Leguminosen und Wildfrüchte sind eher selten. Das Unkrautspektrum ist sehr artenreich und von Ackerunkräuter vor den Tritt-und-Brachzeigern und Ruderalpflanzen dominiert.

Wir erwarten aus den noch nicht untersuchten basalen Füllschichten des Schachtes mit feucht erhaltenem Material mehr Informationen über die primäre Nutzung pflanzlicher Ressourcen und möglicherweise über die Verwendung von Obst-, Gewürz- und Gemüsepflanzen mediterraner Herkunft in vorrömischer Zeit.

Etude des macrorestes végétaux d'une enceinte quadrangulaire de La Tène du Bade-Wurtemberg (Allemagne)

Anne Bouchette, Manfred Rösch

Situé dans le Jura souabe, dans la haute vallée du Danube à une cinquantaine de Km d'Ulm, le site de Riedlingen est une enceinte quadrangulaire de la Tène qui a fait l'objet d'une fouille exhaustive ces dernières années. Plus de 350 échantillons ont été prélevés, faisant de ce site la principale série de référence archéobotanique du Sud-Ouest de l'Allemagne. La majorité de ces échantillons provient d'un puits de 14 m. de profondeur et de plusieurs structures excavées.

Les résultats obtenus jusqu'à présent portent sur l'économie, l'alimentation et l'environnement végétal. Parmi les plantes cultivées, les Céréales sont prédominantes, en particulier l'Orge (*Hordeum vulgare*), l'Epeautre (*Triticum spelta*), le Blé tendre/dur (*Triticum aestivum/durum*) et le Millet des oiseaux (*Setaria italica*). De manière surprenante, le Millet commun (*Panicum miliaceum*) manque totalement. Légumineuses et fruitiers sont faiblement attestés. Le cortège floristique des plantes sauvages est très riche. Il est dominé par les messicoles, les plantes indicatrices de jachères et les rudérales.

Les niveaux inférieurs du puits ont livré du matériel non carbonisé. L'analyse devrait permettre d'obtenir des informations sur les ressources végétales contemporaines de son utilisation primaire ainsi qu'une éventuelle consommation de fruits, condiments et légumes d'origine méditerranéenne au cours de cette période préromaine.

Cultivation and Use of Hemp (*Cannabis sativa*) in the Middle Ages in Switzerland and Surrounding Regions.

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Until the early 1990s, the only and also earliest remains of hemp fruits identified from the area in question originated in late medieval sites in southern Germany. Hemp was therefore considered to have played a minor role as a source of fibres and oil in comparison to flax (*Linum usitatissumum*) and opium poppy (*Papaver somniferum*).

We discovered that these assumptions were due to little available data. In recent years, studies undertaken by the Laboratory for Archaeobotany in Basle have shown that hemp was cultivated already during the Early Middle Ages in the region under consideration.

Hemp has multiple uses. In the medieval sources its use as a fibre and oil rich plant is emphasized. From the 15th century its use in paper manufacture is also mentioned.

It is likely that the hemp (*Cannabis sativa*) cultivated around the Swiss archaeological sites was used for fibre extraction. This interpretation is however only supported to date by the woven fabric remains from two sites.

Sorghum in Italian Middle Age: archaebotanical and historical records

Elisabetta Castiglioni - Laboratorio di Archeobiologia of Musei Civici di Como, P.zza Medaglie d'Oro 1, 22100 COMO - ITALY

In the last ten years, the origin and diffusion of cultivated sorghum (*Sorghum bicolor*) in North Africa has been well studied, while the introduction and diffusion of sorghum in Europe is quite completely unknown. We present here an updating of archaeological finds of sorghum in Italy. Seeds of sorghum (uncharred, charred and impression) are present in the carpological records of six settlements in North Italy, dated from VI to XIII century A.D. We also compare archaeobotanical data with historical sources of the "polittici", medieval inventory of foodstuffs in the monastic properties.

Casale del Dolce : les premières données carpologiques

d'un site du néolithique moyen dans la vallée du Sacco (Latium, Italie)

Sylvie **COUBRAY-MACCHIARELLI** :

Sont exposés les données carpologiques du site néolithique de Casale del Dolce récemment fouillé dans le cadre des grands travaux de la ligne TGV Milan-Rome-Naples. La consistance des échantillons dans les fours, les structures de grillage, les silos a permis de mettre en évidence un cortège de plantes assez important pour ajouter quelques éléments au tableau des données carpologiques de l'Italie centrale.

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Cumes : les données carpologiques d'une cité de la côte campanienne (Ilalie), entre le VII° et le I° siècle av. J.-C.

Sylvie **COUBRAY-MACCHIARELLI**

L'étude carpologiques et anthracologique entreprise sur le site de Cumes ouvre la voie à un type d'analyses jusqu'alors plutôt négligées dans cette région et pour cette période. Les carpo-restes de Cumes sont présentés dans le cadre des données récemment acquises sur d'autres sites de Campanie et notamment Ischia.

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Viticulture in the Roman Province Pannonia based on the Archaeobotanical Analysis of the samples found at the Excavation in Aquincum-Kaszásdűlő

In 1881 during the building of the Filatori-dam a roman cemetery was found north of the roman legion camp in Aquincum-Kaszásdűlő. At that time they excavated 50 graves, only the sarcophagi and tombs constructed of brick. The first systematic excavation took place only a 100 years later. The excavations between 1978-86 recorded a further 450 graves. What was probably a well, 320 centimeters deep, was discovered during an excavation in October 1985.Roman bricks, human and animal bones were found scattered on the top level of the fallen in debris. Lower down wooden staves were discovered, from where soil samples were taken. Deeper excavations were hindered by ground water.The soil sample taken from this well documented and thorough excavation (P. Zsidi, 1985) was undoubtedly from the roman period. The analysis of this sample was supervised by the archaeobotanist Ferenc Gyulai.

The quantity and quality of the analysed material speaks for itself: 6108 whole and complete grapeseeds, at least four different types according to the morphology, 29 different species of fruits and weeds.

1. Amaranthus lividus – Livid amaranth, 2. Arctium minus - Lesser burdock, 3. Arenaria serpyllifolia - Thyme-leaved sandwort, 4. Atriplex patula - Spreading oracle, 5. Atropa belladonna – Deadly nightshade, 6. Chenopodium album - White goosefoot, 7. Chenopodium hybridum - Maple-leaved goosefoot, 8. Cucumis melo - Musk melon, 9. Cyperaceae cf. - Sedge, 10. Ficus carica - Fig tree, 11. Fumaria schleicheri - Small pink fumitory, 12. Galium aparine - Goosegrass, 13. Hyoscyamus niger - Henbane, 14. Lamium amplexicaule - Henbit deadnettle, 15. Linum catharticum - Purging flax, 16. Polygonum aviculare - Common Snotgrass, 17. Potentilla anserina - Silverweed, 18. Prunus persica Peach, 19. Pyrus domestica, communis - Pear, 20. Rubus fruticosus - Blackberry, 21. Sambucus nigra – Elder, 22. Sanguisorba officinalis - Rose burnet, 23. Schoenoplectus lacustris - True bulrush, 24. Silene alba - White campion, 25. Sinapis species - Mustard, 26. Sonchus oleraceus - Common sow-thistle, 27. Stellaria media - Common chickweed, 28. Valerianella dentata - Toothed corn-salad, 29. Viburnum opulus - Water elder, 30. Vitis vinifera – Wine-grape

With the analysis of these species we will be able to have a more complete understanding of the viticulture that took place during the roman occupation of this area. The quality of the samples will allow us to do a more detailed analysis and thus give us this clearer picture of this period.

Hulled and naked barley (*Hordeum vulgare*). Carbonised grains recorded in archaeological sites in Norway.

Griffin, Kerstin, Museum of Archaeology, Stavanger, POB 478, N-4001 Stavanger, Norway.

Carbonised grains of barley (*Hordeum vulgare*), both naked and hulled, have been recorded in archaeological sites, the dates of which range from Neolithic to post-medieval time. The information is obtained from published and unpublished reports. The finds are described and the localities plotted on a series of maps for different time periods. The geographical distribution of Norway (from latitude 58 °N to 71° N) restricts the area where cereals can be grown. One of the common trade items in Late Viking Age /Early medieval time imported to Norway was cereals which is documented in the written sources. It is, however, difficult to identify locally grown cereals and separate them from imported cereals. In Medieval time we know that sowing grains were imported to Norway and accompanying them also the characteristic weed flora from the land of origin. Pollen-analytical studies from several pre-historic archaeological sites are used to suggest the local origin of some of the finds.

Detecting human impact from macrofossils in pollen sample residues at Lake "Nussbaumersee", Switzerland

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Detecting human impact and agricultural practice in prehistoric landscapes is one of the most prominent focuss of palaeoethnobotany and palaeoecology. Traditionally analysis of human impact and prehistoric land-use is done by either macrofossil analysis of archaeological sediments or by determination of pollen types standing for anthropogenic nature-alteraltions. Here we present a new technique for quick determination of the amount of prehistoric human impact within a heavily used agricultural landcape in Switzerland using macrofossils from pollen sample residues within an archaeological time frame from the Late Mesolithic to the Early Middle-Ages. The results show, that macrofossils from samples as small as 1 cc may reflect biodiversity changes due to human agricultural and burning activities.

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Evidence for ritual from plant macrofossils from some medieval human burials

Remains of box (*Buxus sempervirens* L.) and hyssop (*Hyssopus officinalis* L.) have been recovered in association with some monastic burials at the Augustinian Priory in the old town of Kingston-upon-Hull, East Yorkshire. They seem very likely to have been used for ritual purposes. The poster illustrates the material and its archaeological context and considers some other evidence from the UK for plants used in this way.

WHICH PLANT FOODS WERE CONSUMED? - ARCHAEOBOTANICAL INVESTIGATIONS AT VENDEL, E.C. SWEDEN

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Summary of early and recent archaeobotanical investigations at Vendel, one of Sweden's most important hoat-grave cemeteries, the type-site of the Vendel Period. Methods used include analyses of fossil plant remains, of plant tissues in carbonized bread, and of imprints on ceramics. Barley (*Hordeum* sp.) is the dominant cereal, but bread-clubwheat (*Triticum aestivo-compactum*), cf. emmer/spelt wheat (cf. *T. dicoccum/spelta*) and oats (*Avena* sp.) also occur. Other cultivated plants found include flax (*Linum usitatissimum*), hemp (*Cannabis sativa*) and peas (*Pisum sativum* var. *arvense*) as imprints, though pea flour has also been found in charred grave-bread. Field weeds and wet-meadow plants are present, as also hazelnuts (*Corylus avellana*), bilberries (*Vaccinium myrtillus*) and possibly cowberries (*V. vitis idaea*), evidently the result of berry picking. Juniper berries (*Juniperus communis*) may also have been picked. Excavated finds of tools and household utensils are studied for further indications of the food and drink consumed at this high status site.

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A Tool for Charcoal Analysis - Comparative Wood Anatomy of Mimosoid and Caesalpinioid Leguminosae of the West African Savannas.

The charcoal assemblages, examined in the interdisciplinary project "Cultural developement and language history in the West African savanna" contain many fragments belonging to the woody legumes. Identification of these fragments on genera or species level has commonly caused problems, especially with regard to taxa of the subfamilies Caesalpinioideae and Mimosoideae. Therefore, 31 West African species were investigated in order to understand wether their microscopic wood structure would render distinguishing them possible.

As an example, the wood anatomical structures of *Faidherbia albida* (Del.) A.Chev. (*Acacia albida* Del.) and *Prosopis africana* (Guill. & Perr.) Taub. are presented. Both species are important for the interpretation of charcoal assemblages in the area studied in the project. Concerning the microscopic structure of their wood, the reliability of identifying these species differs. It is limited by the variability of their respective differentiating features.

The Sahelian species *Faidherbia albida* is typical for intensely cultivated areas and is considered to accompany *Pennisetum* cultivation. As one of the trees most utilized in the whole Sahelo-Sudanian Africa, its distribution is promoted by man and cattle. The Sudanian species *Prosopis africana*, however, is characteristic for legume-rich, dense dry forests. Today it thrives on fallow land. Due to excessive use and being highly valued for fuelwood and charcoal, the tree has disappeared from greater parts of the Southern Sahel and the adjoining Sudanian savannas.

Faidherbia albida shows features allowing for exact identification as they are not very variable. Its features contain storied structure of all elements (except for the higher rays), mostly uniseriate rays, and broad bands of parenchyma which are frequently wider than *Faidherbia albida's* fiber zones.

The combination of mostly vasicentric to short aliform parenchyma and comparatively low rays characterizes *Prosopis africana*. Since these features are subject to variability, erraneous identifications may be possible. For instance, should features of *Afzelia africana* or *Tamarindus indica* not have developed typically, fragments may mistakenly be identified as *Prosopis africana*. Moreover, a clear differentiation from some *Acacia* species is not always possible.

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CULTIVATED AND COLLECTED PLANTS IN EVERYDAY LIFE OF MEDIEVAL ELBLĄG (N POLAND)

The archaeobotanical materials from trenches located in the Old Town of Elbląg (N Poland), dated to the 13th and 14th centuries, provided the information about cultivated and collected plants.

Among the cultivated plants the only cereals which have been found so far are *Panicum miliaceum* and *Secale cereale*. The lack of other species as well as pulses results from the scarcity of charred remains in this material. Fruit trees are represented by both locally cultivated (e. g. *Cerasus vulgaris*, *Prunus insititia*) and either locally cultivated species or imported ones (*Juglans regia*, *Prunus persica*, *Vitis vinifera*). Vegetables, spices and oil plants frequently appear and/or in great abundance. Although they used to be grown in gardens (e. g. *Allium cepa*, *Anethum graveolens*), yet some of them (*Pastinaca sativa*) were likely to grow in natural or seminatural communities as well. The imported species such as *Ficus carica*, *Myristica fragrans* and *Piper nigrum* were dintinguished, too. Even though the finds of some of these species haven't been mentioned from archaeobotanical sites in Poland so far, their presence in the medieval Elbląg is confirmed by written sources.

Among wild growing plants there are some which meet the criteria to relate them with human activities. They include plants of both culinary (*Corylus avellana*, *Fragaria vesca*, *Rubus* ssp.) and medicinal use (*Betonica officinalis*, *Hypericum perforatum*, *Prunella vulgaris*). The findings of plaits of *Polytrichum commune* indicate that mosses were used in the medieval Elbląg as a packing and isolating material in housebuilding.

Archeobotanical Investigations in the Neolithic Lakeshore Site Arbon-Bleiche 3 (3370 BC cal.) at Lake Constance, Switzerland

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The neolithic lakeside settlement Arbon-Bleiche 3 is situated on the southern shore of Lake Constance in Switzerland (Canton of Thurgau). It was built between 3384 and 3370 BC cal. as the dendrochronologically dated house poles of the different buildings document. It therefore was possible to date every house separately. The village was destroyed by a fire and was not rebuilt. It became well preserved in the groundwater under a layer of sand. The settlement of this village represents one phase of fourteen years in the transition period between the two cultures Pfyn and Horgen. This is quite interesting because there are not many lakeshore settlements between 3600 and 3200 BC. Therefore it exists a lack of information about this period.

We analyze macroremains (seeds and fruits) that are very well preserved in the cultural layer. On one hand we try to collect information about the economy, culture and the impact on the natural surrounding during this time period and on the other hand we work out better methods of sample taking and analyzing but still obtain statistically relevant results. We examine samples of several houses and try to find possible differences between them. It also will be interesting to find out whether there are differences according to the ages of the buildings, their sizes and their localities within the village.

Preliminary results of seventeen analyzed samples show that people cultivated the cereals einkorn (Triticum monococcum), emmer (T. dicoccum), Naked wheat (tetraploid type and also some clear hexaploid types) and barley (Hordeum vulgare). They also had an intensive production of flax (Linum usitatissimum) and poppy (Papaver somniferum), since both of them exhibit great numbers of seeds. Besides cultivating plants they supplemented their vegetarian diet with gathering of wild growing fruits (Corylus avellana, different Rubus species, Fragaria vesca, Malus sylvestris, Prunus species, Brassica rapa, etc.).

This Project is part of a comprehensive interpretation including bones, ceramics, tools, textiles and other botanical remains.

A New Glume Wheat from N. Greece

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At three neolithic and one bronze age sites in northern Greece, spikelet bases of a new type of glume wheat have been recovered. These spikelet bases are morphologically distinct from the typical einkorn (T. monococcum L.), emmer (T. dicoccum Schuebl.) and spelt (T. spelta L.) types previously recorded from Greece and have also been observed at neolithic and bronze age sites in Turkey, Hungary and Austria. Their taxonomic identification remains uncertain but it seems likely that they are tetraploid, and possible that they are a domesticated form derived from T. araraticum Jakubz. (i.e. of the AAGG genome). At the Greek sites, they may have been cultivated as a maslin or admixture with einkorn.

AGRICULTURAL SYSTEM IN SW FINLAND. - NEW ARCAEOBOTANICAL EVIDENCE OF A RURAL SETTLEMENT DATED TO THE LATE IRON AGE

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The excavations of a dwelling site dated to the Late Iron Age in Mulli, Ihala (City Raisio) were stated in 1994 and continued to 1997. They spread also to the surrounding field area with mappings of unknown prehistoric remains and building remains. Also medieval layers were looked for because of that would be a proof of a settlement on this site without a break from the end of the Iron Age to the end of the 18th century. This dwelling site type is very rare in Finland because of the finds of wooden structures of walls and floors of houses dated to the Prehistoric Time and stored in good condition. The radiocarbon dating (wood) of the upper layers was between 1050-1280 AD.

Investigations of plant macrofossils have been carried out all the time with arcaheological excavations. About 300 soil samples were taken for macrofossil analyses. The most interesting finds were the cereal grains. In many samples they were over 70 percent of the total number of macrofossil finds. The species were *Avena sativa*, *Hordeum vulgare*, *H. vulgare* var. *nudum*, *Secale cereale*, *Triticum compactum* and *T. dicoccum*, with number of broken pieces of cereal grains. Many remains of old field weeds, with such as *Agrostemma githago* and *Bromus secalinus* were found. Plant impressions of doum were also investigated. The results were compared with the macrofossil results of other rural dwelling sites investigated in SW Finland and dated to the Late Iron Age.

AIA DI CAPPITELLA - CARIFE (AV): UN EXEMPLE DE CONSERVATION DE GRAINS EN SILO-FOSSES ENTRE L'AGE DU BRONZE ET L'AGE DU FER EN ITALIE DU SUD.

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Les fouilles des niveaux d'occupation préhistoriques et protohistoriques du site de Aia di Cappitella - Carife (Avellino) ont permis d'étudier le contenu des silo-fosses découvertes. Elles se sont révélées riches en paléo-semences, surtout en grains de céréales ; il s'agit de plus que 6000 units étudiées. Les espèces les plus attestées sont : *Hordeum vulgare* (orge), *Triticum dicoccum* (blé amidonnier), *Triticum monococcum* (blé engrain), *Triticum aestivum* (blé tendre), *Triticum spelta* (blé épeautre). On a identifié aussi beaucoup de fragments du rachis d'épis de *T. monococcum*, *T. dicoccum* et surtout de *T. spelta.*

On a aussi reconnu de *taxa* qui font part de la famille de *Leguminosae.*

Ces données paléocarpologiques sont parmis les premières disponibles sur l'économie végétale en Italie du sud pendant l'âge du Bronze et l'âge du Fer : le paysan d'alors a Carife semble posséder une gamme assez étendue et diversifiée d' espèces.

PLANT REMAINS FROM MEDIEVAL FINNISH CASTLES

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In the early Medieval times Finland became a part of the kingdom of Sweden. The power of the King was centred here on three large central castles, which were built in Turku, Hämeenlinna and Viipuri in the late 13th century. Several defensive focal points were fortified in the country during the following century, at the end of which Sweden formed the Union of Kalmar, together with Denmark and Norway. At the Union time, for example, the construction of a stone castle of Kastelhom was begun on the island of Åland, between Finland and Sweden.

The palaeoethnobotanical research in Medieval Finnish castles started in 1980's and macrofossil material has now been investigated from four sites. The food economy and plant husbandry around these residences of highest class has attracted researchers' interest. Remains of cultivated and other usefull plants have been found from every site. Here an insight is given to studies of charred remains of cultivated plants and weeds from two Medieval Finnish castles, one in Kastelholm, SW archipelago, and the other in Hämeenlinna, in inner S Finland.

Most important cereals were *Secale cereale*, *Hordeum vulgare* and *Avena sativa*, but the ratios of cereals and the composition of weed flora were quite different in the two castles, propably indicating differences in the utilization of grain. The weed flora consisted of many species which are rare today, such as *Agrostemma githago*, *Bromus secalinus* and *Lithospermum arvense*. Also some remains of *Claviceps purpurea* were found.

SEEDS FROM THE LATE CHALCOLITHIC AND EARLY BRONZE AGE LEVELS FROM BAKLA TEPE AND LIMAN TEPE IN IZMIR W. ANATOLIA

Emel OYBAK and Cahit DOGAN

Carbonized plant remains from the late Chalcolithic (c. 4000 bc) and the Early Bronze Age (c. 3000 bc) levels at liman Tepe and Bakla Tepe in the vicinity of Izmir have been uncovered duning the 1996 excavation season. The samples are dominated by cereal grains. Hulled barley is the main crop with some einkorn wheat and emmer wheat at Liman Tepe while wheat is predominant at Balkla Tepe. Pulses, such as lentil and vetch, have been found in small numbers. Seeds of ryegrass and grape and fragments of a fig fruit have also been recorded. The results of our preliminary examination may provide some insight into agricultural practice in late Chalcolithic an Early Bronze age times in this part of the Aegean region of Anatolia.

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PALAEOETHNOBOTANICAL ANALYS FROM JUNATSITE TELL SETTLEMENT

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The main aim of the present study is to establish the species composition and to point out the development stage of the agricilture in this tell settlement.

The palaeoethnobotanical material consists of charred fruits lodgings walls and floors. The examined materal from the Yunatsite tell - settlement dated back from the Bronze Age and Halcolithic period. The major cultivated cereal plants were *Triticum monococcum L., Triticum dicoccum Schrank., Hordeum vulgare var.vulgare L., Hordeum vulgare v. nudum L.*. From the legiminouses cultivated plants are determined *Lens culinaris Medic., Pisum sativum L., Lathyrus sativus L., Vicia ervillia Willd.*.

On the ground of the whole examined materal we come to the conclusion that the whole set of cultivated plants is characterized by great diversity and typical for the environment in this area.

We should underline once more that in the Yunatsite settlement mound it was practiced policulture farming during the Bronze Age and Halcolithic period. The cereals had definitely prevailed. The samples of seeds are pure i.e. are without admixture, whichis evidence for growing (once species culture).

The considerably large amount of hulled barley shows that it was preferred to naked barley.Emmer is the prevailing amoung the hull wheats which indicates its basic importance.

Découverte de sorgho (*Sorghum bicolor* (L.) Moench) dans un site médiéval du XIIIème siècle en Gironde (France)

Sorghum discovery in "La Madeleine" (Gironde) a French medieval settlement (XIIIth century)

Bénédicte PRADAT[1] et Marie-Pierre RUAS[2]

La fouille d'un site rural ("La Madeleine" près de Bordeaux) lié à une activité métallurgique a permis la découverte de semences carbonisées dans des trous de poteau. Cette occupation a pu être datée du XIIIème siècle par les archéologues (J.-P. Baigl et *alii*).

Les échantillons se sont révélés assez riches tant en nombre de restes qu'en nombre de taxons puisque nous avons pu attester six céréales (*Hordeum vulgare, Avena sp., Triticum aestivum, Secale cereale, Setaria italica* et *Sorghum bicolor*), trois légumineuses (*Vicia faba var. minor, Pisum sativum* et *Vicia sativa*), du lin (*Linum usitatissimum*), des fruits (*Juglans regia, Vitis vinifera, Quercus sp*) et des plantes sauvages.

Le sorgho (*Sorghum bicolor*) a particulièrement retenu notre attention car, jusqu'à présent, il n'avait jamais été attesté en France. Or, dans le Sud-Ouest du pays, notamment en Languedoc Toulousain, les millets (*Panicum miliaceum* surtout) tiennent une place déjà affirmée dans les productions céréalières du plein Moyen Age.

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Danish medieval monastery gardens - the archaeobotanical evidence

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It is said to have been a monk. Abbot Vilhelm (William), who introduced horticulture to the Nordic countries in the 12th century. He did so at the bidding of his friend, the Danish bishop Absalon, with whom he had studied in Paris. There is, however, no doubt that gardens existed in southern Scandinavia prior to the arrival of Abbot Vilhelm. There is clear Viking evidence, and how far we are able to trace gardens further back in time depends to a very real extent on how we choose to define a garden.

Just as there is little doubt that gardens existed prior to the advent of the monasteries, there is similarly little doubt that monastery gardens represented an enormous leap forward relative to the modest vegetable plots of the Vikings with their angelica, onions and kale. We know from studies based further south in Europe that the advent of monastic orders brought about great changes, developments and progress in all aspects of horticulture, and with particular respect to medicinal plants. But what of the Nordic countries? Was it possible for the founding monks to transfer their monastery gardens, based to a great extent on plants of predominantly southern origin, to a Danish climate?
We have two main sources of information at our disposal with regard to these questions - written sources and the archaeobotanical record. This poster focuses on the latter through archaeobotanical investigations carried out on drain/sewer sediments and refuse deposits at the St. Peter´s monastery in Odense, Funen and Øm monastery near Ry in Jutland.

Probable garden plants at St Peter´s include some well-know medicinal herbs: Opium poppy (Papaver somniferum), Greater Celandine (Chelidonium majus), Caper spurge (Euphorbia lathyrus), Sun spurge (Euphorbia helioscopia), Common Fumitory (Fumaria officinalis), Dill (Anethum graveolens), Henbane (Hyoscyamus niger) and White Horehound (Marrubium vulgare). Seeds of fig (Ficus carica) were also found; the earliest well-dated record of fig seeds from Denmark; these are probably from imported fruit.

From Øm monastery we have records of the medicinal herbs: Goutweed (Aegopodium podagraria), Black Mustard (Brassica nigra), Greater Celandine (Chelidonium majus), Henbane (Hyoscyamus niger), Mallow (Malva sp), White Horehound (Marrubium vulgare), Opium Valmue (Papaver somniferum), Sage (Salvia nemorosa), Mullein (Verbascum sp) and Vervain (Verbena officinalis), and fruit trees: Apple (Malus sp), Cherry Plum (Prunus cerasifera) and Bullace (Prunus domestica ssp. insititia). Walnut (Juglans regia) and Peach (Prunus persica) may also have been grown in the monastery orchard, but it appears more probable that they were imported.

A wide range of other native species was also present including many plants mentioned in the early Danish herbals for their medicinal properties. A survey of all the archaeobotanical finds from other Danish medieval sites has revealed, furthermore, that "monastery plants" were not just confined to monastery gardens, but were also to be found elsewhere in the urban and rural landscape in the course of the Middle Ages.

« De l'Epeautre (*Triticum spelta*) en Corse à la fin du Moyen Age»

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D'après les sources écrites, l'exploitation de l'épeautre (*Triticum spelta*) en France continentale a connu une désaffection notable après le Xe siècle pour ne perdurer au nord que dans des "*zones sanctuaires*" (Devroey, 1989). Les recherches archéobotaniques sur le Moyen Age (Marinval, 1989 ; Ruas, 1992 et exposé) ne l'attestent pour l'heure que très rarement dans les régions septentrionales du pays en contexte carolingien mais jamais en région méditerranéenne. Or, cette espèce vient d'être repérée à l'occasion d'un sondage réalisé dans un des bâtiments d'un habitat fortifié situé en Haute-Corse à 654 m d'altitude (fouilles de D. Istria). Le contexte de découverte daté de la fin du XIVe siècle correspond à plusieurs concentrations de semences et à de la paille carbonisées. Il pourrait s'agir des vestiges d'un stockage.

Un échantillon préliminaire d'environ 2 litres de sédiment a livré 407 restes. L'assemblage est principalement composé de grains, d'entre-nneuds de rachis, de furca et de tiges de céréales mais aussi de quelques noyaux de fruits (*Prunus spinosa* et *Crataegus monogyna*), d'un bulbe (cf. *Allium sativum*) et de semences d'herbacées sauvages. Le spectre des céréales comprend, tous restes confondus, 67% de seigle (*Secale cereale*), 26% de blé tendre (*Triticum aestivum*) et 5% d'orge vêtue (*Hordeum vulgare*). L'épeautre (*Triticum spelta*) y est très discret puisqu'un seul épillet complet portant 2 grains fut remarqué lors de cette première analyse. Bien que nous ne puissions conclure ni à une exploitation ni à une consommation de l'épeautre par les villageois, les mentions écrites informent de sa culture en Provence montagneuse (à Manosque) au XVe siècle ainsi qu'en Italie, dans la région de Bologne (Comet, 1992). Les relatinns cnmmerciales avec Gênes et Pise pourraient expliquer la présence inattendue de ce blé en moyenne montagne au nord de l'île.

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Archaeobotanical find of Spelt wheat (*Triticum spelta*) in Corsica (Western Mediterranean) during the Late Middle Ages

On the bases of historical texts, the cultivation of spelt wheat (*Triticum spelta*) in continental France drastically decreased after the Xth century and only went on in northern "*zones sanctuaires*" [sanctuary areas] (Devroey, 1989) of this country. On the bases of present archaeobotanical data from Medieval times (Marinval, 1989 ; Ruas, 1992 and this symposium), it was scarcely attested in Northern France but it had never been mentioned in the Mediterranean area. This species has however just been discovered from a sounding into one of the buildings of a Corsican defense dwelling, at 654 m a.s.l. (excavations by D. Istria). This find, dated to the XIVth century, laid together with by several charred seed concentrations and straw. They may be storage remains.

A 2 liters preliminary sample of sediment yielded 407 remains. The assemblage consisted mainly of cereals seeds, rachis internodes, spikelet forks and culm internodes but also of fruit stones (*Prunus spinosa* and *Crataegus monogyna*), of a bulb (cf. *Allium sativum*) and of wild plants seeds. Altogether, the cereal spectrum shows 67% of rye (*Secale cereale*), 26% of bread/club wheat (*Triticum aestivum l. s.*) and 5% of hulled barley (*Hordeum vulgare*). Spelt wheat (*Triticum spelta*) is very scarce, since only one spikelet forks bearing two caryopsis has been observed for this first analysis. We are not allowed to conclude that villagers did cultivate or eat spelt wheat, but historical texts indicate that it was actually cultivated in alpine Provence (at Manosque) during the XVth century, as well as in Italy, near Bologne (Comet, 1992). Trade exchanges with Genova and Pisa may explain the presence of spelt wheat in Norther Corsica.

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Recorded finds carbonised grains of Triticum sp. in Norway

Over the last years carbonised grains of Triticum sp. (spelt and emmer) has been found in prehistoric and historic sites in Norway. In some structures it is dominant and in others it is found in low frequencies. The poster will show where in Norway spelt and emmer are found at present (1998). It will be discussed if the findings can tell something about diffusion of Triticum in Norway.

LA VEGETATION CANTABRIQUE DE 13000 A 9000 BP D'APRES L'ANALYSE ANTHRACOLOGIQUE. BOIS DE FEU ET MOBILITÉ DANS UN MILIEU CHANGEANT.

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Les résultats anthracologiques des trois gisements situés au nord de l'Espagne tout au long du littoral, nous ont permis de connaître l'évolution de la végétation dans un environnement côtier entre 13000-9000 BP.

La diversité écologique résultante a été mise en rapport avec les trajets parcourus par les groupes humains à la recherche des ressources économiques distinctes dans un territoire très compartimenté.

Cela nous permet d'envisager la sélection du bois dans un ou plusieurs biotopes determinés, le tout dependant du type de ressources recherchées dans chaque épisode d'habitat.

Au même temps on discute la nature des occupations humaines : sporadiques ou ponctuelles, de plus longue durée ou multissaisonnières, dépendantes des conditions environnementales fluctuantes ainsi que de la nature saisonniére des ressources recherchées.

Cette approche nous a permis aussi de discuter la localisation des refuges de végétation en proximité des habitats humains et en conexion directe avec la mobilité logistique des chasseurs cueilleurs.

THE USE OF CEREAL CHAFF FOR DAUB TEMPERING AT JERF EL AHMAR : A TENTH MILLENNIUM SITE IN NORTHERN SYRIA.

George Willcox* and Sandra Fornite*

Plant impressions from Near Eastern sites were studied by archaeobotanists before flotation techniques became widespread. Charred remains from large scale flotation provide a far broader range of results. However plant impressions can provide complementary information.

Copious charred remains from Jerf el Ahmar are at present under study. Here we report on results obtained from analysis of plant impressions in daud used in construction. They were clearly visible to the naked eye after a fresch fracture was made. It was therefore decided to examine a wide range of daub from this site as well as a few samples recovered from the same period at Mureybet excavated some thirty years ago. Upon examination all plant impressions were found to have been made by the fine fraction of cereal chaff which had been added to the daub as a tempering medium. Three taxa were present; wild einkorn, wild rye and wild barley. Chaff tempering was found to occur in all samples examined. Three aspects of these findings complement results obtained from charred remains.

1) The sheer quantity of this material implies that it was very widely available at the site.
2) Threshing was carried out on a large scale, probably near the site.
3) The impressions confirm the presence of wild rye which is difficult to separate from wild einkorn if only grain is available for identification.

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Archaeobotanical Research in NE-Nigeria (West Africa)

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Investigations of three settlement mounds (Gajigana, Kursakata, Mege) in the Lake Chad Basin (NE-Nigeria) revealed that food production in this area began about 1000 cal BC. Plant impressions in pot sherds and carbonised plant remains include wild and domesticated cereals.

The colonisation of the Chad Basin started 4000 years ago, when retreating water of the palaeolake left behind dry soils. With the beginning of settlement people collected wild grasses *(Oryza spec., Paniceae)*. Domesticated *Pennisetum americanum* (pearl millet) was cultivated from 3000 BP onwards, but gathering of wild cereals was additionally maintained as subsistence strategy until today. Domesticated *Sorghum bicolor* (millet), the main modern crop in the area appears late, presumably around 1000 AD.

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The Role of Legumes in the Epipalaeolithic and Early Neolithic in S.W.Asia

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Abstract

This paper focuses upon the South West Asian grain legumes (pulses). It presents a brief update of the archaeobotanical record from sites in South West Asia, from the glacial maximum in the Epipalaeolithic at about 17000 bc through the subsequent periods of major climatic change to the Holocene and the end of the Pre-Pottery Neolithic in 5500 bc. Aspects of the physical properties and growth requirements of the pulses are described, and the role of the food legumes is examined in the light of recent ethnographic studies of traditional farming in Highland Ethiopia, where the SW Asian assemblage of founder crops was introduced in antiquity.

Key Words

PULSE; SW ASIA; GRAIN LEGUME; PRE-POTTERY NEOLITHIC; CULTIVATION

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3000 Years of Agriculture in a Valley of the High Himalaya (3000 - 4000 Meter NN)

The valley of the Jhong river is situated north of the main chain of the Himalayas in Western Nepal. The excavations of the Institute for Prehistory of the University of Cologne have produced more than 300 samples with remains of plants from 800 B.C. until today. During a visit of this valley the basis for palaeoethnobotanical research was prepared by the investigation of the today's methods of local agriculture and of the recent vegetation of the cultivated areas supported by a collection of the seeds.

Immigrants - probably of the Tibetan Plain - have settled in the Jhong Valley at the begin of the first millenium B.C. Two harvest per year were possible at this time as they are still today: First harvest: Hordeum vulgare nudum. Second harvest: Fagopyrum esculentum, Fagopyrum tataricum.
The remains of six archaeological periods prove the existence of ten new cultivated plants. In a funarary cave of the second prehistoric period fruits and seeds imported from the sub-tropic low lands were found among the grave goods.

Among the more than 100 identified wild plants the remains of more than 50 species were spread in Europe as well.

Kamut - die Weizensensation aus dem Alten Ägypten?

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Seit einiger Zeit gibt es in österreichischen Bäckereien eine neue Brotsorte: Brot und Gebäck aus Kamut. Dieses Brot ist im Vergleich zu herkömmlichem Brot dicht und schwer, soll äußerst gesund sein und ist verhältnismäßig teuer. Auch die österreichischen Medien berichten immer wieder über Kamut, eine "urtümliche Weizenart", die bereits vor 6000 Jahren in Ägypten angebaut worden sein soll, dann aber in Vergessenheit geriet und erst 1946 wiederentdeckt wurde. Seit sechstausend Jahren also soll dieser "Urweizen" unverändert durch züchterische Eingriffe in seiner ursprünglichen Form bestehen und seine hervorragenden Eigenschaften erhalten geblieben sein: höherer Eiweißgehalt als Saat-Weizen und hoher Selengehalt.

Diese Geschichte weist einige Ungereimtheiten auf: traditionelles Grundnahrungsmittel in Ägypten während der Vorgeschichte und der pharaonischen Zeit waren Triticum dicoccum und Hordeum vulgare. Andere Weizen-Sorten wie Triticum aestivum und T. durum spielten, wie unzählige archäologische Funde beweisen, eine untergeordnete Rolle. Erst in griechisch-römischer Zeit wurde Emmer durch Saat- und Hart-Weizen verdrängt. Über eine vierte Weizen-Sorte ist in der für Ägypten recht umfangreichen archäobotanischen Literatur nichts bekannt.

Außerdem bleibt Weizen nicht unbeschränkt keimfähig. Die ältesten Weizen, die wieder zum Keimen gebracht werden konnten, waren 90 Jahre alt. Es ist also unmöglich, daß es sich bei Kamut um "Mumienweizen" handelt, der wieder zum Leben erweckt wurde.

Bei Kamut handelt es sich vielmehr um Triticum turanicum var. notabile, einen tetraploiden Nacktweizen mit dem Genom AABB. Diese Sorte wird heute v. a. in Turkmenien, Uzbekistan und Tadzikistan angebaut, kommt als Beimischung in anderen Kulturweizen aber auch in Pakistan, Iran, Irak, Syrien und Ägypten vor.

ABSTRACT OF THE PAPER TO BE PRESENTED AT THE 11TH SYMPOSIUM
OF IWGP, TO BE HELD AT TOULOUSE (FRANCE), 18-23 MAY 1998.

INITIAL PALAEOETHNOBOTANICAL RESULTS FROM NEOLITHIC WATGAL, SOUTH INDIA IN RELATION TO DATA FROM CONTEMPORARY SITES

By

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Abstract : The paper embodies initial results of field palaeoethnobotanical examinations carried out at the Neolithic site of Watgal (district Raichur, Karnataka State, South India) which has yielded cultural sequence from c.3000 B.C. to beginning of the Christian era. The present botanical study relates to 1997-98 season's excavations conducted by Dr.Jim Schiffer jointly with Karnataka State Department of Archaeology.

Some of the the important constituents of ancient plant economy include Panicum millet, Italian millet, Barley, Horse gram, Indian jujube, etc. The paper discusses importance of these findings in terms of ancient biodiversity, agropastoral practices, introduction of crop plants,etc. by taking into consideration botanical evidences obtained from culturally comprable sites like Neolithic Budiahl, Kodekal, Banahalli, Tekkalkota,Veerapuram, etc. in Lower Deccan peninsula.

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