

May 1992

# Mesolithic Miscellany

Volume 13 Number 1

## RESEARCH REPORTS

### The Population of Mesolithic Britain

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In the absence of direct evidence, archaeologists interested in the demography of Stone Age hunter-gatherer societies are forced to turn their attention to sites as the unit of analysis. The distribution of sites and their varying density across space and through time have been considered to be acceptable, proxy, population records (see, for example, Constandse-Westermann & Newell 1984: 158-164). This note is a contribution to these studies, but one which is not based on the site as the unit of analysis.

Smith & Openshaw (1989) have argued that the conventional archaeological site is a poor unit of analysis in considering regional settlement patterns. It is poorly defined and the recorded distribution of sites is potentially subject to too much distortion by post-depositional factors such as geomorphological processes and land use practices, and biases inherent in archaeological method. We advocate the use of the 10x10km square as a more appropriate unit of analysis. Recording settlement activity in terms of presence/absence data per 10x10km square provides both some control of the above-mentioned distortions but is also more appropriate in the

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context of studies of often highly mobile groups. What we know of their behaviour suggests that all sites within a 100km<sup>2</sup> area, and within an appropriate temporal span, could be attributed to the activities of a single group of people, yet the conventional site-orientated approach would treat each site as evidence for a separate group. Analysis at the 10x10km scale does result in the loss of some spatial resolution, but when finer levels of spatial resolution cannot be interpreted because of post-depositional and methodological biases, this is a small price to pay in order to make progress. For students working within Britain the 10x10km square is also a convenient subdivision of the Ordnance Survey National Grid, and this greatly facilitates the sorting and analysis of the data.

In this study temporal resolution is provided by radiocarbon dates. The dates used are all for Late Upper Palaeolithic or Mesolithic activity, and have standard deviations of 250 years or less. At two standard deviations this gives a resolution of a millennium. A total of 297 dates have been used in this study.

If the full series of dates was analyzed without further adjustment considerable distortion would be introduced by the fact that a number of well-known and intensively studied sites have produced several dates for the same period of occupation. For example, the four 6th millennium RCY (Radiocarbon Years) BP dates from the Cnoc Coig shell midden on Oronsay, which meet the criteria for inclusion in this study, mean no more in demographic terms than the single 6th millennium RCY BP date from the Muirtown site at Inverness. The extra dates are simply an artifact of the archaeological method, there having been a more extensive dating programme at the Oronsay site. In the context of this enquiry these extra dates are redundant. My aim has been to study population development within 1000 year intervals during the period between 13000 and 5000 BP. Data have been collected from 87 10x10km squares and if each square was occupied during each 1000-year span there would be 696 radiocarbon dated records. There are, of course, far fewer than this and when redundant records are taken out of the analysis the usable total is reduced to 150.

However, this situation can be improved slightly if, instead of recording mean dates, ranges are used. The chances of an episode of human activity actually occurring during the year of the mean date are very small. For example, should the 6000±90 RCY BP date for the Risga antler mattock be recorded as evidence for human activity during the 7th millennium or the 6th? At two standard deviations this date has a range of from 6180 to 5820 BP, and using the approach followed here is recorded as evidence for possible human activity in both millennia. While it can be fairly argued that this leads to some loss of temporal resolution, it is also the case that using the dates as ranges increases the number of records available for analysis to 197. In a study such as this, which is concerned with long term trends and overall patterns, I do not feel this loss of temporal resolution is a problem. On the contrary, using only mean values has the danger of implying a spurious level of resolution.

Figure 1 illustrates, in both interval and ratio (%) terms, the temporal pattern of radiocarbon dated records for the Late Upper Palaeolithic and Mesolithic periods in

Britain. For example, thirty-three records have ranges which extend into the period between 8999 and 8000 RCY BP, and these make up 16.7% of the 197 records used in the analysis. Similarly, eight records have ranges extending into the period between 12999 and 12000 RCY BP, and these make up 4.1%. No records have ranges extending into the 14th millennium, and for the purposes of calculating the ratio curve the number of records at 13000 RCY BP is assumed to be zero. Inspection of Figure 1 suggests several interesting points. First, a rapid rise in records during the 13th millennium appears to have begun to slow down by the end of the 12th. Second, a period with only a slow increase in the number of records lasted until the early 10th millennium. Third, a period of rapid increase occurred again after 9000 RCY BP but had begun to slow down by 8000 RCY BP. Lastly, the pattern of records after 7000 RCY BP suggests little further increase during the 7th millennium. The apparent decline during the 6th millennium is probably, at least in part, an artifact of the data in that this time-period does not include 5th millennium records with ranges extending into the 6th. However, within the context of the spread of the Neolithic, a decline in records of hunter-gatherer activity in the 6th millennium should not occasion much surprise.

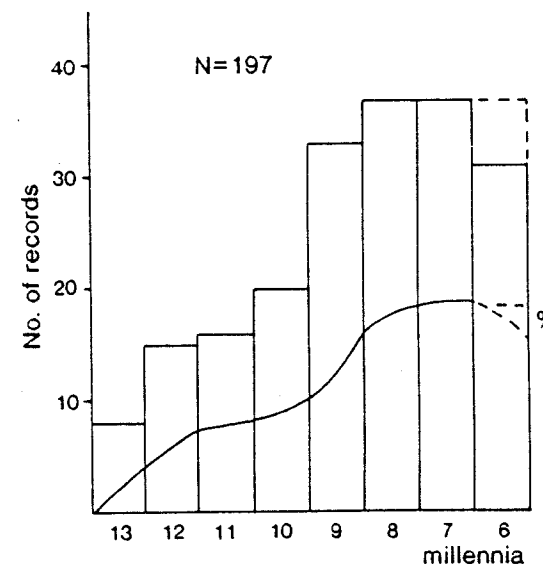
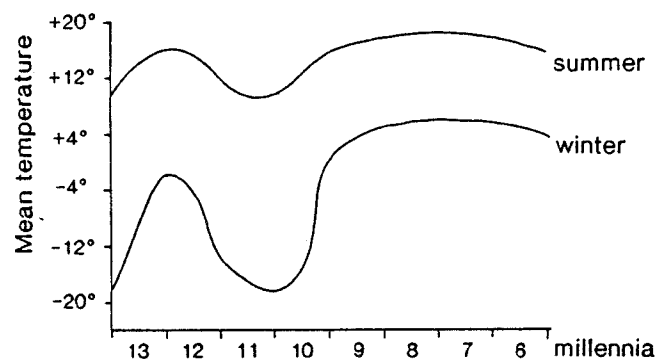


Figure 1: Temporal distribution of radiocarbon dates for the British Late Upper Palaeolithic and Mesolithic. Data from Smith (1992), with additions.

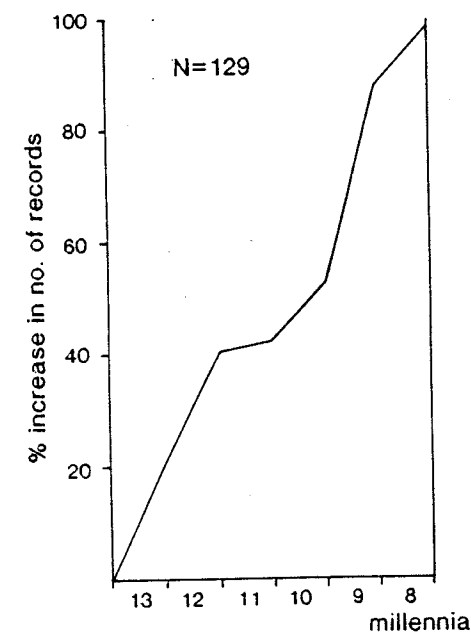
What do these increases in the numbers of radiocarbon dated records mean? Two explanations may be suggested. Growth in population through natural increase and immigration from areas such as the inundated North Sea Lowlands, or behavioural change which led people to increase the ranges of their territories and thereby appear to occupy a greater area. The latter alternative is considered unlikely, given that the spread of deciduous woodland in the early Postglacial can be expected to have led to a reduction in the extent of hunting and gathering ranges, not their increase. I take the view that the increase in radiocarbon dated records through time is due to population growth and that the pattern observable in *Figure 1* illustrates the growth of population in the British Isles (excluding Ireland) during the Late Upper Palaeolithic and Mesolithic periods.



*Figure 2:* Temperature change during the British Late Upper Palaeolithic and Mesolithic. Data from Smith (1992), with additions.

This is not the place to undertake a detailed analysis of these data but readers of *Mesolithic Miscellany* may be interested to compare *Figure 1* with *Figure 2*, a schematic representation of temperature change during the same period. Comparison of the two figures reveals that the first phase of population growth took place during a period of rising temperature, the Lateglacial Interstadial. The period of slow growth during the 11th millennium coincided with the Loch Lomond Stadial. By the time the second period of growth was underway temperatures were rising rapidly. The maximum values of the Postglacial Climatic Optimum were reached around 8000 RCY BP and from this time on population growth seems to have begun to slow down, to have become curtailed altogether after 7000 RCY BP. I have discussed the reasons for this pattern elsewhere (Smith 1992) but a correlation between population growth and temperature amelioration seems evident.

Is there any way in which these population trends can be expressed in real numbers? The answer, of course, has to be, No, except in terms of orders of magnitude. The pattern of increase in the numbers of radiocarbon dated records seems to suggest that expansion was complete by about 7000 RCY BP. By this time the coastline of Britain had assumed its familiar outline and the landmass can be estimated at approximately 270,000 km<sup>2</sup>. Ecological theory and ethnographic analogy suggest that populations in mid-latitude temperate deciduous woodlands can be expected to have had mean densities of the order of 0.01 to 0.02 persons per km<sup>2</sup>. In some areas higher densities may have been achieved but across the region as a whole this seems to offer a reasonable order of magnitude of between 2750–5500 people by 7000 RCY BP. The number of radiocarbon dated records increased continuously until the end of the 8th millennium, but at a varying rate. If the increase, millennium by millennium, is plotted cumulatively (*Figure 3*) we have a means of applying this order of magnitude estimate to earlier periods.



*Figure 3:* Cumulative frequency graph of radiocarbon dated records for the British Late Upper Palaeolithic and Mesolithic. Data from Smith (1992), with additions.

For example, 40% of the increase appears to have been accomplished by the end of the 12th millennium giving a population of between 1100 and 2200 at 11000 RCY BP. Similarly, during the period of slow growth in the 11th millennium population rose by only 2.5% to stand at between about 1200 and 2400 by 10000 RCY BP. After a thousand years' rapid growth between 9000–8000 RCY BP numbers may have risen to between 2500 to 5000. Readers of *Mesolithic Miscellany* may like to calculate magnitude estimates for other periods and those unhappy with my density figures may use *Figure 3* to derive magnitude estimates based on their own figures.

The implications of these analyses in social and economic terms are considerable and beyond the scope of this note, but having some idea of the demographic context within which the archaeological record formed can make an important contribution to our understanding of its meaning. For example, the 70 or more burials at Aveline's Hole have been dated to the late 10th millennium. This, the largest Mesolithic cemetery known in Britain, has important social implications (Smith 1992). Does this large number of burials represent a very conservative and persistent pattern of funerary ritual by a small co-resident group or the cemetery of a larger social unit, comprised perhaps of several such groups? By 9000 RCY BP radiocarbon dated records document a spread of settlement across Lowland Britain south of a line from Morecambe Bay to Scarborough (Smith 1992), an area of approximately 140,000 km<sup>2</sup>. The population magnitude estimate for 9000 RCY BP is between 1500 and 3000, giving density values of between 0.01 and 0.02 persons per km<sup>2</sup>. These values are the same as the maximum densities suggested for the whole of Britain two millennia later and suggest that, in hunter-gatherer terms, by 9000 RCY BP Lowland Britain was densely occupied. In such a demographic context the role of Aveline's Hole as a funerary and aggregation site for several co-resident groups linked by ties of kin and lineage, and claiming a common inheritance, becomes a distinct possibility.

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## Excavations in Ulva Cave, western Scotland 1989: a preliminary report

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The Ulva Cave excavation began in 1987 and the results of the first season were summarized in *Mesolithic Miscellany* 12(2) (Bonsall, Sutherland & Lawson 1991). Two further periods of fieldwork totalling seven weeks were undertaken in 1989, the first in March–April and the second in July, when two areas within the cave were investigated (*Figure 1*).

## Area B

Removal of the thin surface layer of animal dung from the north part of the cave interior exposed an area of artificial stone pavement constructed of densely packed, angular fragments of basalt. This feature overlies clayey sediments presumed to be of Late Pleistocene age, and in one area was found to seal a pit containing burnt fragments of bone, marine shells and charcoal. Mammalian bones and artifacts (the latter including flint débitage and a small bone point) were also found occasionally at the boundary between the dung layer and the clay.

## Area C (Entrance Zone)

The deposits of the entrance zone were investigated by a 10 x 1 metre sondage. This created a section through the midden deposit identified in 1987 and the immediately underlying sediments (*Figure 2*).

The midden has a high shell content, and in the excavated section has a maximum thickness of 0.35 metres. Excavation proceeded in arbitrary levels of ca 10cm thickness; the material from each 'spit' was air-dried, then sieved through a 2mm mesh, and the residue examined for artifacts, and botanical and faunal remains. A list of the shellfish remains identified in preliminary sorting is given in *Table 1*. Other food refuse within the midden includes bones of large mammals, fish bones and otoliths, fragments of crabs' claws, and carbonized plant remains (hazelnut shells and seeds). Artifact density is low; those recovered so far comprise flint débitage (platform cores, blades, flakes), several pieces of quartz débitage, and a single perforated cowrie shell (*Trivia monacha*) —

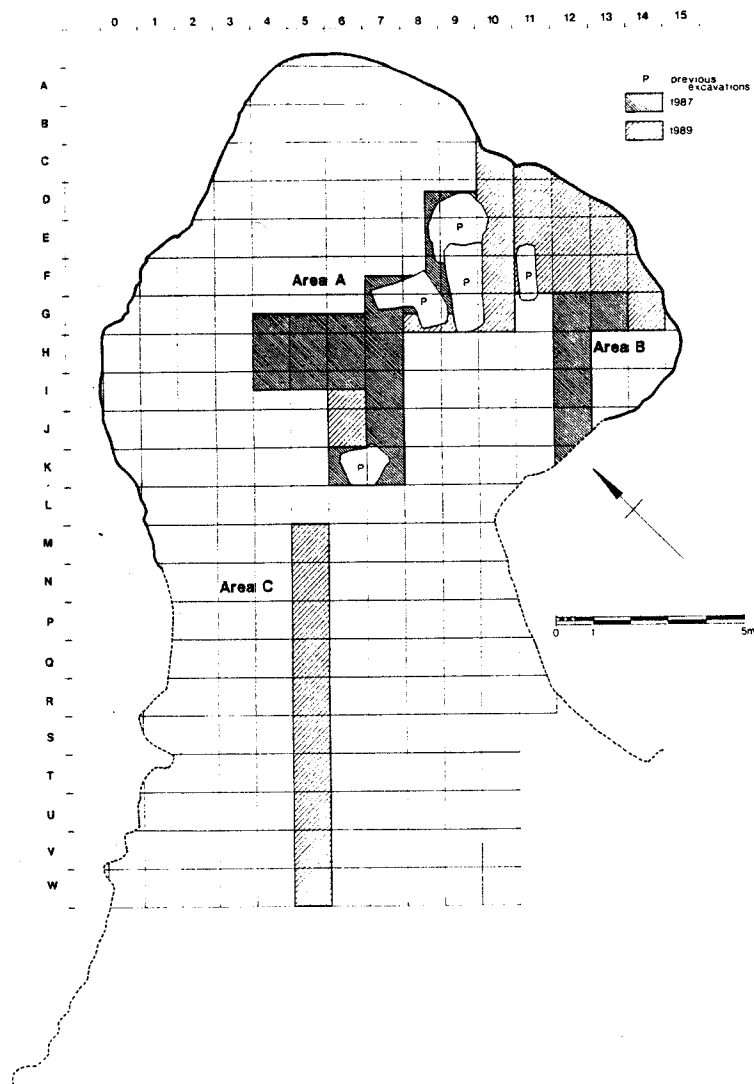


Figure 1: Plan of Ulva Cave showing the areas investigated in 1987 and 1989.

identical to the cowrie-shell 'ornaments' recovered in large numbers from the Oronsay shell middens (Mellars 1987). Fragments of scallop shells (*Pecten maximus*) occur in all levels of the midden; they were probably collected as empty shells on the shore for making into artifacts, and will be examined for traces of working. Other finds include a number of rounded pebbles (presumably collected on the shore) and a fragment of a red deer antler tine.

Samples of limpet shells from the base and top of the midden were submitted for radiocarbon dating to the Scottish Universities' Research Reactor Centre, East Kilbride. The results are given in Table 2. The close agreement between the inner and outer fractions of each sample suggests minimal contamination. When adjusted for the apparent age of sea water (Harkness 1983), these dates indicate that the midden was deposited between ca 7660 and ca 5690 BP.

The midden is underlain by a series of very stony sediments which are contiguous with talus deposits outside the cave. The full vertical extent of these sediments was not established during the 1989 excavation. Two principal stratigraphic units were distinguished -- an upper stratum of angular basalt rock debris with a sandy silt matrix, and a lower stratum of angular basalt gravel (Figure 2). Flint artifacts and faunal material recovered from the upper stratum presumably relate to a phase of occupation earlier than that represented by the midden.

#### Observations

The radiocarbon dates for the midden demonstrate that the history of occupation of Ulva Cave extends back to at least the Mesolithic. Figure 3 compares these dates with those for other Scottish Mesolithic shell middens, including the major 'Obanian' sites of western Scotland.

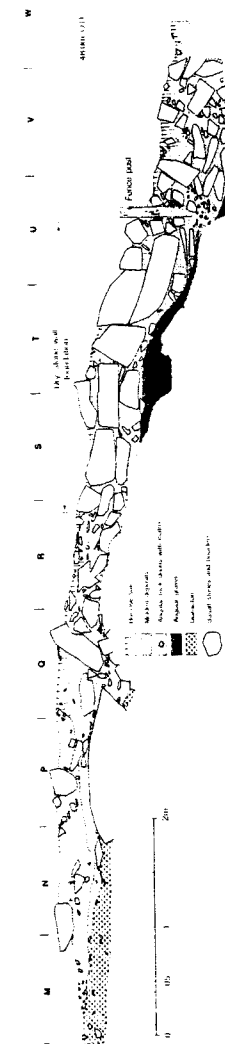


Figure 2: Ulva Cave, Area C — section exposed in north wall of sondage.

Table 1: Preliminary analysis of shellfish remains in midden samples from the 1989 excavation.

Species	Relative Abundance
Blue-rayed Limpet ( <i>Helcion pellucidum</i> )	++
Common Limpet ( <i>Patella vulgata</i> )	++++
Common Oyster ( <i>Ostrea edulis</i> )	++
Dogwhelk ( <i>Nucella lapillus</i> )	+++
Edible Periwinkle ( <i>Littorina littorea</i> )	++++
European Cowrie ( <i>Trivia monacha</i> )	+
Flat Periwinkle ( <i>Littorina obtusata</i> )	+
Great Scallop ( <i>Pecten maximus</i> )	++
Grey Topshell ( <i>Gibbula cineraria</i> )	+
Thick Topshell ( <i>Monodonta lineata</i> )	+
++++ abundant    +++ common    ++ infrequent    + rare	

Table 2: Radiocarbon dates for the Ulva Cave midden.

Laboratory Reference	Stratigraphic Position	Material	Fraction	Date BP	'Adjusted' Age BP
GU-2600	Basal 10cm of midden	Shells of <i>Patella</i> spp.	Inner	8060±50	7660±60
GU-2601	Basal 10cm of midden	Shells of <i>Patella</i> spp.	Outer	8020±50	
GU-2602	Top 10cm of midden	Shells of <i>Patella</i> spp.	Inner	6090±50	5690±60
GU-2603	Top 10cm of midden	Shells of <i>Patella</i> spp.	Outer	5930±50	

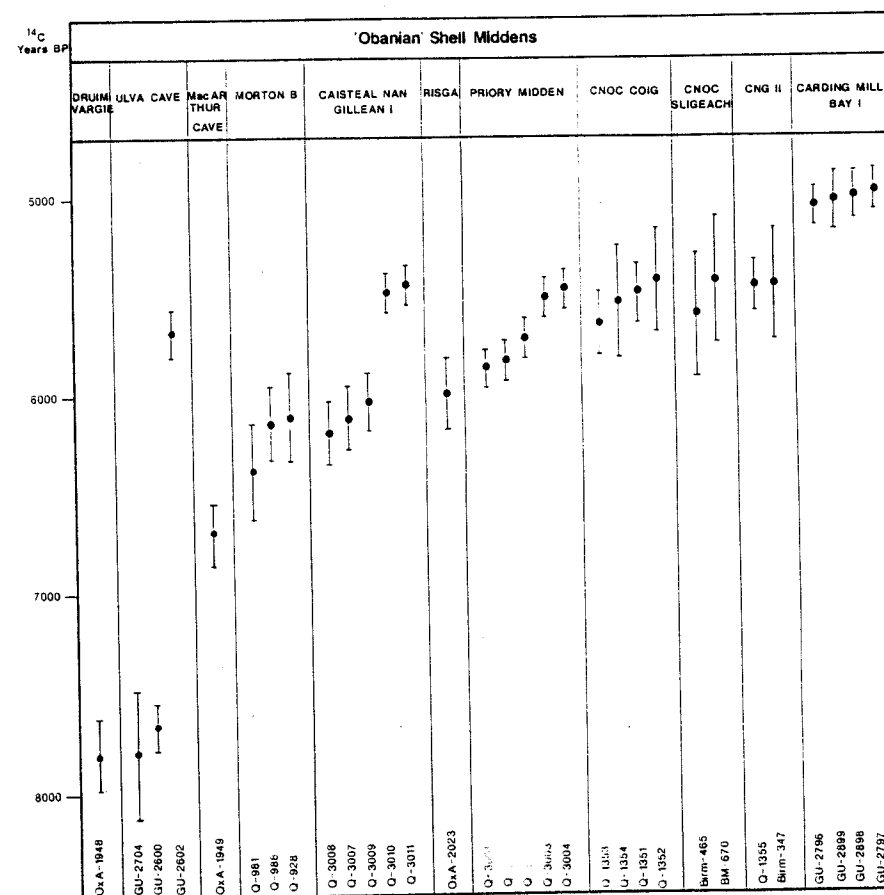


Figure 3: Radiocarbon dates for shell middens with 'Obanian' artifacts. The uncertainty ranges are expressed at two standard deviations (after Bonsall & Sutherland 1992).

The chronological relationships between the deposits of the entrance zone and those of the cave interior have yet to be established. However, some preliminary indications can be drawn from an analysis of the faunal remains (Table 3). The presence of ovicaprid bones in all but the two earliest contexts excavated in 1987 (Contexts A42 & A43: Bonsall, Sutherland & Lawson 1991) suggests that the deposits in Area A relate mainly to post-Mesolithic occupation of the cave.

Table 3: Stratigraphic occurrence of bones of large mammals in Area A (contexts listed in order of increasing age).

Context	FAUNAL GROUP			
	Bos	Ovicaprid	Pig	Deer
A10	+	+	—	—
A11	—	?	—	—
A15	+	+	—	—
A22	+	+	?	—
A23	+	+	—	—
A33	?	+	—	—
A42	?	—	—	—
A43	—	—	—	—

The midden has a number of interesting features. The thick topshell (*Monodonta lineata*) has been noted in samples from the lower part of the midden, whereas at the present day this species is not recorded north of Co. Down in Northern Ireland (Seaward 1982). Conversely, the common mussel (*Mytilus edulis*), which occurs in abundance on the present shore, has not been identified in the midden samples analyzed to date. This evidence is most readily explained in terms of changes in the local shore ecology since the Mesolithic. The occurrence of shells of the blue-rayed limpet (*Helcion pellucidum*) is also of interest. This species typically is found on certain types of seaweed, especially 'kelp' (*Laminaria* spp.). Since all the shells identified so far are very small (<8mm long), *H. pellucidum* is most unlikely to have been procured for food or bait. Its presence in the midden, therefore, may be used to infer collection of 'kelp' by the Mesolithic inhabitants.

While it is too early to draw conclusions on many aspects of the investigation of Ulva Cave, the potential of the site has been amply demonstrated by the results of excavations in 1987 and 1989. In particular, further analysis of the shell midden in the entrance zone should provide valuable information on the exploitation of coastal resources during the Mesolithic, complementing that from the 'Obanian' sites on Oronsay, Risga and around Oban Bay.

#### Acknowledgements

The 1989 excavations at Ulva Cave were funded by grants from The Carnegie Trust, The Royal Archaeological Institute, The Society of Antiquaries of London, The Society of Antiquaries of Scotland, and The University of Edinburgh Department of Archaeology Fieldwork and Research Fund. The British Academy provided a grant for post-excavation work. Permission to excavate was kindly granted by the landowners, Mrs J.M. Howard and Mr J. Howard. Thanks also go to Anne and Ted Jones, and the other residents of Ulva, for their assistance during the excavations; to Dr Gordon Cook of the Scottish Universities' Research Reactor Centre at East Kilbride for providing the radiocarbon dates, and to David Hepple of the National Museums of Scotland in Edinburgh for advice on shellfish identifications. Assistance in the field was provided by undergraduate students from the Department of Archaeology at Edinburgh University.

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## SYMPOSIUM ANNOUNCEMENT



**MAN AND SEA IN THE MESOLITHIC**  
**Coastal settlement above and below present sea level**

14–18 June 1993

An international symposium on foraging coastal adaptations will be held in Denmark in June 1993. It intends to confront the immense empirical data on NW European Mesolithic settlement, gathered over generations, with recent theoretical suggestions on the economic importance of the coast and on the social complexity of coast-adapted Stone Age societies. The Symposium will also serve as a platform where archaeologists working at Mesolithic sites on raised shorelines can meet their colleagues involved in the investigation of sites of the same age on the sea floor. To make this possible we have booked a nice meeting place lying directly on the sea shore near the town of Kalundborg, western Zealand, Denmark.

The following topics for sessions are suggested:

- 1) *Human exploitation of marine resources* – as shown for instance by faunal remains, fishing equipment and chemical analyses of bones of humans and dogs.
- 2) *Topographic location of coastal settlements* – empirical data and theoretical models to be applied in future investigations and protective administration above and below present sea level.
- 3) *Social characteristics of Mesolithic coastal societies* – degree of sedentism, number of inhabitants, technological, economic and social complexity.
- 4) *Differences, similarities and connections between settlements at the coast and in the interior* – seasonality, group size, transported exotic materials, etc.
- 5) *Ethnographic analogies for Mesolithic settlement in NW Europe* – for instance the NW Coast Indians.
- 6) *Changes in the marine environment during the Lateglacial and Postglacial* – hydrology, sea-level changes, land rebound, etc.
- 7) *Submerged Stone Age settlements* – experience and techniques from underwater investigations around the world.
- 8) *Legislation and Administration* – registration and protection of Mesolithic sites above and below present sea level.

## Organizing Committee

*Sveinung Band-Andersen*, Archaeological Museum, Stavanger, Norway

*Lars Larsson*, University of Lund, Sweden

*Heikki Matiskainen*, Finnish Glass Museum, Finland

*Hanne Marie Myrhj* (Assistant Organiser), The Danish Forest and Nature Agency, Denmark

*Anders Fischer* (Chairman and Organiser), The Danish Forest and Nature Agency, Denmark

The Symposium is supported financially by Nordisk Forskeruddannelsesakademi and The Danish Forest and Nature Agency.

## Presentation and publication of papers

Papers on the above-mentioned topics are invited. They are to be presented verbally to the Symposium and will be published immediately afterwards, together with accounts of the discussions of each session. The official Symposium language is English.

The papers must be made available to the Editor and the appointed Discussant for the session no later than **15 May 1993**. The final version, including illustrations ready for publication, shall be handed over to the Symposium Committee by the day of arrival, or preferably earlier.

*Publisher:* Danish Forest and Nature Agency. *Editor:* Anders Fischer.

All participants will receive one free copy of the published Symposium Proceedings. No offprints will be provided as each author may make copies of his/her published contribution. Contributors may purchase additional copies of the published Symposium proceedings at production cost.

## Accommodation

Accommodation, sessions and meals will take place in a small, but well-equipped, conference centre in the countryside. Accommodation is in single rooms. There are excellent possibilities for walking and jogging and for a morning swim in the sea. The maximum number of participants will be restricted to 45, including the Organizing Committee.

Participants should arrive in the afternoon of *Monday, 14 June* and depart in the morning of *Friday, 18 June*. An excursion to Mesolithic inland and coastal (above present sea level) will be part of the Symposium.

The fee for accommodation, all meals, excursion, and one copy of the Symposium Proceedings is 2,400 DKr.



Participants will pay their own travel to the Symposium. Graduate students from the Nordic countries and persons from very far abroad *may* receive some financial assistance from the Organizing Committee to reduce their travelling expenses.

## Registration

Those wishing to attend the Symposium are asked to complete and return the enclosed Proposal Form as soon as possible, and no later than **15 September 1992**. A provisional title and short abstract of the paper should be included.

For the purpose of full coverage of the above-mentioned topics, the Organizing Committee reserves the right to select among applicants to the Symposium. Early registration is recommended. Final acceptance of your participation will be sent around *1st October 1992*.

Payment of fees must be made in Danish Kroner and received by the Organiser no later than *31 January 1993*. In the event that you have to cancel your plans for participating in the Symposium, your money will be refunded, provided that you notify the Symposium Organiser by *1st February 1993*. Thereafter, a cancellation charge may be applied.

### Further information

Further details of the Symposium programme and the format of papers will be circulated to participants later this year. All payments of fee and correspondence on registration and papers should be addressed to:

Anders Fischer  
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Skov- og Naturstyrelsen  
Slotsmarken 13  
DK-2970 HØRSHOLM  
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Telephone: +45-765376 (direct digital call +45-765133 \*3024)  
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**MAN AND SEA IN THE MESOLITHIC**  
Coastal settlement above and below present sea level  
*14-18 June 1993*

## PROPOSAL FORM

The number of participants will be limited. To reserve your place at the Symposium, please return this form as soon as possible and no later than **15 September 1992**, to:

Anders Fischer  
'MAN & SEA'  
Skov- og Naturstyrelsen  
Slotsmarken 13  
DK-2970 HØRSHOLM  
Denmark

First name: \_\_\_\_\_ Surname: \_\_\_\_\_

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I am a graduate student of the Nordic countries/I will travel from far abroad,  
and I would like to apply for support to reduce my travelling expenses:

7

Title of my paper(s):

**Abstract (150 words):**

**Subscription Information**

*Mesolithic Miscellany* appears twice a year, in May and November, as an informal communication among individuals interested in the European Mesolithic. The yearly subscription rates for individuals are: North America — US\$4, Europe — GB£2.50; and for libraries/other institutions — GB£3.00. The subscription covers printing and mailing costs only. European subscribers can take out a 5-year subscription for £10, and should send payment to Clive Bonsall, Department of Archaeology, University of Edinburgh, 16–20 George Square, Edinburgh, UK. North American subscribers should send their subscriptions to Douglas Price, Department of Anthropology, University of Wisconsin, Madison, WI 53706, USA. Individuals for whom currency exchange may be difficult should contact Clive Bonsall at the address above. Subscriptions for 1992 are due now.

**From the Editor**

Editorial responsibility for the newsletter is now shared between Madison and Edinburgh. I shall edit all the issues up until May 1992; thereafter Doug Price will edit the November issues, while I shall continue to edit the May issues. So please forward your manuscripts, notes and new publications to Douglas Price for the November 1992 issue. The deadline for that issue is 31 October.

If you enjoy reading about the work of others, chances are they will enjoy reading about yours. *Mesolithic Miscellany* publishes research reports, book reviews, national synopses of recent excavations and research, statements for debate, conference summaries, important radiocarbon dates, announcements, and summaries or abstracts of recent publications to inform readers of current developments in the field. Recent Publications is a category that is particularly important and particularly difficult to keep up-to-date. Reprints or simple citations of your work would be most useful. Please prepare a brief abstract of the article or publication if one is not included in the text. We always need more reports, reviews and papers from you, the reader.

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## RECENT PUBLICATIONS

Altuna, Jesus, Anne Eastham, Koro Mariezkurrena, Arthur Spiess & Lawrence Straus. 1991. Magdalenian and Azilian hunting at the Abri Dufaure, SW France. *Archaeozoologia* 4(2): 87–108.

Mammalian and bird faunas from the Abri Dufaure (Landes), dating between ca 14,500 and 9500 BP, indicate cold season occupations. Increasingly specialized Magdalenian hunting of reindeer was replaced at the end of the Allerød by an Azilian focus on red deer.

Andersen, Søren H. 1989. Norsminde. A 'køkkenmodding' with Late Mesolithic and Early Neolithic occupation. *Journal of Danish Archaeology* 8: 13–40.

Browall, Hans, Per Persson & Karl-Göran Sjögren (eds). 1991. *Västsvenska Stenåldersstudier*. Göteborg: Institutionen för Arkeologi.

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Bonsall, Clive & Donald Sutherland. 1992. The Oban caves. In *The South-west Scottish Highlands. Field Guide*. M.J.C. Walker, J.M. Gray & J.J. Lowe, eds, pp. 115–121. Cambridge: Quaternary Research Association.

Candussio, Also, Alessandro Ferrari, Umberto Ferrari, Antonio Messoir, Andrea Pessina, Oddone Pez, Franco Quagliaro, Roberto Tosone & Bruon Tullio. 1991. Nuovi siti mesolitici in provincia di Udine. *Natura Bresciana* 26: 251–287.

Discovery of Mesolithic sites in the province of Udine (northern Italy). Archaeological surveys carried out in the province of Udine led to the discovery of five Mesolithic sites. Three of these (Fornaci de Mezzo, Corno-Ripudio, and Cassacco) lie along the shores of small basins or the morainic arc of the River Tagliamento. Fornaci de Mezzo produced a Sauveterrian industry probably dating to the first half of the tenth millennium BP. Corno-Ripudio, which yielded two trapezoidal points, may belong to the Early Castelnovian. Cassacco produced many trapezes and notched bladelets of Castelnovian type. Two sites were also discovered in the Friuli plain, namely Porpetto

and Bertiole. The first yielded a few Late Mesolithic artifacts while the second can be attributed to the Early Mesolithic or the Final Epigravettian.

Colombo, Silvio. 1991. I siti mesolitici di Cascina Navicella e Monte Gabbione (Lonato, Brescia). *Natura Bresciana* 26: 289–298.

The Mesolithic sites of Cascina Navicella and Monte Gabbione (Lonato, Brescia, Northern Italy). The author describes the finds from three Mesolithic sites recently discovered along the shores of two morainic lakes in the Garda amphitheatre. The finds from Monte Gabbione are attributed to the Castelnovian culture. Those from Cascina Navicella 1 are assigned to a recent phase of the Sauveterrian culture, while those from Cascina Navicella 2 probably belong to the Castelnovian.

Costantini, Lorenzo. 1989. Plant exploitation at Grotta dell'Uzzo, Sicily: new evidence for the transition from the Mesolithic to Neolithic subsistence in southern Europe. In *Foraging and Farming. The Evolution of Plant Exploitation*, D.R. Harris and G.C. Hillman, eds, pp. 197–206. London: Unwin Hyman.

The plant remains reveal that, between the 7th and 5th millennia bc, people who frequented the Grotta dell'Uzzo underwent changes in subsistence which transformed them from foragers to crop cultivators. The lowest Mesolithic levels, dated to around 8500 bc, yielded remains of fruits of the strawberry tree *Arbutus unedo* which, in the strata immediately above, were associated with legume seeds (*Lathyrus* or *Pisum* sp.) – presumably gathered from wild stands. The association of legumes and arboreal fruits continues throughout the Mesolithic to the Early Neolithic. Later in the Mesolithic, *Arbutus* and the legumes are joined by an oak (*Quercus* sp.) represented by acorn cotyledons, and by the wild grape (*Vitis silvestris*), remains of which have been found in levels dating from the middle of the 8th millennium bc. At the close of the Mesolithic and, more particularly, during the transition from the Mesolithic to Early Neolithic, the first wild olive remains appear.

Cziesla, E. 1990. Datenbank und atlas zum Mesolithikum beiderseits des Rheins. *Bull. Soc. Préhist. Lux.* 12: 13–20.

Friis-Hansen, Jan. 1990. Mesolithic cutting arrows: functional analysis of arrows used in the hunting of large game. *Antiquity* 64: 494–505.

Arrowheads and projectile points, with their elegant shapes, are the very stuff of archaeological classification. But do the classes relate usefully, or at all, to real differences in arrowhead purpose or efficiency? Modern and Mesolithic arrowheads are studied with their killing purpose in mind.

Meiklejohn, C. & Marek Zvelebil. 1991. Health status of European populations at the agricultural transition and the implications for the adoption of farming. In *Health in Past Societies*, ed. by H.B. & M. Zvelebil, pp. 129–145. Oxford: British Archaeological Reports.

Mithen, S.J. & B. Finlayson. 1991. Red deer hunters on Colonsay? The implications for the interpretation of the Oronsay middens. *Proceedings of the Prehistoric Society* 57(2): 1–8.

Knowing the source of the red deer in the Mesolithic shell middens on Oronsay is necessary for a reconstruction of the early Postglacial settlement patterns in the southern Hebrides. If they came from Colonsay, then it is conceivable that the combined resources of Colonsay and Oronsay could have supported a population on these small islands for extended periods of time — as the seasonality data from the middens suggests when taken at face value. If there were no red deer on Colonsay, then it is more likely that the Oronsay middens result from many short intermittent visits to the island. Since early Postglacial faunal assemblages are unknown from Colonsay, and unlikely to be found, this paper discusses the relevance of lithic assemblages for inferring the hunting of red deer. It describes recent fieldwork on Colonsay and the discovery of the first Mesolithic sites, notably that of Staosnaig. It concludes that the microlithic elements within the assemblages are too small to indicate red deer hunting. If Mesolithic foragers went to Colonsay to hunt red deer, they probably left rather quickly and empty-handed.

Price, T. Douglas. 1991. The Mesolithic of Northern Europe. *Annual Review of Anthropology* 20: 211–233.

Price, T. Douglas. 1991. The Mesolithic and hunter-gatherers: myths and meanings. *Man and Environment* 16: 101–107.

Gebauer, Anne Birgitte, & T. Douglas Price. 1992. From foragers to farmers: an introduction. In *Transitions to Agriculture in Prehistory*, edited by A.B. Gebauer & T. Douglas Price, pp. 1–10. Madison: Prehistory Press.

Price, T. Douglas, & Anne Birgitte Gebauer. 1992. The final frontier: first farmers in northern Europe. In *Transitions to Agriculture in Prehistory*, edited by A.B. Gebauer & T. Douglas Price, pp. 97–116. Madison: Prehistory Press.

Smith, Christopher. 1992. *Late Stone Age Hunters of the British Isles*. London, Routledge.

Stuart, Anthony J. 1991. Mammalian extinctions in the Late Pleistocene of Northern Eurasia and North America. *Biological Reviews* 66: 453–562.

Straus, L.G. 1990. The 'Mesolithic–Neolithic transition' in Portugal: a view from Vidigal. *Antiquity* 65: 899–903.

The Atlantic coast of Portugal is as far west as the Neolithic domesticates could reach in the wave of Neolithic transformations that swept through the Mediterranean and across continental Europe. With rich food resources and a dense Mesolithic settlement, it is also a region where the process of the great transformation was particularly complex.

Straus, L.G., J.A. Altuna, D. Ford, L. Marambat, J.S. Rhine, H.P. Schwarcz & J-L. Vernet. 1992. Early farming in the Algarve (southern Portugal): a preliminary view from two cave excavations near Faro. *Antropologia e Etnologia* 32: 141–162.

Zvelebil, M. & P.M. Dolukhanov. 1991. The transition to farming in eastern and northern Europe. *Journal of World Prehistory* 5: 233–278.

This paper presents a general survey of the transition to farming in Eastern and Northern Europe, approached within the framework of the availability model and treated from the perspective of local (Mesolithic) hunting and gathering communities. It is argued that in eastern and northern Europe, the transition to farming was a slow process, which occurred through the adoption of exogenous cultigens and domesticates by the local hunter-gatherer populations, who may have been already engaged in some form of husbandry of local resources. Contact and exchange with the Neolithic and later Bronze Age of central Europe had a profound and prolonged influence on the process of the adoption of farming in Eastern and Northern Europe. During the slow process of transition, mixed hunting–farming societies emerged, which could be regarded as having a characteristic social and economic organization of their own (i.e. neither "Mesolithic" nor "Neolithic"). In conclusion, the authors argue for continuity in population and in social and economic traditions from the hunter-gatherer past until recent antiquity and, in some areas, into the historical period.

Zvelebil, M. & S.W. Green. 1992. Looking at the Stone Age in south-east Ireland: the work of the Bally Lough archaeological project. *Archaeology Ireland* 6: 20–23.

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## CALLING ALL CONTRIBUTORS

Contributors please note:

The next issue of *Mesolithic Miscellany* will be in November. The closing date for all contributions will be 31 October 1992.