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ABSTRACTS



Hala ALARASHI

SHELL BEADS IN THE PREPOTTERY NEOLITHIC B IN CENTRAL LEVANT: NOTE ABOUT THE CYPRAEIDAE OF TELL ASWAD (DAMASCUS, SYRIA)

Tell Aswad is one of the few archaeological sites dated to the Prepottery Neolithic B found in the Central Levant. More than 190 pieces of ornaments were collected during the excavations which were carried out between 2000 and 2006. The beads are generally made in stone or from hard animal tissues. Regarding the latter category, different species of mollusks were used (40 beads). Although precise taxonomical identification is still needed, 8 families were recognized: *Cypraeidae*, *Conidae*, *Neritidae*, *Unionidae*, *Dentaliidae*, *Nassaridae*, *Littorinidae* (?) and *Muricidae*. Our observations presented in this study deal particularly with the cowries.

At Tell Aswad, the cowrie beads show a high diversity of types contrary to the elements belonging to other families. For the cowries, at least two processes of transformation of the natural shape of the shells were distinguished. These processes imply different techniques such as abrasion, engraving and hole drilling by circular movement.

What were the main types and techniques used for making cowrie beads during the Neolithic period in the Near East? And what kind of information can offer the study of the material from Tell Aswad in this context?.

In order to analyse these questions, a short synthesis about the Near East will be exposed in this work as well as the typology and the distinct techniques for the cowrie bead making observed at this site, for a little known region till now: the Central Levant.

**Esteban ÁLVAREZ-FERNÁNDEZ
Juan Carlos CASTRO**

SHELLS IN THE MIDDLE AGES: ARCHAEOMALACOLOGICAL REMAINS FROM THE WALL OF PONTEVEDRA CITY (GALICIA, SPAIN)

Very few studies of marine malacological remains found in medieval contexts have been made for archaeological sites in Northern Spain. This poster presents the results of the research carried out on archaeomalacological evidence recovered during the archaeological excavation of a section of the medieval wall in the city of Pontevedra, in 2004-5. The wall was built in the second half of the 15th Century. All the remains came from different accumulations located in a stratum interpreted as the city rubbish-dump, on the banks of the River Lérez. This would have been previous to the construction of the excavated section of wall, whose foundation ditch cuts through it. It must therefore have formed in the first half of the 15th



Century at the latest, and probably also during the 14th Century. The most abundant remains belong to *Ostrea* sp. There is also a significant number of specimens of *Venerupis decussatus* and *Cardium glaucum*, and to a lesser extent, of *Littorina littorea* and *Mytilus galloprovincialis*. As well as the taxonomic classification, taphonomic and morphobiometric studies have been undertaken.

Esteban ÁLVAREZ-FERNÁNDEZ
Pablo ARIAS
Marián CUETO
Cristina GARCÍA-MONCÓ
Roberto ONTAÑÓN

ARCHAEOMALACOLOGICAL EVIDENCE IN THE LOWER GALLERY OF LA GARMA (OMOÑO, CANTABRIA, SPAIN)

The Lower Gallery of La Garma shelters one of the most important Late Palaeolithic deposits in Europe. Its original entrance was blocked by a collapse at the end of the Upper Pleistocene, allowing an exceptional preservation of Middle Magdalenian floors (ca. 14500 cal BC) on the surface of the cave. In this communication the remains of marine molluscs found in Zone IV are presented. The archeomalacological evidence documented in that sector of the cave will be compared with those from Zone I (where the Pleistocene entrance was located) and the Middle Magdalenian layers of a cave nearby (La Garma A). The distribution of species in those areas suggests that the molluscs found in the latter (probably a living area) were collected as food, whereas those found in Zone IV are probably related to personal ornament and other aspects of the symbolic realm.

Zhanna ANTIPUSHINA

ANALYSIS OF MALACOFUNA REMAINS FROM ARCHAEOLOGICAL SITES ON ADAK ISLAND, ALEUTIAN ISLANDS

We attempt to reconstruct the dynamic of palaeoenvironmental conditions from archaeological sites on Adak Island, Aleutian Islands, based on analysis of mollusk remains. The samples of this study come from two shell middens excavated by members of the Western Aleutian Archaeological and Palaeobiological Project (WAAPP), lead by Dr. West (University of Kansas). Radiocarbon analysis showed that the first shell midden, situated near Clam lagoon, was formed from the end of the sixth millennium to the beginning of the fourth millennium BC. This shell midden is the oldest archaeological site found on Adak Island. Analysis of shell remains shows that mollusk taxonomic composition changed significantly during the existence of this ancient settlement. A decrease of epifaunal remains (*Mytilus trossulus* and chitons) and increase of infaunal remains (*Clinocardium nuttallii*, *Spusula polynima*, *Saxidomus giganteus*, *Mya* sp.) is evident in the deposits. It is possible that the intertidal zone of Clam lagoon was rockier at the end of sixth



millennium BC. After that the rocky area decreased and the sandy ground began to dominate, the curtailment of rocky area was the result of sea level decrease.

The second shell midden, situated near Sweeper Cove, was formed from the 8th to the 19th centuries AD. The remains of epifaunal mollusks dominate and are the evidence of rocky substrate of the intertidal zone of Sweeper Cove during the 8th to the 19th centuries AD. Analysis of the mollusk taxonomic composition allows us to distinguish two periods in the development of this shell midden. A warmer period was characteristic from the middle of the 11th till the 15th centuries, and from the middle of the 16th till the 19th centuries because of some thermophile species found in the layers are not typical for this region, (i.e. *Nucella heyseana*). The period from the 15th till the middle of the 16th centuries was colder, arctic-boreal species (*Littorina aleutica*, *Onoba aurivilli*, *Puncturella longifissa*) were more abundant in this layer.

Pablo ARIAS
Miguel A. FANO
Ángel ARMENDÁRIZ
Esteban ÁLVAREZ-FERNÁNDEZ
Marián CUETO
Raquel FERNÁNDEZ
María Dolores GARRALDA
Carmen MENSUA
Joan S. MESTRES
Luis C. TEIRA

RECENT RESEARCH IN MESOLITHIC SHELL MIDDENS OF EASTERN ASTURIAS (SPAIN)

The eastern coast of Asturias (North Spain) is one of the classic areas of the European Mesolithic. This paper presents the preliminary results of a programme of fieldwork conducted between 2000 and 2003 in order to sample a series of shell-middens attributed to the Asturian period (local coastal Mesolithic). This research has improved the definition of malacological assemblages in the area. In addition, a large collection of *Osilinus lineatus* shells have been dated; and preliminary data has been obtained for the determination of the ΔR factor on this part of the Atlantic coast of Europe. At the same time, stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) of the collagen from human remains found at some of the sites has provided more objective information about the use made of the marine environment by Mesolithic societies in western Cantabrian Spain.



Álvaro ARRIZABALAGA
Esteban ÁLVAREZ-FERNÁNDEZ
María José IRIARTE

FIRST EVIDENCE OF ARCHAEOMALACOLOGICAL REMAINS IN THE BASQUE COUNTRY (SPAIN): MARINE SHELLS AT LEZETXIKI

In this paper we study marine shells recovered at Lezetxiki, a site with different levels ascribed to the Middle Palaeolithic-Upper Palaeolithic transition. The Middle Palaeolithic level (Level IVc) has yielded Muricidae gastropods. At the Early Upper Palaeolithic, a valve fragment of *Ostrea* sp. and a fragment of *Spondylus* sp., possibly *S. gaederopus*, have been found in Level III. *S. gaederopus* now lives on the shores of the Mediterranean Sea, and has never occurred at the Cantabrian coast. Its presence in this deposit is result of long distance contacts between hunter-gatherer groups in Cantabrian Spain and the Mediterranean area. Finally, we discuss the role played by mollusks in Europe during the Middle-Upper Palaeolithic transition.

LAURA ARUTYUNOVA
N. MANASERYAN
I. GABRIELIAN
M. MARDJANYAN
R. HARUTYUNYAN

MOLLUSKS ON BONE REMAINS FROM HOLOCENE DEPOSITS OF THE LAKE SEVAN BASIN.

Mollusks remains associated to natural bone deposits from the Holocene are concentrated on the north-western coast of Lake Sevan, near the village of Akhkala (Ayrivank monastery). This site is situated along the wave-cut zone up to Noradzuz cape and has a length of 500m and width of 50 to 60m. Early archaeological work indicated that these Early Holocene layers are related to paleo-fluvial sedimentation. These layers contained animal bones lying on diagonal bands of sand. The vertebrate species of this 'faunal complex' is diverse and includes: red deer (*Cervus elaphus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), wild boar (*Sus* sp.), horn cores of the small cavicornia (*ovis /capra*). Bovidae skulls and horn axes dominate these layers.

Ten mollusk species are found on these bone remains (skull, horn trunks, femurs, etc.) and embedded in a grey silty- sandy rock sediment and sandy streaks: *Valvata piscinalis* (Muller, 1774); *Bithynia troscheli* Paasch, 1842; *Lymnaea stagnalis* (Linnaeus, 1758) ; *Lymnaea stagnalis* var. *goktchana* Mousson, 1873; *Lymnaea auricularia* Linnaeus, 1758; *Lymnaea ovata* (Draparnaud, 1805); *Planorbis carinatus* Muller, 1774 ; *Planorbis planorbis* (Linnaeus, 1758); *Gyraulus leavis* (Alder, 1878) and *Euglesa casertana* (Polli, 1791). Some of these species, *Bithynia troscheli* and *Planorbis carinatus*, are glacial relics.



Bárbara AVEZUELA

THE PERSONAL ORNAMENTS OF LA PEÑA DE ESTEBANVELA (SEGOVIA-SPAIN) MADE ON MOLLUSKS

The site of La Peña de Estebanvela is situated on the South edge of the Duero river basin in contact with the Central System. This rock shelter offers a sequence attributed to the Middle-Late Magdalenian. Its ornamental collection is made up of five species of marine mollusks, one of freshwater mollusk and three red deer atrophied canines, all of them perforated. Using an experimental program we present a technological study of the perforations made on the mollusks. Furthermore, we try to go beyond the taxonomic and technological descriptive analyses in order to assess which could have been the relationship of the groups who lived in La Peña de Estebanvela with the coasts

**Daniella E. BAR-YOSEF MAYER
Bernard VANDERMEERSCH**

OCHRE COVERED SHELLS FROM QAFZEH CAVE: EVIDENCE FOR THE MODERN BEHAVIOUR OF MODERN HUMANS.

Qafzeh cave, the site where “anatomically modern humans” were first defined, yielded archaeological evidence for the modernity of the humans living there. Dated to 92k bp, the site contained, not only skeletal remains, flint tools and animal bones, but also sea shells and ochre lumps, as well as other grave goods. The shells that were positioned below the human remains, were brought from the Mediterranean, at about 30 km away. All the complete *Glycymeris* bivalves were naturally perforated. Some included traces of having been strung, and a few had ochre residues on them. The shells join other evidence from the site that together are strong indicators for the modern behavior of the modern humans of Qafzeh.

**Víctor BEJEGA
Eduardo GONZÁLEZ
Natividad FUERTES
Carlos FERNÁNDEZ**

ANALYSIS OF SHELL MIDDENS FROM AN IRON AGE SITE: O NEIXÓN (A CORUÑA, NORTHWEST OF SPAIN).

On the course of archaeological excavations carried out at Castro Grande de O Neixón (Boiro, A Coruña), a site used in recent years, a section of a ditch was uncovered and revealed various materials associated to the Iron Age. These are several deposits of organic garbage characterized by the high proportion of shells.



The analysis of these remains allows us to evaluate the utilisation of marine resources during Iron Age. The main shell species used at this site were taken in the nearest available habitats.

**Eloísa BERNÁLDEZ
Esteban GARCÍA
María BERNÁLDEZ**

INDIRECT DETECTION OF CHANGES IN SEVILLE POPULATION STUDYING SIZE CHANGES IN OYSTERS

Human ancient rubbish dumps are evidence of human uses of natural resources and territory. These structures have never been important for citizens, in fact they are an untouched record of history when methodology is appropriate it is possible to study the tank and their contents.

The city of Seville has a vast archaeological record; in fact, here we can find structures of the 7th century B.C. It is very usual to find organic rubbish such as rubbish dumps, religious offer places or a quarry to construct buildings.

We have 283 oyster (*Ostrea edulis* Linnaeus, 1758) shells from four different archaeological sites of Seville: Reales Atarazanas, Cabildo, Castillo de San Jorge and Plaza de la Encarnación. We measured the shells and observed changes in their size between the 14th and 18th centuries. We compared these results with demographic changes at this time and observed a link between demography and size changes in shells.

**Eloísa BERNÁLDEZ
M^a del Carmen LOZANO
José Luís VERA
Felipe VÁZQUEZ
Esteban GARCÍA
José Luís GOLLONET
Laura EXPOSITO
Aurora OCAÑA
María BERNÁLDEZ
Miguel GAMERO
Ana VELA**

BIOSTRATINOMY OF NATURAL SHELL HEAPS: DIFFERENCES BETWEEN THESE HEAPS AND HUMAN HEAPS IN ARCHAEOLOGICAL SITES

We can find shell heaps in coastal archaeological sites. Scientists usually think that these deposits are always human product. In our opinion, these heaps could be



produced after people had left this place and may have a natural origin. Taphonomic studies and biostratigraphic analyses in archaeological sites and actual beaches show us that other processes can form these heaps. We study composition and structure of the taphocoenosis on the Espigón beach (Huelva).

Gregory CAMPBELL

OYSTERS ANCIENT AND MODERN: METHODS USED TO COMPARE SHELL SHAPE IN MODERN AND LATE ROMAN FLAT OYSTERS (*OSTREA EDULIS*) FROM SOUTHERN ENGLAND

Recognition of two distinct shapes in shells of flat oyster (*Ostrea edulis* L.) from late 3rd-4th Century AD Winchester, south central England, prompted comparison with modern *O. edulis* samples by methods which define shell shape objectively for this species. All oysters were orientated within the shell in a consistent manner regardless of size, shape, location or period; this orientation is probably unique to this species, and forms a useful framework for the analysis of this notoriously variable shell. Relative proportions of the nacreous lining were more consistent means of comparison than proportions based on the whole shell. Some proportions were consistent regardless of shape or location, but were different between periods. Archaeological shells changed abruptly during growth from a range of shapes to a single shape, arguing for oyster management in late Roman England.

Alfredo CARANNANTE

MUREX SHELLS AND STOVES: PURPLE-DYE INDUSTRY SHELL WASTE RECYCLING IN THE BRONZE AGE AEGEAN? THE MINOAN MONASTIRAKI (CRETE, GREECE) PARADIGM

A large number of highly fragmented murex shells were found associated to a stove with lime in the Minoan Palace of Monastiraki (Central Crete). Crushed murex shell middens are generally indicated as evidence of purple-dye production. The location of Monastiraki, situated in an inner region of Crete, at 350 metres upon sea level and, approximately, at 25 kilometres by the coast suggests the recycling of purple-dye industry shell waste in Minoan Crete. This hypothesis may help to interpret in different way other similar contexts in Aegean Bronze Age sites.



Alfredo CARANNANTE

NO FOOD-RELATED SHELLS IN THE BRONZE AGE INDUSTRIAL CENTRE OF PYRGOS-MAVRORAKI (CYPRUS)

Several shells come from the Bronze Age industrial centre of Pyrgos-Mavroraki (Cyprus). Here metallurgy, textile industry, perfume industry and oil and wine production are well documented but any food processing and consumption is attested. Most of the archaeomalacological record pertains to ornamental use of shells as beads or as raw material but also musical instruments and furniture elements are detectable.

Diana Rocío CARVAJAL

MOLLUSKS AT A PURPORTED FISHING CAMP: CUEVA DE LOS VAMPIROS, CENTRAL PACIFIC PANAMA

Aquatic resources such as mollusks are, and have been a vital supply for the economy of pre-Columbian societies.

For my ongoing PhD dissertation, I excavated the upper and more recent deposits of Cueva de los Vampiros site located on the Central Pacific coast of Panama. These stratified deposits which began to accumulate around 2200 BP, have abundant and biologically diverse remains of mollusks, crustaceans, and fish. This paper focuses the taxonomic and taphonomic aspects of mollusk remains. The aim of this paper is to summarize some general aspects of mollusk use at Cueva de los Vampiros.

Cheryl CLAASSEN

SHELLS, CAVES & SNAKES

For at least 9000 years humans carried bivalves into caves and rockshelters of the eastern US. Rather than simply food debris for travellers seeking temporary shelter, mythology and context indicate that bivalves and gastropods were used to symbolize babies in the night sky, deposited as part of thanksgiving rites, and used for eating by menstruating women who retreated to rock shelters.



Cheryl CLAASSEN

THE US FRESHWATER SHELL BUTTON INDUSTRY 1891-1950

The US freshwater shell button industry began in 1891 and ended in the 1950s but was a descendant of a much older European shell button industry. Shells were harvested from hundreds of rivers engendering skirmishes over the beds and occasionally giving rise to pearl rushes. Some species were favored over others for their cutability and for their size. The quantities of shells harvested and the size of individual beds are detailed. Button blanks were either cut locally or shells were shipped to factories in Muscatine, Iowa where the blanks were finished and either sold in mass or sold to the retail trade as carded buttons. Ultimately the high loss of product in the production process and then the high loss in washing machines led to the triumph of the Japanese plastic button.

Arati DESHPANDE-MUKHERJEE

DIETARY USE OF MARINE MOLLUSKS BETWEEN THE THIRD AND SECOND MILLENNIUM BC. AT COASTAL HARAPPAN SETTLEMENTS IN GUJARAT, INDIA

Faunal studies from Harappan sites in Gujarat, datable between the third and second millennium BC have so far provided considerable insights into the subsistence economy of the Gujarat Harappans. While major focus has been on the dietary contribution of terrestrial mammals, very little is known about aquatic animals like fish and mollusks. Among these are mollusks in particular whose role in Harappan shellworking is well established now but their use as a food resource still remains unascertained.

In recent years identification of edible marine mollusks at coastal sites in Gujarat does hint at their probable dietary use during Harappan times. This paper attempts to examine the dietary use of mollusks in the light of the available evidence. Marine shells recovered from the site of Kuntasi and Shikarpur were subjected to a detailed analysis along with ethnographic observations on present-day shellfish gathering on the Indian west coast. Additional shell evidence from a few other sites was used as a comparison for arriving to an overall picture of mollusk exploitation patterns along the Gujarat coast. Besides a dietary contribution, the recovered shell data has provided useful insights into the coastal environments during the Harappan period.



Katerina DOUKA
Robert E.M. HEDGES
Thomas F. G. HIGHAM

RADIOCARBON DATING ON SHELLS CARBONATES: A NEW APPROACH FOR THE DATING OF THE MIDDLE-TO-UPPER PALAEO-LITHIC TRANSITION

Marine shell carbonates are often considered problematic for radiocarbon dating. Problems most often identified include the reservoir effect (the difference between atmospheric and marine ^{14}C activities), the calibration of the radiocarbon age and the need to be converted to a calendar date, or others such as the hard-water effect and the old “shell” problem. However, the assessment of the material’s preservation state, in chemical and physical terms, is most possibly the key parameter that one should take into account when proceeding with chemical pre-treatment prior to shell dating.

We present some new approaches for the radiocarbon dating of marine carbonates in RLAHA (University of Oxford). The protocol includes effective pre-treatment and rigorous screening that, respectively, reduce the effect of secondary carbonate contamination and help us determine, with confidence, whether or not the marine shells have been diagenetically altered and therefore are suitable for dating.

Finally we discuss the application of this new approach to the dating of the Middle to Upper Palaeolithic transition, with the future aim to shed light on two broadly coinciding processes: the Neanderthal extinction and the dispersal of Anatomically Modern Humans along the Mediterranean rim.

Catherine DUPONT

AN INDUSTRIAL EXPLOITATION OF OYSTERS DURING THE MIDDLE AGES AT BEAUVOIR-SUR-MER (FRANCE)

Large amounts of the flat oysters *Ostrea edulis* dated from the Middle Ages are frequently recovered in Vendée along the French Atlantic facade. Some of these oyster’s deposits are genuine hills more than two meters high. This gigantic aspect and the presence of connected valves have led archaeologists to interpret these deposits as natural accumulations. Several archaeologists and biologists have examined attentively the one of Saint-Michel-en-L’Herm since the beginning of the 19th century to prove its anthropic origin.

But most of these oyster deposits are less known. In spite of their large dimensions they remain invisible in the landscape. They are located under the current ground where villages have been built above the heaps of oysters.

One of them, located in the village of Beauvoir-sur-Mer was recently excavated. This oyster’s deposit is 160 meters long, 20 to 25 meters wide and one to two



meters high. The first aim of our study was to determine if the oyster was the only species represented in the shell-midden. With that in mind, we sample this deposit and sieved it. More than thousand valves of these oysters were studied. Only a few of them have a hole. The biometric analysis of these features and their position allows us to define the origin of these perforations. The biometric analysis of the valves linked to the observation of the opening marks gives information on the technique used to gather the bivalve. The associated fauna inform about the exploited territory. It allows us to discuss the viability of this gathering activity in the long term.

But these large deposits of flat oysters raise another question. What did people do with all these oysters? The characteristics of the deposit underline the specialization of the activity, the nature of which we will discuss.

Alicia ESTRADA
José Miguel TEJERO
Joseph Maria FULLOLA
Xabier MANGADO
Mari Angels PETIT
Raúl BARTROLI
Xavier ESTEVE

FROM THE MEDITERRANEAN SEA TO THE RIVER SEGRE: PERFORATED SHELLS FROM MAGDALENIAN LEVELS OF PARCO'S CAVE (ALÒS DE BALAGUER, LLEIDA, SPAIN)

Discovered in 1974, Parco's Cave has been the object of intensive and systematic excavations by the team from Seminari d'Estudis i Recerques Prehistòriques (SERP) of the University of Barcelona since 1987. In this paper, we will present and discuss these studies of perforated shells obtained from the Upper Magdalenian level (N. II).

To date, more than 30 of these pieces have been identified. Among these fragments found on the site, we distinguish the presence of exclusively fluvial species, such as *Teodoxus fluviatilis*, as well as exclusively marine species, such as *Homalopoma Sanguineum* and *Cyclope neritea* – both being strictly of Mediterranean origins. While the origin of the former raises no question whatsoever since their catchments were done from the nearby river Segre, the procurement of marine gastropods, however, which has been identified so far exclusively in Cantabrian sites could suggest the possibility of a new doorway through the Ebro Basin, thereby strongly pointing to the possibility of a new way between the Mediterranean Basin and the Cantabrian area other than the commonly known North Pyrenean corridor. Here, we shall also report on the taxonomical, technological as well as the Geographical Information System (GIS) data of perforated shells found at the Parco's Cave.



**Ademar EZZUGHAYYAR
Muhammad ZAWAHRA
Hamed SALEM**

MOLLUSKAN FAUNA FROM SITE 4 OF TELL JENIN (NORTHERN WEST BANK –PALESTINE).

Site 4 of Tell Jenin covers many strata from Late Neolithic to Recent Past. Tell Jenin was the first archaeological site excavated in the Area of West Bank (Palestine) by Birzeit University.

The molluskan fauna accumulated during the Bronze Age shows a dominance of freshwater and landsnails over the Mediterranean shells. The "construction" phase (occupation) contain many more specimens than the "destruction" ones (abandonment) in each studied stratum of the site. This archaeomalacological study identifies palaeoclimatic variations in the prehistoric times.

It also reflects the different patterns of trade exchange, food sources, and the use of mollusks as artifacts, including their use as ornaments, in traditional and ritual activities by the population of the site.

**Miguel Angel FANO
Esteban ALVAREZ-FERNANDEZ**

MAGDALENIAN MARINE SHELLS FROM EL HORNO CAVE (RAMALES DE LA VICTORIA, CANTABRIA, NORTH OF SPAIN)

The aim of this poster is to present the available information about the intensity and method used to exploit malacological resources provided by the Bay of Biscay by Magdalenian groups at El Horno Cave. The location of the site in the upper Asón Valley, far from the coast, gives a specific weight to the malacological record within the analysis of the population dynamics of the societies being studied. In the case of El Horno, hardly any evidence has been found that the malacological resources were used as food, but in contrast, they were used to make personal ornaments.

**Carlos FERNÁNDEZ
Natividad FUERTES**

SHELL TRADE AND CONSUMPTION DURING ROMAN AGE AT ASTURICA AUGUSTA (LEÓN, SPAIN).

We present a study of malacological remains from Roman levels at Asturica Augusta. Most of those remains are marine origin. Our analysis evaluate the



importance of this type of resource to the Roman population's diet and provide us with information of the nourishing habits of the upper social classes. In addition to their dietary use, there are some shells that have been used as ornaments.

Asturica Augusta - in the interior of the Iberian Peninsula – was integrated into a commercial network that linked this city with the coast. Thanks to transportation and preservation systems, this commercial network reached the nutritional demand of the elite inhabitants of this city.

**María de Lourdes GALLARDO
Emiliano Ricardo MELGAR
Hortensia DE VEGA**

THE SHELL GARMENT OF OXTANKAH, QUINTANA ROO, MEXICO: A PROPOSAL OF ITS ANALYSIS AND RESTORATION.

The aim of this paper is to demonstrate the existence of a Maya nacreous shell garment by analyzing more than 1600 shell objects of a tomb from Oxtankah, near Chetumal City in Quintana Roo, México. We showed the different techniques employed on this pieces (taxonomical identification, typology based on shape and function, and technological analysis with experimental archaeology and Scanning Electron Microscopy). Also, we compared the design of different garments from hundreds of images from 32 Mayan archaeological sites and the Calakmul reddish shell garment, appreciating in almost all of them the same semicircular B-shape. Finally, we showed how we restored the garment and proposed other ones based on the drawings of some Mayan burial offerings.

**Ana GARCÍA
Jordi MARTINELL**

STUDY OF THE MALACOFUNA MARINE OF THE ANCIENT NEOLITHIC IN THE DEPOSIT OF THE CAVET (CAMBRILS, TARRAGONA)

The study of marine malacofauna of The Cavet (Cambrils, Tarragona) has been done based on the basic principles of mollusks' identification. Previously, a study of gastropods' and bivalves' morphology has been taken place, focused on features that possess the shell. The material analyzed is represented by a total number of 13 taxa, both gastropods and bivalves. On regards gastropods remains, three of them are the most common in The Cavet: *Gibbula turbinoides*, *Columbella rustica* and *Cerithium vulgatum*, very frequent in other neolithic deposits of the Iberian Peninsula. From the morphologic study of mollusks and their abundance in other deposits, it has been considered their conferred use.



**Ermengol GASSIOT
Ignacio CLEMENTE
Virginia GARCÍA**

ARCHAEOMALACOLOGY AND PALEOECONOMY. THE SHELL MIDDENS INTO THE PREHISTORIC SUBSISTENCE PRACTICES IN THE CARIBBEAN COAST OF NICARAGUA (1400 calBC TO 1000 calAD)

Still not so well known in many areas, shellmiddens are a common trait in the archaeological record from the Caribbean. Ten years of intensive archaeological researches in the littoral lowlands around the Pearl Lagoon and the Bluefields Bay into the Atlantic Coast of Nicaragua provide abundant data on littoral sites, most of which with shellmiddens. This permits to construct an archaeological sequence of 3,500 years of occupation, with an intense exploitation of aquatic mollusks that has continuity. With the exception of the prehistoric village of Karoline (400 calBC to 350 calAD) and a few handfuls of sites in the Bluefields Bay, the shellmiddens are conformed quite merely by the medium fresh water bivalve *Polymesoda solida*. In spite this apparent homogeneity in the shellmiddens, the exploitation of mollusks undergoes notable changes through time.

This paper presents the patterns that undergo the exploitation of mollusks across all the archaeological sequence. First, the taxonomy of shells is detailed, linking these data to the remaining evidences of subsistence at different sites. Second, the formation process of the shellmiddens is hypothesized, on the basis of their internal stratification, the ethology of the different species of shells and the inferred practices of collection. Third, it is exposed too the use of the shells as raw material, shown both in the necklace beads and in use wear analyses of lithic tools. Finally, the paper concludes with an economic analysis of the exploitation of mollusks as a subsistence practice. Different patterns of collection are presented for the different species from the confrontation of archaeological data (counting and measuring of shells, stratigraphy of the shellmiddens, etc.) with the ethnographical ones. On the basis of these patterns, the traditional assumption of the mollusks as a “*low rank resource*” is revised, especially for these taxa that were mass collected.

**Eduardo GONZÁLEZ
V́ctor BEJEGA
Laura LLAMAZARES
Carlos FERNÁNDEZ**

MARINE SHELL EXPLOITATION AT SAN CIBRAO SITE (LUGO, NORTHWEST OF SPAIN)

Recent discoveries of shell remains and other materials were found during various construction works at San Cibrao's beacon located on a small peninsula (Cervo, Lugo). These findings are associated to a Roman maritime settlement, a fort on a



hill, similar to those previously found at the Cantabrian sea sector of Lugo province.

Sampling and posterior analysis of these remains allows us to evaluate the importance of mollusks for the diet of an indigenous-type population during Roman times.

Gustavo GONZALEZ
Eduardo MESA
Alberto BRITO
Gustavo PEREZ
Jacinto BARQUIN
Bertila GALVAN

DISTRIBUTION OF THE *PATELLA CANDEI* (D'ORBIGNY) IN THE CANARY ISLANDS AND ITS SUPPOSED EXTINCTION IN PRE-HISPANIC TIMES

We will analyze the distribution in the Canary Islands of the limpet *Patella candei* (d'Orbigny 1840). This limpet is considered in the national catalogue of threatened species as an endangered one. Nowadays it only has bad preserved populations in the south and south eastern areas. Until now this populations have been considered as a relic after its extinction in the rest of the islands. The previous fact would be a consequence of intensive shell-fish exploitation since prehistoric times. The results of this study were obtained from an exhaustive sampling of the entire islands' coast and from the revision of shells from aboriginal shell-fish gathering in the archaeological record.

After all studies we can see that, at least since the period of the first human settlements in the Canary Islands, the distribution of this limpet was similar to the present one. We must discard its extinction in the other islands as a direct consequence of the intensive exploitation. In the pre-Hispanic deposits of Fuerteventura, *Patella candei* was very common in shell middens and maintains its population nowadays. On the other hand, from the study of 41 sites in the rest of the islands only four of these limpets were found in the shell middens of Tenerife and Lanzarote. In the last 30 years only 3 *Patella candei* specimens have been found alive outside Fuerteventura and they belong to the typical morphotype of the Wild Islands



Andrea GUÍA

WHERE THE SEA INVADES TO THE DESERT: FORMS OF UTILIZATION OF THE MOLLUSKS IN THE UPPER GULF OF CALIFORNIA, MEXICO

Diverse species of mollusks live in the Gulf of California. They were used in various ways by the ancient inhabitants of the Baja California peninsula. This is demonstrated by the numerous shell middens located along the coastline, which resulted from the collection of these organisms by the human groups that lived in the region. Studying the middens reveals to us the species that were most commonly used for food, the ways in which the animals' meat was acquired, and the preferences for certain species as raw materials for manufacturing artifacts. Archaeological investigations carried out by INAH-BC make clear the importance of murex snails (primarily *Hexaplex nigritus*) and several species of clams as fundamental to the groups' survival. Also sites in the interior of the peninsula are examined and where there are found species of freshwater mollusks that were used to make ornaments. This study is one of the first projects into the region in which the species that compose the middens are described. In the present lecture, an attempt is made to describe and discuss mollusk exploitation and the means of subsistence for the ancient inhabitants of Baja California.

**F. Igor GUTIÉRREZ
Manuel GONZÁLEZ-MORALES**

NEW DATA ON ASTURIAN SHELL MIDDEN SITES: THE CAVES OF LA LLANA AND MAZACULOS II (ASTURIAS, NORTHERN SPAIN)

Throughout the 20th Century research on Mesolithic shell midden sites in northern Spain have focused predominately on the Asturian chronocultural period (\approx 9000 - 6000 BP). However, the last twenty years has seen a decline in the archaeological investigation of the Asturian period, while research in Mesolithic shell midden sites has increased in other areas of northern Spain, such as eastern Cantabria and the Basque Country. In spite of the large amount of research conducted on the Asturian shell middens during the past century, only a few detailed archaeomalacological analyses have been carried out. In this paper, I present the results of the archaeomalacological analyses from the Asturian shell midden sites of La Llana (Andrín, Asturias) and Mazaculos II (La Franca, Asturias). These new data are used to address both mollusk exploitation patterns as well as to compare these results to established data from previous mollusk research on the Asturian.



Karen HARDY

SHELLS IN SCOTLAND. USE OF SHELLS AS RAW MATERIAL FOR TOOLS AND JEWELLERY IN MESOLITHIC SCOTLAND.

Scotland has thousands of miles of coastline and numerous prehistoric sites. Many of Scotland's Mesolithic sites lie near or adjacent to the coast and shell middens abound. Most of the shells in these middens appear to be related to food however in certain sites such as Sand, near Applecross, a range of evidence for shells as jewellery and as raw material for tools has emerged. The Mesolithic in Scotland does not have a particularly rich material culture and these exciting results will be presented and placed in the wider context of similar artefacts from the Scottish Mesolithic and Neolithic.

Juan Carlos HERNÁNDEZ
Eduardo MESA
Juan Francisco NAVARRO
Gustavo GONZÁLEZ

ARCHAEOLOGICAL SHELL MOUNDS AND SHELLFISH GATHERING ON LA GOMERA ISLAND (CANARY ISLANDS, SPAIN)

We present the preliminary results of the project: "Superficial Study of the archaeological shell middens of La Gomera (2006-2008)". The remarkable level of conservation at La Gomera island's coastline, where these archaeological units are located, has allowed their study. Firstly, the work consisted of an exhaustive compilation of spatial information of the existing shell middens on the island. On the other hand, with the purpose of successfully obtaining data and looking for elements to interpret these shell middens, a series of interviews were conducted within neighbours and average sailors in the entire island to ages between the 60 and 95 years. Also the archaeomalacological remains deposited in the Insular Archaeological Museum coming from excavations, archaeological surveys and donations made between 1974 and nowadays were revised. This information permit to understand the role developed by shell gathering between the old Gomeros and evaluated these shell middens by their patrimonial interest as well their scientific potentiality.



**María José IRIARTE
Álvaro ARRIZABALAGA
Francisco ETXEBERRIA
Lourdes HERRASTI**

SHELL MIDDEN PEOPLE IN NORTHERN IBERIA. NEW DATA FROM THE MESOLITHIC ROCK SHELTER OF J3 (BASQUE COUNTRY, SPAIN)

In the course of a sondage dug in the rock shelter of J3, in the Jaizkibel mountains (at the north-western tip of Guipúzcoa), the body of an adult man was located buried inside a shell midden. This shell midden had not been disturbed and presented internal stratigraphy features. In any case, the outer edge of the shell midden does show some interesting interdigitation with the adjacent habitational layers, with evidence of different stages of occupation. Within the shell midden itself, under the individual buried there, it was possible to observe layers without any ceramics, whereas the layers covering said individual included ceramic fragments. This individual has been dated to 8,300 BP and therefore corresponds to a Mesolithic context.

**Ilean Isel ISAZA
Patricia A. MCANANY**

SOCIAL USES OF SHELL ORNAMENTS: A COMPARATIVE STUDY FROM THE MAYA AREA AND CENTRAL PANAMA

Shell, both marine and freshwater, is one of the most common raw materials used for the crafting of personal ornamentation. Retrieved from the cosmologically charged watery depths, shell is relatively easy to work with. Globally and throughout time, shell has been highly sought after and often is cited as an item of value in exchange networks and pre-state spheres. Interpretation of archaeological patterns indicates that shell ornaments can provide significant insights into the construction of social identities. During the presentation of this paper we will use examples from two cultures in Central America: the Maya from Mesoamerica and Gran Coclé from Central Panama where large samples of shell ornaments were found in pre-Classic and Classic period burials, particularly those of children and adult females.



Jesús F. JORDÁ
J. Emilio AURA
Carlos MARTÍN
Bárbara AVEZUELA

ARCHAEOMALACOLOGICAL REMAINS FROM THE UPPER PLEISTOCENE – EARLY HOLOCENE RECORD OF “VESTÍBULO” OF NERJA CAVE (MÁLAGA, SPAIN)

At the final stages of the Upper Pleistocene and the Early Holocene, a strong stratigraphic series was placed on the access of Nerja Cave (“Vestíbulo”). This serie was distinguished by the evidence of major human activities throughout the human occupation of the cave (*ca.* 30.000 - 6.000 years cal. BP). This series represents one of the broadest archaeological records on the Western Mediterranean area at this age, and it is the technological evidence of various cultural assemblages of the prehistoric sequence (Gravetian, Solutrian, Magdalenian, Mesolithic and Neolithic). The technological remains are not the only evidence found, an important amount of vegetal and animal remains related to human activities in the cave have been also found. Among the remains, stands out the abundant presence of remains of marine and continental mollusks: 76 taxa and more of 135.000 remains (80 kg of shells) of Gastropoda, Scaphopoda, Bivalvia and Cephalopoda. Surpasses the important presence of mollusks used for food, but others also were used as ornaments, and finally some species are introduced in the cave accidentally by men and those inhabit in these karstic zones.

Darko KOMŠO
Preston T. MIRACLE

MESOLITHIC SEA AND FRESHWATER PERFORATED SNAILS FROM ISTRIA, CROATIA

Perforated shells figure prominently in discussions of exchange systems and body ornamentation during the Mesolithic in Europe. In this paper we discuss assemblages of perforated snail shells recovered from recent excavations of Mesolithic sites in Istria, Croatia. The most numerous species is *Columbella rustica*, and recent experiments and observations on the assemblage from Šebrn Abri suggest that larger-sized shells were selected and that perforations were made quickly and expediently using a punching technique (Benghiat et al. in press). A much larger assemblage of perforated shells was recovered from Pupićina Cave, and alongside *Columbella* (dominant in the assemblage) there are also perforated shells from freshwater taxa. The significance of the Pupićina perforated shell assemblage is examined in light of other evidence of site use, as well as within the context of the Late Upper Palaeolithic and Mesolithic of Istria and the surrounding region.



Pedro LÓPEZ
Emiliano Ricardo MELGAR

EXPLOITATION OF SHELLS AT EL CUYO, CAMPECHE, MEXICO

During the 2006 and 2007 underwater fieldwork at El Cuyo, Campeche, a pre-Columbian Mayan seaport, the archaeologists had been recovered a rich shell assemblage. The taxonomical identification allowed us to know the different environments exploited by the ancient Maya. Also, the comparison of the archaeological specimens with the modern ones showed us that the former shells were bigger in size than the modern ones, probably as a result of the overexploitation of these marine resources by the modern fishermen.

M. Carmen LOZANO
José Luis VERA

PALAEOBIOGEOGRAPHY RECONSTRUCTION OF *MODIOLUS LULAT* (DAUTZENBERG, 1891) (BIVALVIA, MYTILOIDA) OBTAINED FROM MOLLUSK'S RECORD IN FENICIAN-PUNIC CITIES AND THANATOCOENOSIS AT HOLOCENE BEACHES

Modiolus lulat (Dautzenberg, 1891) is a specie of Mytiloidea (Mollusca, Bivalvia) living in West Africa from Senegal to Angola and Cabo Verde Islands. It has been cited as fossil in Dakar Quaternary (Senegal). *Modiolus lulat* has been confused in the bibliography with *Mytilus edulis* and *M. galloprovincialis*.

It has cited in Alborán Sea (West Mediterranean) and recently in Málaga, the only point in Europe where there are living specimens and cited. *Modiolus lulat* is not cited in the archaeology record neither in European coasts, so we think that this specie colonized Alboran Sea and Lusitanian (Cádiz province, Southern Spain) recently, possible at the terminal Holocene.

The authors have collected living specimens of *M. lulat* in the thanathocoenosis of beach in some stations of Málaga province: El Morche, Misoricordia (Málaga town), Calaburra (Mijas), Cabo Pino (Marbella), Punta de la Plata, Arena Beach (Estepona); and Sardina beach (San Roque, Cádiz).

Lozano-Francisco studied the sea resources of Fenician-Punic populations of Camposoto (San Fernando, Cádiz) (century VI B.C.). She reported eight valves of *Modiolus lulat* excellently preserved with their original coloration (deep red-pinkish). This is the first mention of this rare specie in the zooarchaeological record in Europe, which was identified before as *Mytilus edulis* (Linné, 1758).

With *Modiolus lulat*, the Fenician-Punic populations of Camposoto exploited also 32 species of mollusks, one crab (Crustacean) and five species of fishes, mainly for food. Mollusks were complete (with both valves), these are: *Glycymeris glycymeris* (Linné, 1758), *Glycymeris insubrica* (Brocchi, 1814), *Mytilus edulis* (Linné, 1758),



Pecten sp., *Chlamys* (*Chlamys*) *varia* (Linné, 1758), *Chlamys* (*Proteopecten*) *glabra* (Dillwyn, 1817), *Anomia epphipium* Linné, 1758, *Ostrea edulis* Linné, 1758, *Acanthocardia* sp., *Rudicardium tuberculatum* (Linné, 1758), *Eastonia rugosa* (Helbling, 1779), *Ensis minor* (Chenu, 1843), *Ruditapes decussatus* (Linné, 1758), *Venerupis corrugata* (Gmelin, 1791), *Patella caerulea* Linné, 1758, *Patella rustica* Linné, 1758, *Monodonta lineata* (Da Costa, 1778), *Charonia lampas lampas* (Linné, 1758), *Bolinus brandaris brandaris* (Linné, 1758), *Trunculariopsis trunculus trunculus* (Linné, 1758), *Thais* (*Stramonita*) *haemastoma* (Linné, 1766), *Nassarius reticulatus* (Linné, 1758), *Bittium reticulatum* (Da Costa, 1778), *Hidrobia ulvae* (Pennant, 1777), *Hidrobia ventrosa* (Montagu, 1803), *Hydrobia* sp., *Caracollina lenticula* (Michaud, 1831), *Rumina decollata* (Linné, 1758), *Cecilioides acicula* (Müller, 1774), *Theba pisana* (Müller, 1774), *Ferrussacia acicula* (Müller, 1774), *Sepia officinalis* Linné, 1758, Decapoda sp., *Myliobatis aquila* (Linné, 1758), *Lophius piscatorius* Linné, 1758, Sparidae sp., *Merluccius merluccius* (Linné, 1758), *Thunnus thynnus* (Linné, 1758). Some small marine gastropods such as *Hidrobia* or *Bittium* were interpreted as part of the sand or sediment from the beach.

In conclusion, taxonomic and ecologic studies of the archaeological record are the keys to know the paleobiogeography and taxonomy of the marine mollusks, especially when they are occupying areas in the past where do not live recent in Mediterranean area. This conclusion is extrapolated to fresh water and continental mollusks.

David LUBELL
Mary JACKES
Meredith L. FABER
Crayton J. YAPP

LAND SNAIL STABLE ISOTOPES AND THE CAPSIEN TYPIQUE-CAPSIEN SUPERIEUR TRANSITION IN EASTERN ALGERIA

Excavations in the 1970s at two stratified Capsian escargotières in the Téli djène Basin, eastern Algeria, revealed a Capsien typique-Capsien supérieur sequence dated ca. 9500 to 6500 calBP. Geoarchaeological analyses of the deposits and zooarchaeological studies, especially of the abundant land snail assemblages, suggest a change from wetter to drier environmental conditions coinciding with the transition from Capsien typique to Capsien supérieur. New studies of the stable isotope composition of *Helix melanostoma* shells from one of these sites, Aïn Misteheyia, as well as of live/recent samples of the same species collected near the site in 1973, show measured values of $\delta^{18}\text{O}$ that correspond with the decrease observed in the Greenland ice cores at 8200 calBP. Values for $\delta^{13}\text{C}$ are consistent with a snail diet of predominantly C3 organic matter throughout the sequence, and this is being verified using studies of phytoliths from the same deposits. Analyses now in process of land snail shell samples from the second site, Kef Zoura D, where variations in land snail assemblages were used to reconstruct the stratigraphic sequence, are expected to demonstrate a similar scenario. In this paper, we will combine data from all studies, but especially those of the land snails, to show that



the cultural/technological shift from earlier (typique) to later (supérieur) varieties of the Capsian, was related to environmental changes brought on by the Abrupt Early to Mid-Holocene Climatic Transition (EMHT), also known as the 8200 calBP event.

Ruth MAICAS

MORE THAN FOOD, BEADS AND SHELL TOOLS IN LATE PREHISTORY: SPANISH SOUTHEAST

Current reviews point out the bromatologic role of malacological remains and their increase attribution as ornaments in prehistoric societies. Beads and other ornamental objects are very common components of archaeological assemblages in Mediterranean Late Prehistory, but they are not the exclusive production in shell materials in our sites.

This paper discusses objects from the Siret collection in the Museo Arqueológico Nacional (Madrid, Spain). We would like to emphasize, among other topics, the role of a pioneer in Spanish Archaeology, Luis Siret, as regards malacological studies: some analysis and experimental works made by him at the end of XIX century are presented here.

The study of malacological material collected from Neolithic and Chalcolithic sites documented in Vera Basin (Almería, Spain) is revised in this paper. More than 2,600 objects were made of shell. Personal ornaments, such as beads and pendants, compose the main group, although we have also identified a small assemblage of tools. An interesting point is the existence of shell materials in the inland, far from the sea. Shell objects are evidenced in 30 of 35 burials documented in the Alto Almanzora, being frequently the main component of grave-goods. Shell industry was studied in order to learn artefact's functionality of these assemblages in Neolithic and Chalcolithic societies. Moreover, this other kind of objects, prepared as utilitarian tools (i.e. small pots), has shown a different perspective for their social value.

**Jorge MARTÍNEZ
Joel CASANOVA
Rafael MORA**

LOST IN THE MOUNTAIN? MARINE SHELLS AND SOCIAL NETWORKS IN THE SOUTHERN PYREENES

In the past few years, Mediterranean carved marine shells (-particularly *Collumbella rustica*) have been profusely mentioned at the south Pyrenees and Ebro valley Mesolithic sites. Some scholars argued this gastropod allows identifying long distance social networks that articulate a common cultural Post-glacial landscape. In this presentation we will introduce the marine carved shells



evidence found in the south-eastern Pyrenees sites of Santa Linya, Balma Guilanyà, Sota Palou and Font del Ros, that included a wide temporal range, from the end of Paleolithic to Early Neolithic. The characterization of these assemblages in the geographic, crono-climatic and crono-cultural context of the Pyrenees sites permit to visualize the radical transformations that affected the technical, social and cultural spheres of the hunter-gatherer lifestyle from the late Pleistocene to the Holocene. These data can evaluate if these ornaments describe patterns of cultural change and if the pertinence to consider them like Post-glacial social network tracers in the south Pyrenees and Ebro Valley.

Emiliano Ricardo MELGAR

THE MANUFACTURING TECHNIQUES OF THE OLIVA PENDANTS AT XOCHICALCO, MORELOS

At the Epiclassic (AD 600-900) site of Xochicalco, in the Western Valley of Morelos, México, archaeologists had been recovered a lot of Oliva pendants, some of them forming necklaces in the offerings inside the main structures. Through the experimental archaeology and the analysis of the traces of manufacture with optic microscopy (OM) and scanning electron microscopy (SEM), I could identify the different tools and techniques employed in their production. Surprisingly, each pendant presented different technologies, despite that they were part of the same necklace and offering. Probably, they were produced by different working groups or shell workshops, because in the later stages of the site, the shell objects presented a strong standardization of their manufacture.

**Eduardo MESA
Bertila GALVÁN
Gustavo GONZÁLEZ**

ARCHAEO-MALACOLOGICAL STUDIES IN PREHISTORIC CONTEXTS IN TENERIFE (CANARY ISLANDS, SPAIN)

We will present a synthesis of the malacological studies made in different prehistoric contexts in Tenerife (middle of the first millennium B. C. (s. IV-II) until the 15th century A. D.). These contexts are the result of the first occupation of the islands by bereber populations from northern Africa. The first seashell's taxonomical identifications from prehistoric sites of the island were made at - the 70's decade of the 20th century. But it is mostly in the 90's when a theoretical and methodological change occurs as far as the study of this kind of findings. This new approach implies an advance on the past hypothesis that deals with shell-fish gathering as a complementary activity. They have been now replaced by a new approach that deepens in the importance and development of this activity inside the productive process between these populations.



Hervé MONTERROSA
Reyna Beatriz SOLÍS

MALACOLOGIC MATERIALS OF THE ARQUEOLOGICAL AREA IN PEZUAPAN, GUERRERO, MEXICO

During the season 2005-2007 in the area of Pezuapan, located in Chilpancingo city, Guerrero, there were recovered various malacological materials of marine and freshwater origin. These mollusks correspond to the Epi-classic (AD 600-900) and early Post-classic (AD 900-1150) periods. The material presents a diversity of species that indicates the relationships of this area with settled groups in the Pacific Ocean shores, surely following the beds of the main rivers like Balsas, Huacapa, and Papagayo. Finally, this study is a pioneer in a not well known archaeological area such as the Chilpancingo valley and Guerrero in general.

Mònica OLIVA

TECHNOLOGY, PRODUCTION AND USE OF MALACOLOGICAL ORNAMENTS AND TOOLS IN THE PREHISTORIC SITE OF CAN ROQUETA (BARCELONA, SPAIN).

This poster shows preliminary typological, technological and spatial analyses of shell ornaments from the site of Can Roqueta near Barcelona, Spain. Can Roqueta is situated at 15 km from the city of Barcelona, in a platform over Ripoll River which has a long and wide valley with - diverse paleoecological and water resources. The site is dated between the 5th-4th millennium BC (Ancient Neolithic) to the Middle Age. The artifacts analyzed in this study are associated to the beginning of the second millennium BC (Early Bronze Age). Most of the ornaments are made of shell but other raw materials were also used. These shell ornaments were founded in funerary contexts, pit storage and habitation areas. The analyses determine the variety of shell species chosen by ancient people in the area, their use, production and the manufacture of ornaments. With the help of experimental archaeology and traceology techniques, we try to established how those ornaments were made, which techniques were used, how much time they may spent elaborating these objects and what were their finally use.



Mònica OLIVA
Riker YLL

THE USE OF MARINE SHELLS IN CINGLE VERMELL AND ROC DEL MIGDIA, TWO PREHISTORIC SITES IN WESTERN MEDITERRANEAN: A PRELIMINARY APPROACH.

This poster presents the results of a preliminary study of malacological materials at the archaeological sites of Roc del Migdia and Cingle Vermell. This first approach determines the variety of shell species chosen by ancient people settle in the area and try to discern their use.

Early excavations at the Roc del Migdia reported human occupation from Upper Palaeolithic until Bronze-age. There are few contemporary archaeological sites in the immediate area with the exception of the Cingle Vermell with evidence for Mesolithic occupation. The sites are included in the multidisciplinary project *Evolució de les Ocupacions Humanes des del Paleolític al Neolític a la Vall de Sau (Osona)*.

Both rock shelters, Cingle Vermel and Roc del Migdia are located at 15 km east of the city of Vic (Barcelona province) in north eastern Catalonia. The sites lay at the base of a cliff at 650 meters of altitude in the Sau Valley. The Sau Valley's slopes support helm oak woodland and lies near the intersection of distinct climatic influences. These ecological conditions create a zone with a wide range of different biological communities that have potential as human food resources. Because of this ecological richness, this zone has had a considerable attraction to prehistoric populations with an economy based on hunting and gathering. One of the resources documented were marine shells. These remains are represented by few ornaments and fragmented shells appeared in the occupation levels. These ornaments were made in species like *Nassa*, *Trivia* and *Cyclope*. Most of the shell ornaments described present one or two perforations using different techniques and have small size.

Roberto ONTANÓN
Esteban ÁLVAREZ- FERNÁNDEZ

FIRST DATA ON MARINE MOLLUSC EXPLOITATION DURING THE NEOLITHIC IN CANTABRIAN SPAIN: LOS GITANOS CAVE (MONTEALEGRE, CASTRO URDIALES, CANTABRIA, SPAIN)

Mollusc shells from the archaeological site of Los Gitanos Cave largely correspond to the Patelloidea family. Due to their good preservation, it is possible to identify four different bivalve species: *P. vulgata*, *P. rustica*, *P. intermedia* and *P. ulyssiponensis*. Gastropods such as, *Osilinus lineatus* is also abundant, while other species of gastropods and bivalves are less represented (*Gibbula* sp., *Mytilus* sp., etc). In this paper we study the evolution in the consumption of molluscs through the Neolithic sequence in this archaeological deposit.



Isabel C. RIVERA

THE SHELLS OF PUNTA CANDELERO: PALAEOENVIRONMENTAL EVALUATION OF ANTHROPOGENIC SHELL DEPOSITS IN A SALADOID COASTAL SITE IN PUERTO RICO, AND ITS IMPLICATIONS FOR COASTAL HABITAT AVAILABILITY

This essay evaluates a shell assemblage from Punta Candeleró, a Saladoid site located in the south portion of Puerto Rico's eastern coast, in the Caribbean Sea. Given the different possible ways in which shells are incorporated to archaeological contexts, this assemblage has been classified as an anthropogenic shell deposit, differentiating it from middens or other shell accumulations. Analysis of the shell assemblage reflects the foraging strategies of the inhabitants of the site, exploiting all the locally available coastal habitats, including rocky shores, soft bottoms and sandy beaches. The importance of the exploitation of riparian environments seems to be much greater than anticipated given the abundant presence of *Neritina* sp.

**Antonio José RODRÍGUEZ
Antoni CANALS
Palmira SALADIÉ
Ana GARCÍA**

UPPER PALEOLITHIC SHELL ORNAMENTS FROM SALA DE LAS CHIMENEAS, MALTRAVIESO CAVES, CÁCERES (SPAIN)

In this work we carried out taxonomic, technological and traceologic studies of two perforated shells: *Littorina obtusata* and *Patella vulgata* recovered from the Sala de las Chimeneas, inside of Maltravieso caves site, Cáceres (Spain).

The presence of both species is frequent in Paleolithic contexts and common in Epi-Paleolithic contexts but rare in later chronologies, especially for *L. obtusata*. The techniques of perforation and utilization of shell pendants have been characterized by traceologic and morphometric studies. These Cáceres Complex ornaments were compared to other Upper Paleolithic sites in the Portuguese Tajo's Basin.



**Cristina SAN JUAN
Pascal FOUCHER**

MARINE SHELL BEADS FROM THE GRAVETTIAN AT GARGAS (CENTRAL PYRENEES, FRANCE): CULTURAL AND TERRITORIAL MARKERS

Gargas Cave (Aventignan, Haute-Pyrénées) is a reference site for the Gravettian period in Europe because of its exceptional parietal art and rich archaeological strata. The excavations carried out in the late 19th Century and early 20th Century showed that the deposit covered a wide chronological range: Mousterian, Chatelperronian, Aurignacian and Gravettian. A new series of excavations was commenced in 2004 with the aim of establishing a detailed stratigraphic sequence that would be more precise than the schematic profile proposed by E. Cartailhac and H. Breuil in their studies of 1911-1913. At the same time, a further objective has been to carry out the first palaeo-environmental study of the deposit.

The Gravettian levels discovered in the recent excavations (dated by C14-AMS to between 27,000 and 25,000 BP) have yielded lithic and bone assemblages that are characteristic of the middle Gravettian with *Noailles* burins, which has confirmed the initial attribution of the level. It has also been possible to recover new archaeological material, in particular a series of 17 personal ornaments made from marine shell beads, including a dozen examples with the perforation intact. The identified species are: *Littorina obtusata*, *Littorina littorea*, *Patella vulgata*, *Nucella lapillus*, *Trivia europea*, *Neritina fluviatilis*, *Neritina picta* and *Pirenella plicata*. These are Atlantic gastropods that are often found in Gravettian deposits in south-west France or fossil shells from lower Miocene beds (*faluns*) in Aquitaine. Most of the potential sources are located at distances of 150 or 250km from the cave, on the Basque coast and in the middle and lower valleys of the Adour and Gave de Pau. These areas coincide with the sources used for the supply of the most common allochthonous flint at Gargas. This information is of great significance in terms of the directions of movements and the cultural space of Gravettian populations in the Central Pyrenees.

**Romina SILVESTRE
Natacha BUC
Daniel LOPONTE**

WHAT ABOUT SHELLS? EXPERIMENTATION AND FUNCTIONALITY OF SHELL ARTIFACTS IN THE PARANÁ'S WETLAND, ARGENTINA

This presentation is based on three main characteristics of the late Holocene archaeological deposits located on the Paraná's wetland (Pampean Region, Argentina): low availability of lithic raw materials, a contrasting great abundance of bone tools and an overwhelming quantity of malacological remains. In previous works, we exposed the technological scenario of our study area discussing that lithic and bone technology functioned in a complementary fashion. In this paper we



consider the possibility that mollusk shells had been used as an alternative raw material, that is, as a third part of this integrated technological system given their high availability and low procurement costs.

As a starting point, we explore the functional possibilities of shells as raw material. For this reason, we developed an experimental program that involved both the extraction of base forms and their use as artifacts as well. We used them as natural edges for varied tasks such as cutting, scraping and sawing hard materials, mainly bone and antler. But also we tested the capabilities of lithic raw material for the formalization of malacological tools such as *tembetás* (ornament items used by ethnographic groups in northern Argentina).

Results can be briefly summarized as follows:

Processes of micropolish formation on shells can be equated with those produced on lithic materials, although differential sharpness introduces some variation. Moreover, we can differentiate bone cut marks made by mollusk shells from those made by lithic edges (U-shaped vs. V-shaped, respectively). In sum, shells can undergo different tasks efficiently, but we also recognize the difficulty of identifying the artifacts on the archaeological record, especially after taphonomic processes. However, these results point out that we must consider mollusk shells as a source of raw material in our study area and as an important option within the technological strategies of hunter-gatherers during late Holocene times.

**Reyna Beatriz SOLÍS
Guadalupe MARTÍNEZ**

THE SPECIALIZED PRODUCTION OF SHELL OBJECTS IN TEOPANTECUANITLAN, GUERRERO, MÉXICO

In the area of Teopantecuanitlan, located in the east-center region of Guerrero, it has been recovered the most ancient and abundant shell collection correspondent to the Mesoamerican Formative period (1200-600 BC). Most of this material comes from the Pacific Ocean shores and in less quantity from the Mexican Gulf and of rivers on the slope of the Pacific Ocean. There has been identified: non modified mollusks, pieces in process of work and finished objects. Through the use of experimental archaeology and the observation of the various modifications with optical microscopy (OM) and scanning electron microscopy (SEM), it was possible to deduce the techniques and tools used for its production, which should have been concentrated in one or in a few workshops controlled by the rulers of the site.



José LuíS VERA
M. Carmen LOZANO
María Dolores SIMÓN
Miguel CORTÉS
Julián RAMOS

THE TUSK-SHELLS (SCAPHOPODA, MOLLUSCA) IN THE ARCHAEOZOOLOGICAL RECORD OF MÁLAGA PROVINCE (SPAIN): SYNTHESIS AND PREHISTORIC OUTCROPS

Molluscs were obtained by humans from Upper Paleolithic, Epipaleolithic, Neolithic and Calcolithic contexts of Nerja Cave, Mina Hole and Humo Complex (Málaga), specially tusk-shells (Scaphopoda, Mollusca) which were utilized as ornaments. Similar artefacts arranged in collars are found in every cave in Malaga province. These tusk-shells are strongly polished on the outside and scratched inside. Tusk-shells were obtained by human populations on the thanathocoenosis of beaches, near of caverns (Humo Complex, Mina Hole), and far away of cavern (Nerja Cave).

Fossil tusk-shells (Pliocene) obtained in Upper Paleolithic and Neolithic contexts from Mina Hole are exceptional findings. Molluscs excavated in Mina Hole have been compared, measured and identified with fossil and recent tusk-shells from Tertiary age (Miocene and Pliocene) of Andalusia, Catalanian (Spain) and Italian basins deposited in MMPE. This is an important collection of reference in Spain to study scaphopods and mollusks from prehistoric outcrops. We have found scaphopods fossils (Miocene to Pliocene) *Dentalium sexangulum* Gmelin, 1790 and *D. inaequale* Bronn, 1831. These two species are bigger than recent European scaphopods and both are buried in marine Pliocene sediments in Málaga basin, near of Mina Hole. These species of the genus *Dentalium* are extinguished since Upper Pliocene (Gelasien).

The Quaternary species identified in Prehistoric outcrops of Málaga province are *Antalis inaequicostatum* (Dautzenberg, 1891), *Pseudantalis rubescens* (Deshayes, 1825) and *Antalis vulgare* (Da Costa, 1778). These shells might be collected dead by humans in the thanathocoenosis of beach. Nowadays, these shells are frequent in the littoral of western Mediterranean Sea.

Ester VERDÚN

MOLLUSKS AS SEDIMENTARY COMPONENTS. ANOTHER PERSPECTIVE OF ANALYSIS

The study of shell middens through representative and significant sedimentary samples from every stratigraphic subunit, gives us a different approach to archaeological sites. The statistical study of the components of each sedimentary sample shows spatial differences in the site Túnel VII (Tierra del Fuego,



Argentina). This is a shell midden located at the coast of the Beagle Channel. It was occupied in the last decades of the 19th century by the Yamana, a hunter-fisher-gatherer society that lived along the Beagle Channel until the arrival of the European expeditions. There are some chronicles and ethnographic testimonies of Yamana occupation. The spatial differences observed in this site, give information about the activities carried out in the settlement and about the use of the shells as building material.

Rena VEROPOULIDOU

PURPLE-DYE PRODUCTION IN THE BRONZE AGE AEGEAN: THE EVIDENCE FROM MAINLAND GREECE AND THE ISLANDS

The use and importance of purple-dye are well documented in Geometric and Classical Greece and the earliest evidence of purple-dye production in the Aegean comes from Crete and dates to the end of the Middle Minoan period, in the 18th cent. BC. Archaeological data, however, related to prehistoric purple-dye production and use is generally insufficient since early excavations collected only a sample of shells, if at all. Furthermore, interpretations which are strongly influenced by the testimonies of the large scale chemical industry of Roman times often discredit the existing meager evidence on prehistoric purple-dye production.

Recent research indicates that the production of the dye is also feasible on a much smaller, even on a domestic scale. Adopting this point of view, the discussion here examines data from Bronze Age sites in mainland Greece and the Aegean islands with the aim to identify evidence of the activity. Special attention is directed to two mainland Bronze Age sites, which suggest the existence of small scale purple-dye production. The data from the recent excavations of the settlements of Thessaloniki Toumba and Mitrou, in Northern and Central Greece respectively, are presented as case studies. The results of the analysis of all shell specimens are presented, with a particular emphasis on the hundreds of purple-supplying seashells found fragmented in the Middle and Late Bronze Age layers of the two sites and their archaeological context.

Eugenia VILLARMARZO

MOLLUSK EXPLOITATION IN THE ATLANTIC COAST OF URUGUAY

In 1996 the first shell midden site was discovered in the Atlantic Coast of Uruguay (Locality of La Esmeralda, Rocha). This site presents three structures composed of valves of coquina clam (*Donax hanleyanus*, Bivalvia, Donacidae), as well as other mollusks, animal bones, lithic remains and sediments.

This paper presents the results of the archaeomalacological study of Excavation I carried out at the Structure A. This structure was dated at 3.300 BP.



We identified ten bivalves and gastropods species, both marine and freshwater. Some of these species are food remains while others are intrusive. The study analyses the relative importance of each species in the sample, biometric characteristics and taphonomic issues in order to generate site formation hypotheses.

Dustin WHITE

HOLOCENE MOLLUSCAN SUCCESSIONS IN THE LAKE BAIKAL REGION, SIBERIA – RECONSTRUCTING A NEOLITHIC LANDSCAPE

This paper reviews recent multidisciplinary research investigating Holocene molluscan successions in the Lake Baikal region of Siberia and their significance to archaeological and palaeoecological reconstructions.

Archaeological data from the area demonstrate two distinct phases of greater socio-economic complexity, evidenced by the use of large formal cemeteries, increased sedentism and resource intensification dating to the Early Neolithic and Late Neolithic-Bronze Age periods, separated by a c. 1000-year interval in which large mortuary sites are entirely absent. Results further suggest that groups on either side of this Middle Neolithic discontinuity differed in subsistence strategies, diet, mobility patterns and genetic affiliation. Causal explanations for these pre- and post-hiatus cultural changes remain unresolved however. Data presented here examines this developing model of Neolithic-Bronze Age prehistory within the context of shifting climatic and environmental conditions across the Lake Baikal region during the Holocene.

Recent fieldwork has focused on the study of high-resolution floodplain biostratigraphic records, in particular the palaeoecological significance of radiocarbon dated pedogenic profiles developed within both alluvial and aeolian sedimentary environments and the associated fossil sequences of terrestrial and freshwater molluscs. The malacological data recovered to date comprise well over 100,000 shells representing over 53 species and are the most detailed yet reported from the entire eastern Palaearctic. These results, together with other published proxy records from the region, provide the framework both to reconstruct the climate and environmental context of Holocene culture change in the Lake Baikal area and to evaluate the hypothesis that regional palaeoecological variability was a contributing factor in reconfiguring both the Neolithic landscape and the bio-cultural profile of resident boreal hunter-gatherer populations.



Miguel Angel ZUBIMENDI

THE USE OF ARCHAEOMALACOLOGICAL FAUNA AS INSTRUMENTS IN PATAGONIA (ARGENTINA)

The Patagonian region represents the southernmost tip of the American continent, and was the last landmass colonized by humans at 12.000 or 13.000 B.P. Hunter-gatherer populations lived in this region since the end of Pleistocene and during the Holocene. They exploited available resources, especially guanacos in the interior areas, and sea lions and shellfish from the coast.

Few thousands years after the initial settlement, there is evidence of the exploitation of malacological resources for food. Freshwater shellfish have been exploited since 9.000 BP, while marine molluscs began to be heavily consumed two thousands years later.

The archaeology of Patagonia documented a large number of sites with evidence of an intense exploitation of shellfish for consumption over the past 4,000 years with a greater emphasis on central sector. Few instruments made of molluscs have been identified, mostly shellbeads and containers for liquids and paints.

Recent investigations of the Patagonian coast study not only the role of shellfish in the diet of the aboriginal peoples but also archaeomalacological remains as raw materials for tools. The purpose of this paper is deepened on the use of mollusc as raw material for tools in Patagonia (Argentina).