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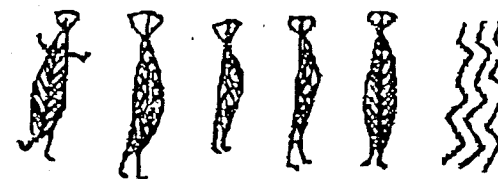
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## FROM THE EDITOR

This issue of Mesolithic Miscellany is the smallest in recent years. Please send a contribution to the next issue (deadline 1 May). We have a number of categories of articles in our contents including research reports, book reviews, national synopses of recent work, statements for debate, radiocarbon determinations, conference summaries, announcements, and summaries or abstracts of recent publications help to keep the readers informed of current developments in the field. Without your participation the newsletter will cease to be an effective means for discussing the Mesolithic.

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## MESOLITHIC MISCELLANY

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## DEBATE

## Away from a Definition of the Mesolithic

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Recent attempts to define the Mesolithic (Clark 1980, Mellars 1981, Price 1984, Rozoy 1984) imply that a definition is both possible and desirable. I question whether this is so. The lack of a definition is not necessarily a barrier to progress. The concepts of "culture" and "Intelligence" defy definition, yet anthropologists and psychologists do not appear unduly constrained. Indeed, it might even be thought that such a state may be advantageous for an academic discipline.

To define something is to lay down precise limits, and a definitive statement is one which is final and not subject to revision. Is such an objective desirable for Mesolithicists? I think not.

The Mesolithic represents a complex set of interactive phenomena. Because

many of the constituent elements are amenable to empirical study, there seems to be an implicit assumption that there exists some sort of common denominator. As Czarnik (1976) makes clear, we can recognize that the Mesolithic has a complex character. Ascertaining the ethos of this archaeological domain seems equally as complex.

The key to the problem surely lies in the different bases of the Mesolithic. The chronological component has two unrelated elements. The starting date of 8300 bc seems reasonable; but this is an arbitrary date based on varve analysis. The upper horizon depends on when farming reaches a particular locale. A different problem obtains with regard to climate and environment. Both variables play a

part in conditioning cultural development, but we remain unsure as to how much. Technologically we recognize that microlithization certainly represents a hallmark of the Mesolithic, but not a material definition.

The quest for a definition is essentially an exercise in modelling, and is therefore a process which involves a progressive reduction of the complex to the simple (Clarke 1968). Mellars 1981 has suggested that our models of the Mesolithic should be manageable, clear, and precise. No one could deny that models should be manageable, but the choice of the remaining attributes can be more problematical. As Poincaré (1905) notes, the attributes of models are always compromises; to emphasize precision is to do so at the expense of generality, for example, and the final emphases will reflect the purposes of the model and the modeller.

A major problem in anthropology has been the creation of models which contain all of the important elements of a phenomenon. In order to defend against the clarion cry of "What about the Ugga-Bugga" - a syndrome well known in North American anthropology with probable parallels in Europe - it sometimes becomes necessary to generate some unwieldy contrivances.

One strategy in current use is for Mesolithicians to focus on a "before" and "after", but leave to the imagination what goes in the middle. "Post-Pleistocene pre-agriculturalists" defines nothing except the parameters of the domain. Probably reflecting the ultimate in reductionism, this approach represents a safeguard against the omission of key elements by omitting them all! It also precludes the need to balance technological factors against environmental variables, etc.

But even assuming the Mesolithic could be neatly summed up in one succinct phrase that would satisfy all concerned, what benefit could this have? Only rarely can common denominators be used as units of analysis in their own right. Even more rarely can such be used as the basis for inferences to the wider whole. It seems more appropriate to reiterate Czarnik's (1976) cautions: the application of static and rigid delineations to phenomena that are essentially continuous, dynamic, and fluid is to invariably constrain and obscure. A definition that obscures is one that fails.

I suggest two possible solutions. The Mesolithic seems to have much in common with natural selection, but the essence of natural selection cannot be determined by examining one or two organisms and seeing how they fare in their environment. Natural selection is a holistic process and a classic example of a whole being more than the sum of its parts. It seems worthwhile to consider the Mesolithic as an analogous process, the totality of which denies the validity of reductive methods. That social factors are involved necessitates we give attention to human choice and policy; the Mesolithic was never an event to which humanity passively responded in a determined manner.

Rather than develop an argument at this point, I prefer to wait and see if such suggestions have merit. In the meantime, I leave an interim suggestion. Culture and intelligence have been given ad hoc definitions; culture can be defined as "that which is described in ethnographies", and intelligence as "that which intelligence tests purport to measure". Perhaps the best definition of the Mesolithic is "that which is discussed in Mesolithic Miscellany".

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 Mellars, Paul A. 1981. Towards a definition of the Mesolithic. *Mesolithic Miscellany* 2(2): 13-16.  
 Poincaré, H. 1905. *Science and Hypothesis*. New York: Dover.  
 Price, T. Douglas. 1984. Review of Clark (1980): *Mesolithic Prelude*. *Mesolithic Miscellany* 5(1): 15-19.  
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### Announcement

#### The Big Puzzle:

#### Symposium on the Subject of Refitting Stone Artifacts

An international symposium devoted to problems in interpretation and description on the subject of refitting stone artifacts will be held in Monrepos, Neuwied, B.D.R., in September 1987. The symposium will aim at coordinating Stone Age research on a global basis and pooling the knowledge and experience gained by refitters in order to evolve models for research. The Organizing Committee consists of Doris Winter (University of Cologne), Erwin Czesla (University of Cologne), and Nico Arts (University of Amsterdam).

The following themes have been proposed for the meeting: (1) theory, (2) spatial analysis, (3) refits between different sites, (4) chronology, (5) experiments, (6) technology, (7) methodology, and (8) computer applications. The symposium can only be attended by participants who themselves are working on themes relating to the symposium aims. The fees will be approximately 100 DM.

For further information, or if you are interested in joining the symposium, please write to:

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# RADIOCARBON DATING OF HUMAN SKELETAL MATERIAL FROM TWO SITES IN PORTUGAL

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This report concerns recently obtained radiocarbon determinations for two Mesolithic sites in Portugal, one of them a classic site, and one excavated in 1984. The classic site is part of the famous Muge complex near the head of the Tagus estuary to the northeast of Lisbon, the Moita do Sebastião. The materials dated come from the nineteenth century excavations. The new site is Samouquiera, a coastal site from the Atlantic Coast region south of the modern industrial town of Sines. The dates were obtained as part of the work of a joint Canadian/Portuguese project concerned with the Mesolithic/Neolithic transition in southern Portugal (Lubell 1984; Lubell & Jackes 1985; Lubell, Jackes, & Meiklejohn 1986). The dates for Moita do Sebastião have been published elsewhere (Lubell, Jackes, Schwarcz & Meiklejohn 1986). These dates are the first  $^{14}\text{C}$  dates obtained from Mesolithic skeletal

materials in Portugal. The format followed below conforms to that used previously in Meiklejohn 1986 and Meiklejohn & Straus 1986.

## Find Confirmed as Being of Mesolithic Age

Site: Moita do Sebastião, Ribatejo, Portugal

Type of Date: Direct accelerator date of human bone collagen

Predicted Date: Mesolithic age considered probable but the possibility of later intrusion could not be excluded (Newell et al. 1979:149-154.)

### Dates:

7240±70 bp (5290±70 bc),  $\delta^{13}\text{C} = -16.1\text{‰}$  (TO-131) Individual 22

7180±70 bp (5230±70 bc),  $\delta^{13}\text{C} = -16.8\text{‰}$  (TO-132) Individual 24

7200±70 bp (5250±70 bc),  $\delta^{13}\text{C} = -16.9\text{‰}$  (TO-133) Individual 29

7160±80 bp (5210±80 bc),  $\delta^{13}\text{C} = -16.7\text{‰}$  (TO-134) Individual 41

6810±70 bp (4860±70 bc),  $\delta^{13}\text{C} = -15.3\text{‰}$  (TO-135) Individual CT

These five determinations have been provided by Dr. Henry Schwarcz of McMaster University, and offer the first direct dating of the materials excavated between 1863 and 1892 by Ribeiro, da Costa, and Paula e Oliveira (see Roche 1972). When the skeletal materials from this classic site were recently reassessed it was concluded that, while all the materials excavated between 1952 and 1954 (by Rocher and Viegas Ferreira) were in clear Mesolithic context, the earlier material was effectively unprovenanced within the site (Newell et al. 1979).

For this reason, none of the earlier collection could be reliably associated with the Mesolithic industry within the midden. Samples from the older collection were therefore chosen on the basis of visual differences in bone preservation and associated matrix, as part of an ongoing re-examination of the collection (Lubell 1984; Lubell & Jackes 1985; Lubell, Jackes, & Meiklejohn 1986). The results obtained demonstrate the Mesolithic nature of the samples chosen, and are also compatible with previously published dates for the lowest cultural level of the site (7350±350 bp [Sa-15]; 7080±130 bp [H-2119/1546]). They thus appear to be contemporary with the burials excavated by Roche and Viegas Ferreira, which lay within the subsoil beneath the lowest cultural deposits. It should be noted that the basis for choosing the original samples was not quantitative in nature. For this reason, the results cannot yet be extrapolated to the totality of the nineteenth century collection. Further work must be completed on the bone matrices, bone mineral contents, microscopic condition of the bone, and bone morphology before general conclusions can be reached. The results obtained are, however, positive in nature. The associated  $\delta^{13}\text{C}$  determinations have been reported previously (Lubell & Jackes 1985) and support a diet for the Mesolithic inhabitants that combines marine and terrestrial food resources.

## New Mesolithic Skeletal Find

Site: Samouquiera, Alentejo, Portugal

Type of Date: Direct accelerator date of human bone collagen

Predicted Date: Mesolithic age on basis of associated cultural materials but possibility of intrusion cannot be excluded.

Date: 6370±70 bp (4420±70 bc),  $\delta^{13}\text{C} = -15.3\text{‰}$  (TO-130)

This large site (120 x 140 m) was discovered on the basis of surface finds attributed to both the Mesolithic and the Neolithic (Tavares da Silva & Soares 1981). It was test excavated in 1984 by a joint Canadian/Portuguese team during which time two partial and disturbed skeletons were located (Lubell 1984; Lubell & Jackes 1985; Lubell, Jackes, & Meiklejohn 1986). During the excavations a lithic industry attributable to the Mesolithic was recovered together with faunal materials and marine shell. No ceramics or clear domesticates were recovered, besides a possible dog. The area of the site from which the skeletons were excavated was disturbed (it lies be-

neath an area of active plowing) and was not sealed. For this reason the association of the burials and the archaeologically recovered materials is not fully assured.

The result obtained does, however, demonstrate the Mesolithic age of the skeletal materials. However, the disturbed nature of the site is indicated by the difference between this determination and one obtained earlier on a bone shaft of bovid or cervid found in the same horizon ( $5190 \pm 130$  bp, Beta-11722) (see Lubell & Jackes 1985). The  $\delta^{13}\text{C}$  determination for the burial indicates a diet that may be slightly more directed toward marine resources than is seen in the majority of the population from Moita do Sebastião.

#### Acknowledgements

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This work was funded by the Social Sciences and Humanities Research Council of Canada in a grant to Lubell, Jackes, and Meiklejohn (410-84-0030). Work on the skeletal material from Moita do Sebastião was performed on materials housed at the Geological Survey of Portugal, Lisbon. We thank the Director of the Survey and Dr. O. da Vieira Ferreira for permission to study the material for use of facilities, and discussion including a visit to the site. The Portuguese work was under the direction of C. Tavares da Silva, Setubal Museum. We thank Dr. Henry Schwarcz for the work in extracting the collagen and preparing the dates from Moita do Sebastião.

## DIRECT RADIOCARBON DATING OF THE VISTE BURIAL, COASTAL NORWAY

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Following the format developed for the last issue of this newsletter, this note reports the results of direct  $^{14}\text{C}$  dating of the Viste skeleton, a find that previously could not be securely dated on stratigraphic grounds (see below). The details of the date are previously unpublished, though it has been alluded to in the recent overview of the site by Bang-Andersen (1983).

Site: Viste, Randaberg, Rogaland, Norway (Svarthåla)

Type of Date: Direct collagen dating of human skeleton (tibia)

Predicted Date: Mesolithic burial or Neolithic intrusion into Mesolithic levels (Newell et al. 1979:161-162.)

Date:  $7420 \pm 150$  bp ( $5470 \pm 150$  bc),  $\delta^{13}\text{C} = -17.1\text{‰}$  (T-3351)

Svarthåla or the Black Cave lies ca. 8 km WNW of Stavanger. It was excavated from 1907 to 1910 and again from 1939 to 1941. Occupation extends from the Mesolithic through to the Migration period (ca. AD 500), with up to 1.6 m of deposits. The burial of an adolescent male was found in the original excavations of 1907 and published shortly thereafter (Furst 1909).

The skeleton was believed to have been wholly within the Mesolithic shell midden. This a direct dating of the skeleton itself was necessary in order to establish the age of the skeleton. This has now been done by A.K. Hufthammer. The result is a clear indication of the Mesolithic affinity of this skeleton. Perhaps surprisingly the result is closer to the previous results for underlying Layer I than for the shell midden Layer II.

A brief comment should be made about the  $\delta^{13}\text{C}$  determination. Work on later Mesolithic materials (from Denmark) especially in Ertebølle contexts, has given values similar to those found in marine mammals and in Eskimos heavily dependent upon a marine diet (see Tauber 1981, 1983). Figures, in general, were between values of  $-10.0\text{‰}$  and  $-17.0\text{‰}$ . It is instructive to note that the value obtained here is on the boundary between values for a marine dependent diet and those based on terrestrial diets ( $-17.0\text{‰}$  to  $-26.0\text{‰}$ ). The Viste skeleton shows a much clearer balance between the two dietary sources than seen at later dates in the Danish Mesolithic at sites such as Vedbæk-Bøgebakken.

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- Tauber, H. 1983.  $^{14}\text{C}$  dating of human being in relation to dietary habits. *PACT* 8:365-375.

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Update on New Dates:  
Further Information on Two Swedish Sites

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In the last issue of this newsletter I summarized recently published radiocarbon dates (Meiklejohn 1986). I have since received further information on two of these determinations from Dr. Lars Larsson, which I would like to summarize below. Both of these dates have been published in more detail. These are burials from Kams (Lummelunda), now confirmed as being of Mesolithic age, and from Hylliekroken, now removed from further consideration as Mesolithic.

Kams (Lummelunda), Gotland, Sweden  
(8050±75 bp,  $\delta^{13}\text{C} = -18.0\text{‰}$  Lu-1983)

This date was published and discussed by Larsson (1982). Of the three graves located on Kams, on the island of Gotland in 1939 and 1947, it is the third, female, individual which has been dated. This burial had already been tentatively assigned a Mesolithic age on the basis of an associated triangular stone axe. The other two burials were previously considered to be undated and, unfortunately, both have been impregnated with preservative and cannot therefore be directly dated. Thus though

individual can now be clearly assessed as of Mesolithic age, this attribution can still not be extended to the two other skeletons with any full assurance. It should be noted that the  $\delta^{13}\text{C}$  determinations indicate a balance between terrestrial and marine resources. It lies within the range reported from the burials at Hjulsholm in Scania, but differs quite markedly from the marine dominated results seen at Vänge Sö and Holmegaard-Jutland (see Meiklejohn 1986) and at sites such as Vedbæk-Bøgebakken in Denmark.

Hylliekroken, Scania, Sweden  
(4360±80 bp,  $\delta^{13}\text{C} = -20\text{‰}$ , Lu-2345)

This date has recently been published by Larsson (1985). As previously noted, geological considerations placed this burial into either a late Mesolithic or earlier Neolithic association. Larsson views the burial as a grave cut into deposits normally contemporary with the Mesolithic. He also notes that new excavations in the area of the site have provided evidence of both Mesolithic and Neolithic age. I would like to thank Dr. Larsson for providing me with copies of these two articles together with additional comments.

## References

- Larsson, Lars. 1982. De äldsta gutarna. *Gotländskt Arkiv* 1982: 7-14.
- Larsson, Lars. 1985. En grav från bonderstenåldern - omtolkning av ett skelettfynd från Hylliekroken i Limhamn. *Limhamniana* 1985: 29-35.
- Meiklejohn, Christopher. 1986. Old bone, new dates: recent radiocarbon results from Mesolithic human skeletal remains. *Mesolithic Miscellany* 7(1):9-16.

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## Recent Publications

Andersen, Søren H., & Claus Malmros. 1984. "Madskorpe" på Ertebøllekar fra Tybrind Vig. *Aarbøger* 1984: 78-95. ("Food crust in Ertebølle vessels from Tybrind Vig.")

The thick-walled, pointed-bottom Ertebølle vessels have served as kitchen utensils and have been placed in a thick layer of embers. During cooking the food has stuck to the vessel forming food crusts, and occasionally the contents have boiled over.

$\delta^{13}\text{C}$  analyses of the food crusts from 3 vessels show that they consisted mainly of ingredients from dry land. Cod has also formed part of this dish, however, and traces of charred grass leaves have also been observed. We must assume that the pointed-bottom vessels have been used for the preparation of a fish soup containing abundant terrestrial foodstuffs, probably mainly gathered plants. Two of the vessels have been  $^{14}\text{C}$  dated to 3490 B.C. and 3690 B.C.

Food from the dry land has, however, only made up a minor part of the diet.  $\delta^{13}\text{C}$  analyses of skeletal material from contemporaneous coastal populations show that the major part of the diet has consisted of marine food such as fish, seal, whale, and shellfish. This is also supported by the location of the settlement sites and the presence of fish bones and fishing tools.

The introduction of pottery into Denmark around 3700 B.C. must have been of great importance: foodstuffs in seeds, fruits, roots, and other vegetables because much more easily available through boiling, which also provided a good soup.

The stone age hunters are generally supposed to have preferred frying over an open fire, but this does not agree with the examination of thousands of bones from the settlement sites, which rarely show signs of fire. Boiling has likely been more common as a cooking technique, as it was among Arctic hunters until very recently.

Arrhenius, Birgit. 1984. Grötfrikost på stenåldern. *Forskning och framsteg* 7: 4-9. (Morning porridge in the Stone Age.)

Chemical analyses of carbonized food left-overs on potsherds from the Ertebølle site at Lödödsborg (Skåne), revealed a meal of seeds, hazelnuts, and egg white along with fermented blood. (NAA)

- Andersen, Knud. 1984. Mesolitiske flækker fra Åmosen, Sjælland. *Aarbøger* 1982: 5-18. (Mesolithic blades from Åmosen, Sjælland)

The development of flint technology, as represented by the dimensions of ca. 15,000 blades, is presented and corresponds neatly with a chronological division of the Mesolithic into four major groups: Maglemose, Handled Core group, Kongemose, and Ertebølle. (NAA)

- Fraye, David W. 1984. Biological and cultural change in the European Late Pleistocene and Early Holocene. In *The Origins of Modern Humans: A World Survey of the Fossil Evidence*, pp. 211-250. New York: Alan R. Liss Inc.

- Gregg, Susan Alling. 1986. *Forager-Farmer Interaction: Processes in the Neolithic Colonization of Central Europe*. Ph.D. Dissertation, University of Michigan.

This dissertation examines the relationship between indigenous foragers and immigrant cultivators during the Mesolithic/Neolithic transition in Central Europe. Population interaction models from evolutionary ecology are adapted for the archaeological investigation of possible relationships between the foragers and the farmers. The model allows for both competitive and cooperative interaction; however, emphasis is placed on determining the conditions under which a long-term, cooperative relationship would have developed. Both Neolithic and Mesolithic economies are reconstructed (1) to identify services and resources that might have been exchanged, and (2) to determine how participation in the exchange would have affected each population.

The model of Early Neolithic farming suggests large harvests could have been produced regularly; but if and when poor spring weather delayed planting, the farmers would have needed an additional labor force to plant their crops before serious losses occurred. The foragers would have provided the best pool of emergency labor, and in exchange they could have received wheat from the farmers. A reconstruction of the forager economy indicates cooperation could have been accomplished with few changes in their annual round of subsistence activities. Moreover, the addition of wheat to the forager diet would have reduced the need for fish, the resource that proved to be the limiting factor in determining territory size. Cooperation therefore could have led to a reduction in forager territorial requirements.

Based on the periodicity of grain surpluses and the sporadic need for emergency labor, it is argued the goods and services are highly elastic commodities. The relationship would have to have been maintained through inelastic goods incorporated in the social organization and rituals of both

populations. The extant archaeological record was examined in light of the expectations of the interaction model. Available data tend to support the model but specific data needed to test it are lacking. Suggestions for new directions of research conclude the dissertation.

- Gob, André. 1985. Extension géographique et chronologique de la culture Rhein-Meuse-Schelde (RMS). *Helinium* 25: 23-36.

- Poulsen, Mogens. 1984. Himmerlands ældre jægerstenalder. Brommekultur og Maglemosekultur. *Fra Himmerland og Kjær herred* 73: 139-148. (The earlier Mesolithic of Himmerland. Bromme culture and Maglemose culture).

- Lewthwaite, James. 1986. From Menton to Mondego in three steps: application of the availability model to the transition to food production in Occitania, Mediterranean Spain and southern Portugal. *Arqueologia* 13: 95-119. Porto, Portugal.

The transition to food production in the Western Mediterranean littoral region which extends from Menton to Gibraltar & up the Atlantic coast as far as the Rio Mondego is examined from a new perspective, that of the Availability Model recently developed in the Boreal Zone. The model predicts that the advance of the farming frontier took the form of three successive phases (seen in space as concentric or parallel zones: those of availability, substitution and consolidation. In the former, a knowledge of farming is diffused among foragers well in advance of the farming frontier proper. The substitution phase refers to the period during which farming progressively replaces foraging under pressure from competition both external (farmer-forager conflicts) and internal (farming foraging scheduling conflicts), while the phase of consolidation refers to the secondary extension of farming to less fertile terrain and its eventual intensification.

Application of the model leads to the conclusion that the concept of an availability phase serves little purpose in this region, so rapid was the dispersion of the domestic animals (the most viable criterion of the presence of the farming frontier) from Western Asia; it is hypothesized that the delay in the transition to the mixed-farming village way of life found much earlier in the Eastern and Central Mediterranean is due at least in part to the "filtration" of the westward dispersal of the full range of domesticates. It is also proposed that the role of within-group competition for wealth and prestige has been unjustifiably overlooked as a key mechanism promoting the substitution of farming for foraging. It is concluded that an application of the Availability Model is useful in that it focuses attention on aspects of the transition to food production which would otherwise be ignored.

Matiskainen, Heikki. 1986. Beiträge zur Kenntnise der mesolitischen Schrägschneidpfeile und Mikrolithen aus Quarz. *Iskos* 6:77-98.

Mellars, P.A., and Mike Haynes. 1986. Mesolithic exploitation of sandy areas: towards the testing of some hypotheses. In *Stone Age Prehistory*, edited by G.N. Bailey and P. Callow. Cambridge University Press.

Purhonen, Paula. 1984. Grupa mogilnikov s krasnoj ohroj. Obscie certy v formah mogilnikov Finljandii i vostochnoj Karelii. *Novoe v arheologii SSSR i Finlandjii* 1984:41-46. (In Russian with German and Finnish summaries) (A group of Red Ochre graves. Common features in the Finnish and East Karelian graves.)

Red ochre graves are known in Finland from both the Suomusjärvi and the Combed Ware cultures. Mesolithic red ochre graves have been excavated at Jönsas in Vantaa/Vanda (Uusimaa/Nyland) and at Jokela in Kuusamo (Pohjois-Pohjanmaa/Norra Österbotten). These graves differ from those of the Combed Ware culture, and the nearest equivalents are to be found at Mesolithic dwelling sites in East Karelia in the Soviet Union. (NAA)

Schulte im Walde, Th., J.C. Freundlich, Hermann Schwabedissen, & Wolfgang Taute. 1986. Köln Radiocarbon Dates III. *Radiocarbon* 28:134-140.

This listing of new <sup>14</sup>C dates comes from archaeological samples attributed to the European Mesolithic from the typology of associated finds, especially microliths. Of these samples 14 are from Germany (Sarching, Teverener Heide, Gustorf, Sedelsberg, Minstedt, Grosse Ofnet Höhle, & Taubried), and 6 are from France (Gramari, Baume de Montclus, & Abri des Boeufs). Of particular note is the new determination from Grosse Ofnet Höhle of 7700±80 bp on skull fragments from one of the two skull nests at this site. The date confirms the previous Mesolithic attribution of the skull nests on typological grounds. Amino acid racemization dates in the 1970s had suggested that these skull nests might be Upper Paleolithic.

Shackleton, J.C., and T.J.H. van Andel. 1986. Prehistoric shore environments, shellfish availability, and shellfish gathering at Franchthi, Greece. *Geoarchaeology* 1: 127-144.

People who exploit marine resources choose among them according to technological, economic and social considerations. Prehistoric selectivity in their exploitation has often been postulated but can be established only by comparing the archaeological record with an estimate of the kinds and quantities available in the environments of the time. Only then can those

factors be considered that might have influenced their choice, a subject which is the domain of the archaeologist.

In Franchthi Cave, a thick Upper Paleolithic through Neolithic sequence (ca. 23,000 -5,000 yrs BP) of occupational deposits has been excavated. As might be expected at a site now only a few meters from the sea, this sequence has yielded ample evidence for the use of marine resources, though only from ca. 11,000 BP onward. Moreover, the marine molluscan record exhibits drastic changes in composition over time, implying either major variation in availability of selective collecting.

A marine geophysical study supplemented by an examination of present shore environments in the area has permitted the reconstruction of the changing coastal environments since ca. 20,000 BP, thus providing an estimate of the probably available shellfish resources. Comparison with the molluscan assemblages found in the cave demonstrates that only during the latest Paleolithic and most of the Neolithic were the collected shellfish reasonably representative of what should have been available in the area. At other times, the inhabitants made highly specialized, seemingly idiosyncratic choices from the spectrum of available species.

Straus, Lawrence Guy. 1986. Late Würm adaptive systems in Cantabrian Spain: the case of Eastern Asturias. *Journal of Anthropological Archaeology* 5:330-368.

Villaverde Bonilla, V., and B. Martí Oliver. 1984. *Paleolític i Epipaleolític. Lesa Societats Caçadores de la Prehistòria Valenciana*. València: Servei d'Investigació Prehistòrica de la Diputació de València.

Zvelebil, Marek. 1986. *Hunters in Transition. Mesolithic Societies of Temperate Eurasia and their Transition to Farming*. Cambridge University Press.

An analysis of the emergence of postglacial hunter-gatherer communities and farming. Drawing on extensive research in eastern Europe and temperate Asia, the book argues persuasively for the essential unity of all postglacial adaptations whether leading to the dispersal of farming or the retention and elaboration of existing hunter-gatherers.

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