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Please note that the May 1993 issue of *Mesolithic Miscellany* will be edited by Clive Bonsall. All materials for inclusion in that issue should be sent directly to him. The deadline for the May issue will be 30 April 1993.

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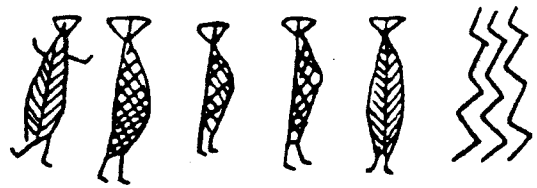

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Mesolithic Miscellany

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Mesolithic Fishing in the European Northeast (Russia)

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During the 1960-1967 excavations at Vis I in the region of Lake Sindor, organic objects of wood, bark, grass were found in the waterlogged portion of the site (Burov 1973; 1981; 1989a, b; 1990). These finds date to the period 8350-7000 BP. A number of these artifacts (7.4%) include equipment needed for fishing: a net made of sedge fiber, a pine bark float for a net, a wooden disk of an implement for net fishing, a fragment of a fishing-basket (?), and a series of hoops which may belong to landing nets.

The remains of the net were discovered in the shape of a interlacement 30 x 20 x 10 cm. The net was made of a cord which is 0.15-0.20 cm thick. The distances between the knots varied between 4.5 and 5.5 cm. A piece of a cord, 0.4 cm in diameter, was also found in this area and probably used for fastening the net to strings or sticks (Figure 1, nos. 3-5).

In this Issue . . .

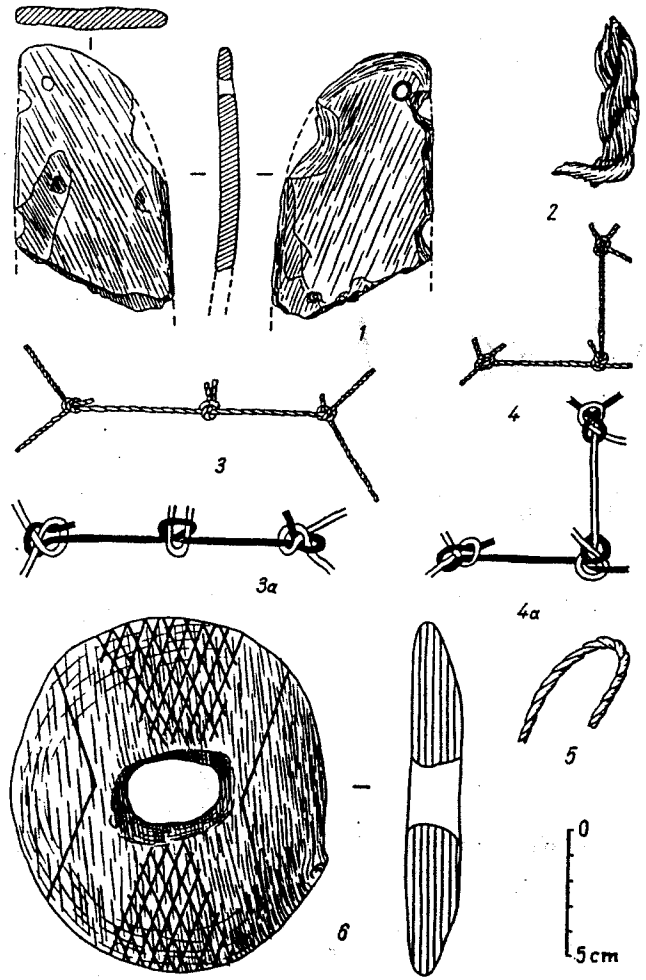

Figure 1. Artifacts of plant materials connected with fishing at the site of Vis I. 1. Pine bark float; 2, 5. Cords; 3,4. Fragments of netting; 3a,4a. Patterns of knots; 6. Wooden disk.

The remains of Mesolithic nets in northeast Europe have been found only at the site of Antrea-Korpilahti on the Karelian Isthmus (Pälsi 1920: 16). Neolithic nets were uncovered at Sarnate in Latvia (Vankina 1970: 94-95) and at Sventoji in Lithuania (Rimantene 1981: 73). Nets have also been discovered in western Europe, for example, at the Mesolithic site of Friesack in eastern Germany (Gramsch and Kloss 1989: 322) and at the Neolithic pile-dwellings of Robenhausen in Switzerland (Vogt 1926: Fig. 39).

Several common features are shared by the net from Korpilahti and the one from Vis I. These include the way of twisting the cord (two threads, to right), the thickness, the type of the weaving knot (Brandt 1975: F. 45) and the dimensions of the cells. The two nets differ from one another only in raw material for construction: willow fibers were utilized at Korpilahti (Äyräpää 1950: 6). The net from this site was 27 m long and 3 m wide. With floats and sinkers, it undoubtedly served for fishing purposes. Both of these nets were intended for catching big fish (perhaps pike).

The float from Vis I (Fig. 1, no. 1) is 0.7 cm thick and 6.3 cm wide. It has a bored hole, 0.4-0.5 cm in diameter, at one end. This float was broken; its preserved part is somewhat elongated but probably represents only half of the total. The floats from Antrea-Korpilahti were also cut from pine bark and are oblong with a small hole at one end (Pälsi 1920: Table. VI, no. 22). In addition, a Mesolithic float from Siivertsi in Estonia with a stone sinker tied to the cord (Indreko 1948: 324-328, Fig. 79, nos. 1,6) is similar to Korpilahti ones (Figure 2, nos. 2,4).

The function of the pine disk from Vis I (Figure 1, 6), 14 cm in diameter and 2 cm thick, was also related to net fishing. There is an oval opening, 3.3 x 2.2 cm, in the center of this disk. It was hollowed, not along, but across the fibers for durability. One side of the disk is ornamented with two engraved, "skew nettings" and two broken lines.

The disks have similar parallels at the Mesolithic sites of Nizhnee Veret'e in the region to the east of Lake Onega (Foss 1952: 209, Fig. 23, no. 7) and Torvala in Estonia (Indreko 1948: 90-95, Fig. 79, no. 2) (Figure 2, nos. 3,5). At the Mesolithic site of Nizhnee Veret'e I, a series of similar round objects, about 10 cm in diameter, with a large hole were found, (Oshibkina 1983: Table 40). Disks of this type are noted also at Sarnate (Vankina 1970: 94, Table XXIV, no. 2), Sventiji 2B and 23

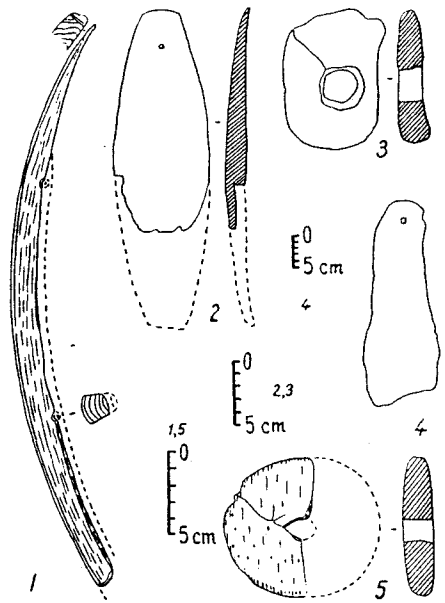

Figure 2. Parallels from other Mesolithic sites to artifacts of wook and bark at Vis I. 1. hoop; 2,4 floats; 3,5 disks; 1,3,5 wood; 2,4 bark; 1. Nizhnee Veret'e (Gosudarstvennyy istoricheskiy muzey); 2. Siivertsi; 3. Torvala (2,3 after R. Indreko); 4. Antrea-Korpilahti (after S. Pälsi); 5. Nizhnee Veret'e (after M.E. Foss).

(Rimantene 1991: 78; Satrup in Schleswig-Holstein (Schwabedissen 1981: Fig. 3, no. 5), Magleung in Denmark (Gramsch 1973: 46), and at other Neolithic sites. Analogous artifacts have been found on medieval sites as well, for example, at Vis II (Burov 1984: 158), Tiutey-Sale in the Lower Ob basin (Charnetsov 1957: 196, Table XXIC, no. 12), and Novgorod in the Eastern Baltic region (Kolchin 1968: 23, Table 8), as well as in ethnographical materials (Indreko 1948: Fig. 80, no. 3). M.E. Foss, L.V. Vankina, V.N. Chernetsov, and S.V. Oshibkina have interpreted such finds as net floats, while R. Indreko and B.A. Kolchin see them as heads of implements (Russian: *botalo*) for frightening fishes and driving them into a net. The second interpretation is more probable than the first one. Some disks from Novgorod were found with sticks in them (Kolchin 1968: Table 8, no. 1-3). In addition, a float does not require a large hole, and is made of bark, not wood. The "skew net" ornamentation is known also on bows of Vis type (Burov 1981: Fig. 2, nos. 2, 3) and apparently symbolizes successful fishing or hunting.

An object of thin (0.1-0.2 cm) pine laths 0.5-0.8 cm wide, tied by plant plaits may also have a relation to fishing (Figure 3, no. 1). It is represented only by a fragment. The laths, arranged parallel to another and interlaced with twin, thin plaits of twisted cords make up the base of the artifact. The distance between the separate cords is 1.0-1.5 cm. The sizes of the laths in the Vis I object resemble modern fishing-baskets which are made of laths 0.2-0.4 cm thick (Egoshin 1955: Fig. 6). This allows one to assume that the wicker artifact from Vis I was used for fishing. But it may also be a mat.

There are eight wooden curved objects with triangular and trapazoid cross-sections intended for bending in the collections from Vis I. The wider outer side corresponds usually to the bark-less surface of a tree trunk or branch; only one such artifact was made from a thin twig (Figure 4, no. 3). In this aspect, the objects resemble the bows from Vis I, used for hunting purposes and for boring holes and making fires (Burov 1981; 1989b: 397-400). The preserved end of such an object has a long slanting cut. Thus, the author suggests that the described objects served as hoops; one cut was inserted into the other.

The hoops may be divided into two groups. The first includes four specimens with holes which are perpendicular to the flat axis of the hoop (Fig. 3, no. 4; Fig. 4 no. 1, 2, and 4). The spaces between the holes vary from 7.7 to 15.8 cm. The hoops have largely a trapezoidal section, but in the area of the holes it is triangular. This shape facilitated making the holes.

The second group consists of four unperforated hoops (Figures 3, nos. 2, 3; 4, no. 3). One of them is provided with a small hollow on its end; the maker refused to bore the holes (Figure 3, no. 3). But this hoop cannot be considered as an unfinished object because it is decorated with an engraved, obtuse-angled zigzag. The same ornamentation is found on one hoop of the first group (Figure 4, no. 4). Two hoops with perforations and two without them have one preserved end truncated from within (concave side); one artifact in the first group had a cut on the outside (Figure 4, no. 1).

The fragments of hoops (Table 1) are 1.3-1.9 cm wide (in one case, 0.7 cm). The width is measured on the flatness of the hoop (first group) or perpendicular to it (second group). Five large fragments are 32-100 cm long. Three of them preserved the curved profile which corresponds to a diameter of 45-130 cm (Figures 3, nos. 2, 4; 4, no. 4). Because the residual curvature can be less and must never be more than the initial one, it may be supposed that the hoops were ca. 50 cm in diameter.

These artifacts have an indisputable analog at the Mesolithic site of Nizhnee Veret'e, where a "tiny bow" (Foss 1941: 218, Table II, no. 1;

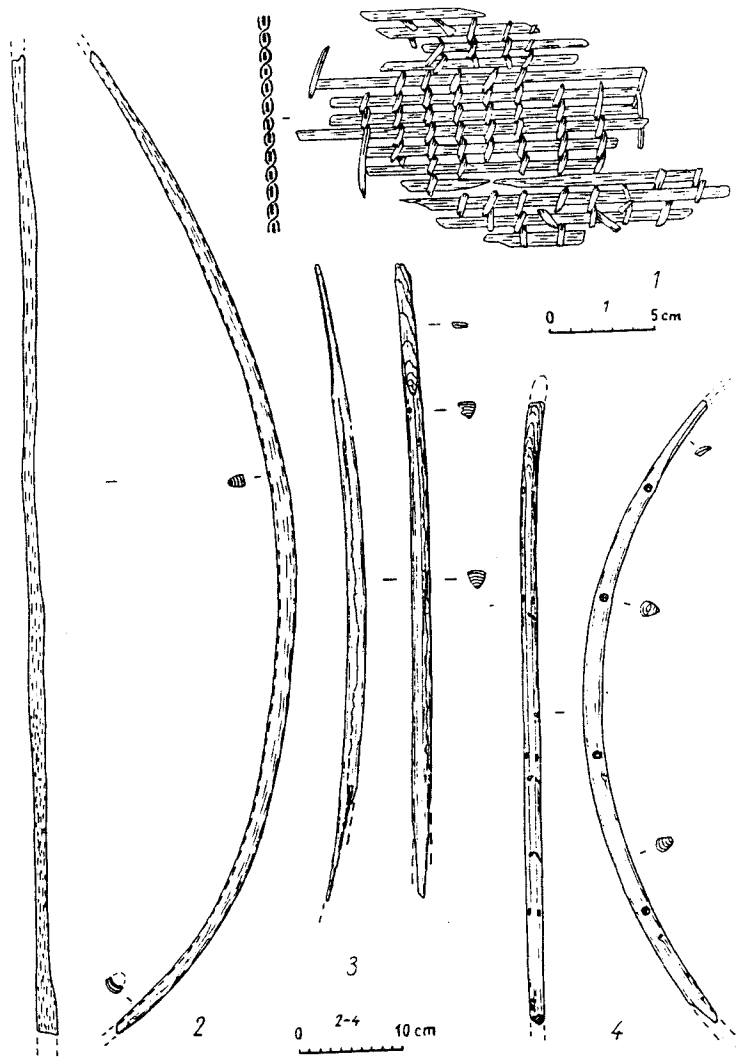

Figure 3. Arifacts of plant materials connected with fishing from Vis I site. 1. Fishing basket (?) of wood and fibrous material; 2-4. Wooden hoops.

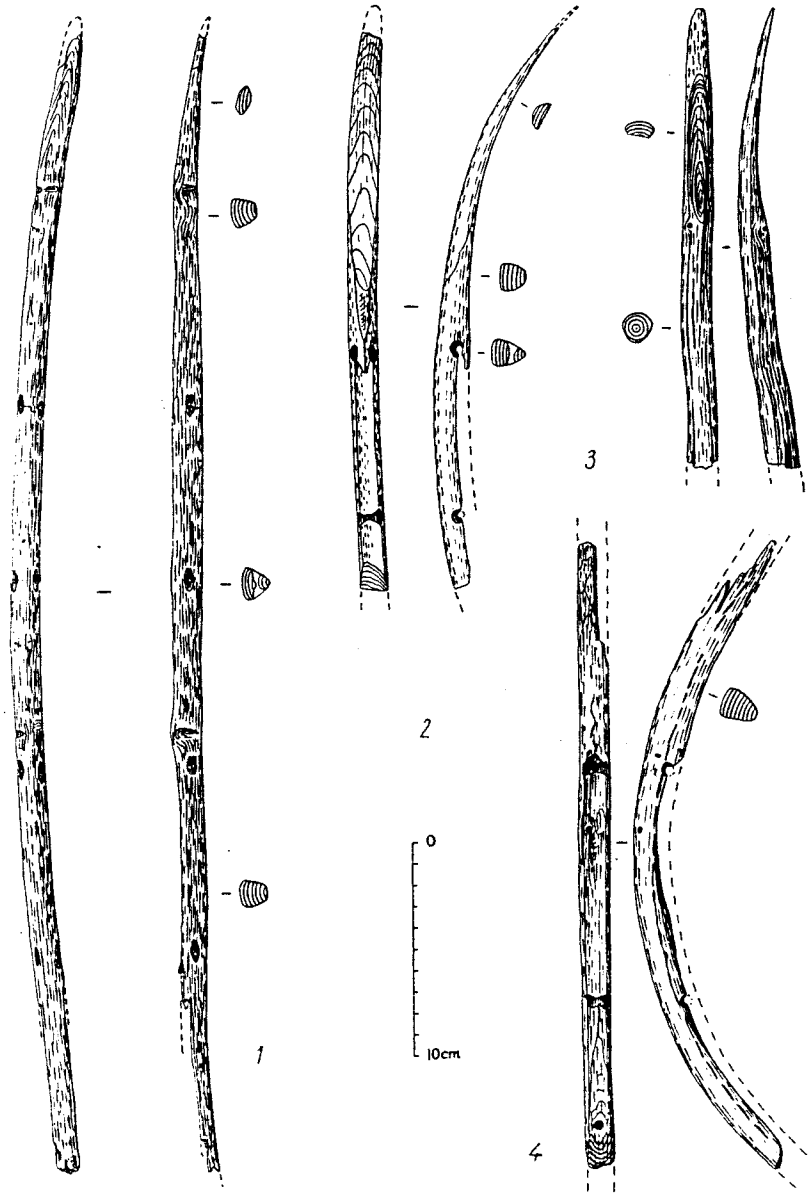

Figure 4. Wooden hoops from Vis I.

Table 1. Characteristics of the hoops from Vis I -- all measurements in centimeters.
Note: the 9th hoop (Number 130) was not preserved.

Number	Figure	Side of cut	Presence of holes	Presence of ornament	Length of fragment straight condition	Width in flatness of hoop	Width accross to flatness	Diamter of circumf. correspond. to flatness	Length of cut	Space between holes
82	3,4	Inside	+	-	63.5	1.8	1.4 - 1.6	100	>10	11.0 - 15.8
98	4,1	Ouside	+	-	52.6	1.3	1.3 - 1.5	-	c.8	8.7 - 9.0
99	4,2	Inside	+	-	27.2	1.6	1.3	-	c.17	7.7
14	4,4	-	+	-	32.0	1.7 - 1.9	1.9	45	-	11.0
45	3,3	Inside	-	+	58.0	1.7	1.7	-	12.5	-
127	4,3	Inside	-	-	21.7	1.4	1.4	-	10.3	-
166	3,2	-	-	-	100.0	1.8	1.7	80-130	-	-
148	-	-	-	-	15.7	0.7	1.3	-	-	-

State Historical Museum, registration no. 76692-431) was found. This object is in reality a hoop with a cut from within and bored holes. However, the inside part is broken off and the line of these openings is missing (Figure 2, no. 1).

The hoops were probably intended for making landing-nets or fish traps of netting and the holes served for fastening the net. The use by the Finns on the Kymi River of landing-nets with a base in the form of a frame with openings bored all over perimeter closely resembles this practice (Sirelius 1906: 161, Fig. 229). In the Finnish case, the cord was fastenedto the frame of the net in order not to break from rubbing against the edges of an ice-hole or when fish were removed from a fish trap .

Bone artifacts were not preserved at the Vis I site, but hooks from Nizhnee Veret'e (Foss 1952: Fig. 19,7,8) and Nizhnee Veret'e I (Oshibkina 1983: 124) testify indirectly to angling in the Vychegda region during the Mesolithic. Also at these sites numerous bone barbed points were recovered, intended for spearing fish, or for shooting them with a bow and arrows (Brandt 1975: Figs. 18, 19), along with a fishing spear with two points (Oshbkina 1989: 409).

Fishing played an important part in the Mesolithic subsistence economy of northeastern Europe and in part permitted a shift toward sedentism in this region.

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Maglemosian Microliths and Their Mounting

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Some years ago, I registered a large number of amateur collections in southern Jutland. Quite a number of Maglemosian microliths had traces of impacts. These were mostly negative scars from small burin spalls as well as some other types (Fischer *et al.* 1984, fig. 7). Their direction seemed to indicate the direction of the movement of the projectile. For each of the microlith types one end seemed to contain the main part of the impacts indicating that this was the unprotected front and that the other end was likely to have been mounted in, and protected by, a semi-elastic material such as birch resin. It was especially interesting to note that the scalene triangles (B.P. type 50, see Brinch Petersen 1967) had the main part of their impacts at the short retouched end, indicating that this end actually formed the front of the projectile heads.

A brief account of the results was published based on 58 impacts observed (Grøn 1985), as I did not have the time to make a more detailed study. Since then I have registered another 207 impacts on different kinds of Maglemosian material. The total of 265 observed impacts strongly supports the earlier conclusions (Fig. 1):

1) The lanceolate points (B.P. 39, 40, 41, 44, & 45) served as parts of projectile heads with their 'pointed' ends—the ends with the facet from the microburin and mainly the proximal end of the piece—in front.

2) The scalene triangles (B.P. 49, 50) served as parts of the projectile heads with their short

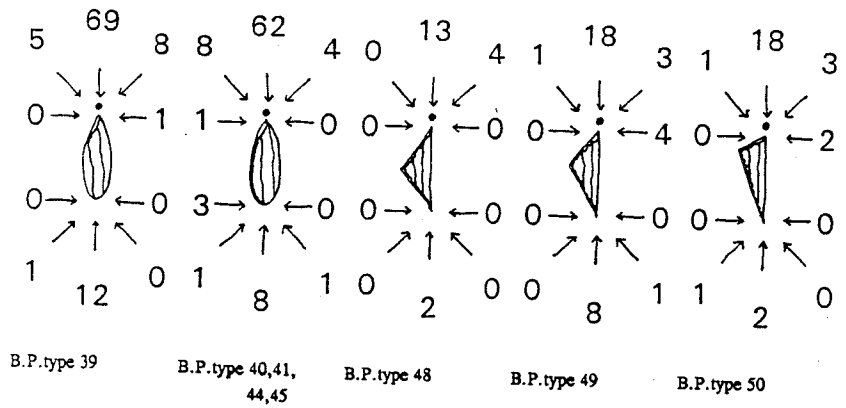

Figure 1 : The number of impacts from different directions.

retouched ends—the ends with the facet from the microburin and mainly the proximal end of the piece—in front.

3) The isosceles triangles (B.P. 48) served as parts of the projectile heads with their bulbar—proximal ends—in front.

As the bulbar ends of the pieces are most resistant to blows—themselves being created by blows—it seems a logical that the microliths generally were shaped so that their bulbar ends were in front.

From a few to 10% of the microliths from a site may have impacts. The pieces forming the front of the projectile heads should be expected to be most exposed to such damages. For points used as fronts, at least 40% should be expected to have impacts (Fischer *et al.* 1984:27). Microliths used as barbs in projectile heads, such as one of the two lanceolates from the Loshult arrow (Fig. 2; Petersson 1951), and the eight lanceolates from the Neverkær spearhead (Bech 1966), can be expected to have been less exposed to damage. This may be one reason why such a small proportion of points with impacts are observed on the sites.

As I have noted earlier there seems to be some confusion about the categorization of 'perforators' and some 'Sværdborg triangles'. The triangular microliths considered here have the point between the long sides formed by retouch from both sides—eventually as a 'propeller retouch'—and this point is in some cases located in the bulbar end.

Figure 2 : The Loshult arrow.

Knud Anderson is inclined to think that these 'scalene triangles' functioned as lanceolates (Andersen *et al.* 1982: 28). I have earlier supported this point of view (Grøn 1987: 309). Meanwhile, the locations of the impacts seem to indicate that these types were all used as 'triangles' with the short retouched end in front. Thus, in the later phases of the Maglemose Culture the rule that the 'front' of the microlith must be at the bulbar end seems to be weakened somewhat.

The suggested mounting of triangles, with the short retouched end in the front of projectile heads, appears to form a more understandable link to the rhombic arrows of the Kongemose Culture than do the lanceolate points.

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Some Comments on the Interpretation of Baremose I

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An important precondition for successful theoretical work on archaeological material is correct basic data. In the use of the material from the Maglemosian site of Barmosen I, in southern Zealand, it appears that some misunderstanding concerning the horizontal distributions of the different find categories has been introduced by Blankholm (1990) and is now repeated by Stapert (1992: 141-188). I think it is necessary to correct these misleading figures before more researchers invest time in the analysis of this material or refer to the results.

Blankholm has developed a theoretical apparatus for the analysis of distributional features on Stone Age sites. As a test case he applies the method to the site of Barmosen I. He states, "Most of the area west of the x=6 grid line was excavated in 1x1 or 1x0.5 m units, whereas most of the eastern part of the site was dug in 0.25x0.25 units" (Blankholm 1991: 184, see also 186). This contradicts Johansson's preliminary account of the site, where he notes, "These (the squares) were too large in the beginning, as three squares measuring 2x2 were excavated in the central part of the site. After the square size was reduced to 1 m^2, and the last two summers to 50x50 cm (1/4 m^2), (Johansson 1971: 106). Johansson made no secret of the fact that his distribution plans of the lithic waste (Johansson 1971: 108, 1990: 16) are based on an artificial divison of all pieces registered within larger units into the 1/4 m^2 units of these. Roughly half of the smaller objects (microliths, etc.), especially those excavated during the first campaign, can only be related to the square in which they were found.

Thus the main importance of the site is as an example of a small concentration of early Maglemosian material connected to a small (5x4) bark floor with a central hearth. I think one should agree with the excavator that the material should *not* be used for detailed distributional analysis.

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Ichthyofaunas and Seasonality atVidigal (Alentejo, Portugal)

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Introduction

The purpose of the present note is to provide information on the ichthyofaunas of the Late Mesolithic open-air and (possible) Neolithic cave sites at Vidigal. Its further aim is to discuss the evidence for seasonality in human occupations at Vidigal, in light of mobility hypotheses and preliminary seasonality data that have been set forth for other pene-contemporaneous sites in NW Altentejo and Ribatejo (Portugal). Details on the archeology and mammalian paleontology of the *concheiro* at Vidigal have been published elsewhere (Straus & Vierra 1989; Straus et al. 1990; Straus 1991).

The sites are located along the open Atlantic coast, 3.5 km south of Porto Covo, above the south bank of the Barranco do Queimado. Vidigal is 2 km from the present shore, but would have been slightly closer during the Flandrian Transgression, when the lower course of the Queimado would have been estuarine. The indurated dunal ground surface of the *concheiro* is 50 m above present sea level. At this place the coastal plain is 5 km wide and is bordered to the east by the Serra do Cercal, a schist range whose maximum elevation is 341 m. The mouth of the Rio Mira (one of only two major rivers in western Alentejo) is 10 km to the south. This stretch of coast is extremely rich in Mesolithic sites, including the surface type locations of the Mirian "culture", characterized by large, simple waisted hoes or axes.

The central part of the open-air site at Vidigal is a low, diffuse shell midden, poor in artifacts. The main molluscan constituents of the midden are limpets, whelks, and mussels. A samples of 100 limpets yielded an average length of 28.75 mm. A feature consisting of stones (many burned), faunal remains, a few scrapers and other artifacts was found right at the western edge of and directly below the midden. The midden dates to 6030±180 BP (GX-14557) and the feature dates to 6640±90 BP (Ly-4695). Peripheral areas of the site yielded more formal tools (mainly geometric microliths and other armatures), plus microbladelet cores and debitage including microburins. Four undecorated, friable, coarse-temper ceramic sherds were found in upper spits of peripheral excavation squares.

The cave at Vidigal is formed in soft sa. stone along the southern bluff of the Barranc. do Queimado, directly below the open-air site. Its total depth is 15 m; the vestibule is at most 7 m wide and there is a rear chamber 2.5-5 m wide. Sherds, a hammerstone, a handstone and a slab millstone were found on the cave floor and a microbladelet core was found on the surface of the talus. Two test pits were excavated in the vestibule.

In the first, G9 (1x1 m), the uppermost layers (spits 1-3) yielded human, ovicaprine and fish remains, molluscs, burnt and unburnt vegetal matter and recent ceramics. However, a layer of mottled, dark grey-brown silty sand (spits 4-6), lying atop sterile yellow-beige sand (disintegrated "bedrock"), yielded a more homogeneous prehistoric assemblage. Human infant bones were found associated with several ceramic fragments (including rim sherds from three different vessels), a chalcedony blade, 3 blades of different flints, a quartzite flake and

a chert flake. At least two of the rim sherds and the blades are typical of the regional "Middle Neolithic" (J.Arnaud, pers.comm.). No such blades were found among the 1345 lithic artifacts found at the open-air site (Vierra 1992).

In the deeper (2.5 m vs. 1.3 m) F11-12 sondage (2x1 m), stratigraphy is more seriously mixed than G9, with a major intrusive hole, small pits full of molluscs, ash and charcoal-filled hearths, and numerous rabbit burrows. Molluscs in the upper part of the sequence are mostly large (2.5-3.5 cm) limpets and topshells, whereas those of the lower layers are small (1.5-2 cm) limpets and mussels. Scattered, burned human remains were found in the upper layers. No diagnostic artifacts were found, although among the 20 coarse-temper, undecorated sherds, some might be prehistoric. There are also 4 groundstone fragments and 4 flakes. It is impossible to isolate a definite Neolithic component among the substantially mixed sediments of F11-12. At any rate, no geometric microliths or other Mesolithic artifacts were found in the cave excavations, even though all the dry, sandy sediments were screened through 2.5 mm mesh. While the cave deposits yielded sheep and goat remains, no domesticated animals were found in the *concheiro*. The fact that the "Neolithic" limpets are much smaller than the "Mesolithic" ones of the *concheiro* could be indicative of overexploitation of this resource along this stretch of coast.

It is clear that there have been recent human occupations and burials in the cave. In fact, landless people are known to live off the land in this area at present (1988 survey observation of a recently abandoned lean-to near Vidigal; & A.Quaresma, pers. comm.). All conclusions concerning the Neolithic in the cave at Vidigal are of course provisional, because of extensive disturbance of the deposits.

Ichthyofauna of the Concheiro

The *concheiro* per se (squares A21,31,41,51,66, B27,55, C19,55,56) yielded 422 fish remains: 376 from cartilaginous taxa and 46 from bony fish. Most are from the heart of the midden deposit (spits 2 & 3). The cartilaginous fish are essentially represented by vertebrae. Precise identification was not possible below the level of the Chondrichtyes class, which consists of 27 families and many genera. However it is appears that most of the remains are attributable to a squalus in the triaquid family and genus *Mustelus* (Linck 1790). This genus includes several, often confused species, that are known in English as smooth hounds. These are small (ca. 1.5 m), harmless, elongated sharks that are bottom-dwelling and nocturnal in their habits. They live alone or in groups along soft, algal, coastal bottoms, and eat fish, crabs and molluscs within 150 m of the shore. Pregnant females sometimes can be found right along the littoral. Their multi-row upper and lower teeth are small, low, rounded and suited for crushing and grinding.

There are two dental series from the *concheiro* that testify to Mesolithic fishing of the eagle ray, *Myliobatis aquila* Linnaeus 1758. This is a lozange-shaped ray (broader than long, with a prominent head). The mouth, located on the lower surface, is filled with specialized triple-row grinding teeth. The long, whip-like tail is armed with one or more poison stingers. The eagle ray lives in warm coastal waters, often on the surface. It is carnivorous, eating crustaceans and especially molluscs.

Bony fishes (Osteichthyes) definitely include members of 3 families and possibly two others. Sparids are represented by *Sparus aurata* L.1758, the gilthead sea bream, a fish of up to 70 cm in length, that lives alone or in small schools along sandy littoral bottoms or even in coastal marshes and estuaries. In winter, however, it takes refuge in deeper waters (juveniles down to 30 m and adults down to 150 m). It is essentially a mollusc-eater and is a good-tasting fish caught by net, weir or line.

A few scombrids (chub mackerel—genus *Scomber* L.1758) were also taken. They too live along the littoral and eat crustaceans, small invertebrates and fish. They can attain 50 cm in length and 1.5 kg in weight. Living in large schools, they are easily caught. They spend the summer near the coast and migrate to deeper water in the winter.

Also represented in the *concheiro* are serranids, one of the more typical families of the Perciform order, divided among many genera and species that include sea perches, stone bass, combers and groupers. They are bottom-dwelling littoral or sublittoral fish, and eat fish and invertebrates.

The other families that may be present in the *concheiro* are the sciaenids (meagres and drums) and gadids (probably the lotine subfamily: rocklings). All these are shallow-water, coastal carnivores.

Unfortunately most of the vertebral annuli are not readable on the cartilaginous fish and those of the bony fish are few and poorly preserved. Hence, seasonality results are relatively few:

Early Warm Season	Warm Season	2nd Half of Warm Season	End of Warm Season	Cold Season
3	6	6	7	0

(n=number of vertebrae)

Mesolithic fishing at Vidigal would seem to have been done only in the warm season—mainly in summer and fall. This makes sense, since most of these marine fish come toward the shore when the water is warm, and it is warmest in summer and fall. People took advantage of this fact, exploiting the shallow littoral zone — less than 30 m deep, with muddy or sandy-clay bottom. This was the sort of habitat to be expected near a shell midden — rich in molluscs and perhaps dotted with rock outcrops. The molluscan resources were exploited both by the humans and by many of the carnivorous fish.

Fishing of the small sharks may have been done with lines baited with molluscs, crustaceans or small fish. The eagle rays could also have been harpooned, either on the bottom or on the surface. It is possible that the epipelagic fish such as the scombrids, were caught through the use of nets and light boats.

Ichthyofauna of the Cave

The two sondages in the cave yielded a total of 44 fish remains: 33 from cartilaginous taxa and 11 from bony fish. Most (33) came from lower spits (4-8) and thus may mainly pertain to Neolithic occupations of the cave. The Chondrichtyes cannot be precisely identified with certainly, but they are probably mainly members of genus *Mustelus*. The few bony fish include sparids and one each of the scombrids and sciaenids. There is also a freshwater fish from the genus *Abramis*. There are very few vertebral annuli that could be read for seasonality:

Early Warm Season	Warm Season	2nd Half of Warm Season	End of Warm Season	Cold Season
0	5	0	2	0

All that one can say is that fishing was also done only in summer. This is logical given the habits of the species concerned: close to the coast in summer, deeper in winter. These indications in the cave for significant (and probably warm season) fishing tenatively support arguments for substantial continuity between "Mesolithic" and "Neolithic" adaptations in southern Portugal, despite the eventual adoption of domesticates and ceramic technology (e.g., Lubell et al. 1989; Straus 1991).

Portuguese Mesolithic Seasonality

The Vidigal open-air site yielded remains of boar, fox, at least two adult and two juvenile red deer, and one adult and one juvenile aurochs. At least one of the fawns was killed within a month of birth, hence late spring/early summer, fully concordant with the ichthyological results. In short, there is no evidence for winter occupation of Vidigal by Mesolithic hunter-fisher-gatherers.

The open-air site of Fiais, dated by 4 radiocarbon dates (obtained by D.Lubell and J.Arnaud) between 7010±70 and 6180±110 BP, is located at the interior edge of the coastal plain, 20 km up the Rio Mira from its mouth at Milfontes. Situated near the town of Odemira in an area of low plateau and hills, Fiais is 26 air km from Vidigal. In short, it is within a day's walk from the shore and could have been used by people who also used Vidigal and/or other sites between Porto Covo and Cabo Sardao. It is a large, apparently internally more complex site than Vidigal, with numerous hearths, paved areas, a rich butchery area and a shell midden (Gonzalez Morales & Arnaud 1990). The mammalian species are the same as those at Vidigal, with the addition of roe deer; but the quantities of bones are much greater than at the coastal site. Arnaud (in Gonzalez Morales & Arnaud 1990) argues that Fiais, with its ecotonal location and wide variety of available plant and animal food resources, was a base camp that was occupied year-round. From this residential hub, he argues that task groups went out to more specialized temporary camps such as Vidigal. However, Lubell and Jackes (1987) specifically mention evidence for fall and winter occupations at Fiais, which could suggest seasonal complementarity with Vidigal. In point of fact, Vidigal with an area of about 5,000 m^2 versus Fiais's ca.1,000 m^2 could well have been much more than a "temporary camp". However, totally exposed to the ocean winds, it would have been a most uncomfortable site in winter.

The principal meat-acquisition activity at Fiais seems to have been hunting, in contrast to Vidigal's emphasis on fishing. Shellfishing and (presumably) plant food gathering were conducted at both sites. (Handstones were found at both.)

A similar pattern of seasonal movements is hypothesized by J. Arnaud (1986,1987,1989) for the 11 penecontemporaneous (Atlantic period) sites of the Sado Valley. All the sites have shell middens. The site closest to the mouth of the Sado (on a stretch of river that would have been salt-water under Flandrian conditions), Arapouco, has few mammalian remains, but large quantities of fish remains. The fish are similar to those of Vidigal: shark, ray, meagre and gilthead. These fish are argued by Arnaud to have been captured in summer, when they are to be found in shallow estuarine waters.

In contrast, Cabeco do Pez, a large site which is the one furthest upstream along the Sado (ca.18 km from Arapouco), has a very large mammalian faunal assemblage. The ungulates are dominated by red deer and boar, with smaller amounts of aurochs, roe deer and horse (Rowley-Conwy in Arnaud 1987). The relatively complete representation of red deer anatomical elements suggests that this was a basecamp (Rowley-Conwy in Arnaud 1987). The wealth of red deer and boar, together with analysis of boar teeth rows, are argued by Arnaud (1987, 1989) to indicate fall/winter occupation.

In contrast, A.Lentacker (1986,1991) suggests year-round occupations in her faunal recent analyses of the Muge concheiros of Cabecos da Amoreira and Arruda. As at Vidigal and Arapouco, the fish species are ones that would have entered the estuary in spring and summer. However the migratory birds that are present may indicate winter occupation. Studies of the mammalian remains suggest that all age categories are represented, supporting human occupation of these vast sites at all seasons of the year. Such an interpretation would seem to be supported by the numerous structures and human burials in these and the other Muge sites (Roche 1972).

Provisional Conclusions

Atlantic period settlement-subsistence systems along the Sado and Mira valleys in Alentejo may have involved residential moves between sites near the coast occupied during the warm season and others on the interior plateau that were used in late fall/winter. Although late Mesolithic humans maintained a highly diverse subsistence base (including extensive gathering of molluscs, acorns and other plant foods) at all sites, fishing was emphasized at the warm season sites and big-game hunting was stressed at the cold season sites. Much further research (specifically oxygen isotope analysis of molluscs, analyses of fish otoliths and vertebrae, and cementum analysis of mammal teeth) is needed to test this model.

The scenario suggested for Alentejo contrasts with that of the Muge sites, located on a tributary of the Tagus estuary—the largest estuary in the Iberian Peninsula. Here further analyses (such as confirmatory studies of fish, birds, molluscs and mammals from the structure- and burial-rich site of Moita do Sebastiao) are needed to test the attractive hypothesis of (semi-) sedentary, year-round occupation of these extraordinary sites.

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The Site of Deby 29 and the Transition to Farming in the North European Plain

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Summary: The site of Deby 29, located in Central Poland, has been put forward as an example of a transitionary phase between the Mesolithic and Neolithic periods in the North European Plain [see *Mesolithic Miscellany* 1987, 1991]. This article is a response to the previous articles published in Mesolithic Miscellany by the excavator of the site, Lucyna Domańska, and evaluates the evidence in the light of a recent use-wear study of the lithic material from Deby 29 (Willis 1991).

Since its excavation the site of Deby 29 has been the centre of a certain amount of controversy and debate among Polish prehistorians concerning the introduction of farming to the Polish Plain (Domanska 1989a, 1989b, 1990a, 1990b, 1991; Kozlowski S. 1991). In particular, through typological and functional links between certain lithic assemblages, Domańska has linked early food production in the Caucasus with the recognition of domesticated animal bones from Deby 29[1]. However, with respect to Domańska's thesis, there is no hard archaeological evidence that the rearing of animal domesticates was carried out at the site. Her interpretations rest on the analysis of only about 20 identifiable fragments, predominantly phalanges, all of which are fragmentary and burnt. Furthermore, the results of the faunal analysis are as yet not published in sufficient detail to allow the precise examination of the procedures of identification adopted by the faunal analyst concerned.

Additionally, the results of the use-wear analysis carried out by the author (Willis 1991) provide strong evidence for the hunting of wild animals. The evidence of hunting, in the form of impact fractures on a number of microliths (see Fig. 1), fits in with a more traditional view of a hunting and gathering economy. This strongly argues that the faunal remains at the site are not those of domesticated animals but wild fauna and, in fact, species such as roe deer and aurochs were positively identified at the site. In addition, the functional evidence from the study does not show a high frequency or variety of processing activities. This would argue against the long-term occupation of the site which might be expected with an interpretation involving the rearing of animal and plant domesticates, and processing of their products.

Central to Domańska's original thesis is the suggestion that certain of the blades and tools from Deby 29 showed gloss similar to that found on Neolithic sickles. The original proposal was that these traces were produced by the processing of domesticated plant species (Domańska 1989a: 452). However, in her later writings (1990a, 1990b), this interpretation is tempered and the emphasis is directed more toward the similarity of such traces with those found on blades and truncated pieces from Early Holocene sites in the Caucasus. Such tools, presumed to be used in composite artifacts, were interpreted as being utilized for the cutting of wild plants which reflected an intensification of gathering, an interpretation supported by the occurrence of grinders at these sites (Amirkhanov 1987; Domańska 1990a: 327; Gabuniya and Cereteli 1977).

The data from Deby 29 certainly shows some evidence for plant collecting and some important points can be made about this activity at the site. The evidence for plant working isnot necessarily the result of the harvesting of cultivated plants. Without any palaeobotanical evidence whatsoever, it is very difficult to argue that the plant materials were cereals, although the polish is likely to have been produced by working plants of the *Gramineae* family which may have left superficially similar traces.[2] A similar interpretation has been suggested for comparable evidence in the form of lustrous blades from the Mesolithic site of Mokracz (Niesiolowska-Sreniowska 1990: 313-314). The low number of pieces (10 in all) from Deby 29 showing such wear traces, and their low intensity of use, also implies that plant gathering activities were not on the scale that would occur with the intensive harvesting of cereals. It would have been more plausible perhaps to suggest such traces could be the result of small-scale experimental planting and harvesting as a supplement to a broad spectrum economy. Such an activity could be seen as a natural extension of the gathering of wild species.

Furthermore, the character of these polishes is very different from the majority of traces produced experimentally in harvesting cereals by numerous researches (Korobkova 1981; Unger-Hamilton 1983, 1985; Vaughan 1985), most notably in the orientation of striations which are predominantly perpendicular on the examples from Deby 29. The question of striations is, however, vexed. Experiments with the harvesting of domesticated cereals for instance have produced polish with striations ranging from angled to paralleled, but rarely predominantly perpendicular (e.g. Vaughan 1985: Plates 77 and 80). The formation of striations seems to depend on various factors such as the presence of soil particles and weeds within the plants worked (van Gijn 1988).

However, similar polishes were produced experimentally by the author by transversal cutting of wild, non-ligneous plants of the Gramineae family. It is highly probable that

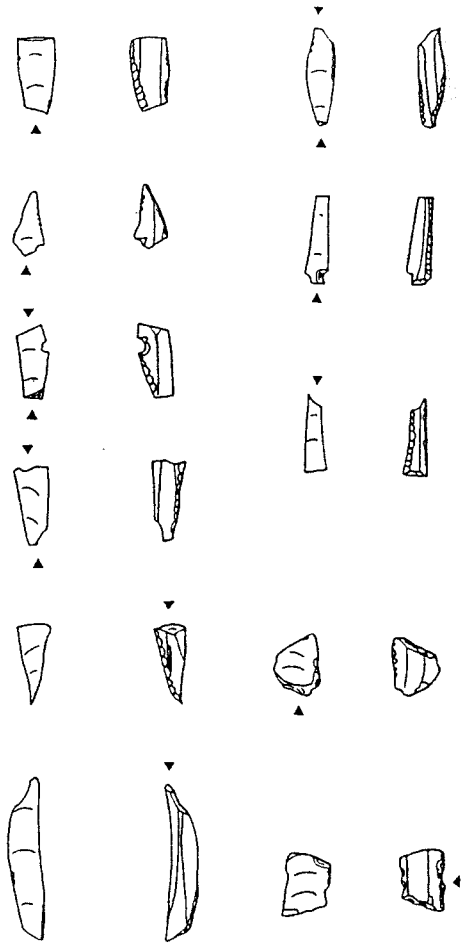

Figure 1. Microliths with impact fractures indicated by the filled triangles.

a similar activity accounted for the traces on the archaeological tools. However, the small number of tools showing this type of use-wear polish, and their varied morphological forms, argues against any thesis that this was part of an 'intensification' of gathering activities, a view strengthened by the absence of other plant-working artifacts, such as the grinders found on the Caucasian sites. Also, the development of these polishes is limited, suggesting a non-intensive activity.[3]

The use of plant materials for food and raw materials can be expected to have been widespread. In this context, the evidence of the use of the stone tool component for plant collecting should not be surprising. Use-wear studies of hunter-gatherer flint tools from elsewhere in Europe are beginning to show such a pattern, although the number of cases where plant working has been identified on a significant scale is admittedly limited (Juel Jensen 1983, 1988). The lack of recognition of such activities by use-wear analysts in the past may reflect the bias that economic archaeology has usually adopted toward plant exploitation by hunter-gatherer communities, a factor emphasized by Clark (1976), and reiterated more recently (Zvelebil 1990).

Equally, the recognition of plant gathering activities need not necessarily point to any kind of intensification that may lead to the independent adoption of plant domestication. For instance, although there is a tendency to link plant exploitation with food, this is certainly not the only use of these materials. In fact it may be just as likely that the use of the plants that left the gloss on the Deby blades was for containers, bedding, roofing or some such similar, non-consumable use. The most useful aspect of the recognition of such activities may be to illustrate the economic evidence that is missing from other dry sites, and which is often so abundant from wetland excavations.

S. Kozlowski (1991) has reinterpreted the stratigraphy at Deby 29 in order to assign the evidence of farming (domesticated animal bones and sickle gloss) to later, Neolithic admixtures. However, if one accepts first that the interpretation of domesticated faunal remains at the site is flawed, and second that no evidence exists for plant husbandry, then Kozlowski's need to explain away such 'Neolithic traits' disappears. This is despite the secure evidence that Domanska has provided for an intact Late Mesolithic stratigraphy. What remains is a late Mesolithic site showing evidence of the hunting and gathering of wild animals and plants and the processing of these same resources. The inhabitants lived in a single dwelling structure; smaller structures on the site may indicate preservation of some of their food by smoking. Such an interpretation will hardly be seen as revolutionary, but is at least consistent with the evidence as it stands. The debate would be clarified by the expansion of the dataset to include a number of sites that can be related socio-economic information, spatially and chronologically, with Deby 29.

Therefore, the evidence from Deby 29 does not provide any basis for supporting a thesis proposing the introduction of farming into Poland in the Mesolithic period, whether from the Caucasus or anywhere else. So what mechanisms can be put forward to explain this transition? In general terms there is no evidence to refute more traditional accounts of the direction of the spread of farming into the North European Plain from South Eastern Europe (Bogucki 1987). On the other hand, given the likely contacts that existed between indigenous hunter-gathers and farmers, the appearance of plant and animal domesticates in otherwise late Mesolithic contexts would not be entirely unexpected, and in fact has been intuitively and theoretically proposed before now (Bogucki 1987; Gregg 1988). In

this sense, Dománska (1991: 4) is right to acknowledge the possibility of associations between forager tools and domesticated animals. However, the evidence from Deby 29 and the lack of data from other sites located on the North European Plain means that the case as yet remains empirically unproven.

On a theoretical level, it would seem extremely likely that interaction between foragers and farmers would have taken place during some sort of availability phase as suggested by Zvelebil (1986). In ethnographic situations, this entails on the one hand the provision by the foragers of products of the forest, such as meat and honey as well as seasonal labour, in return for new technological products (Turnbull 1984). Thus, in our case, we may expect to find signs of contact in the form of pottery and new stone artifact types on Mesolithic sites, while on Neolithic sites, such contacts remain invisible. Claims for such interactions have been made by many authors in Poland, which, however have been doubted on the basis of the admixture of assemblages and the accuracy of radiocarbon dates (Tomaszewski 1988: 437).

There is a lack of evidence in the Polish lowlands, and the North European Plain in general, for more sedentary settlement in the late Mesolithic. The signs of increasingly long-term occupation and complexity in the form of cemeteries and structural remains from settlements known from elsewhere in Europe, mainly found in coastal, lacustrine or estuarine locations (Srejovic 1969; Albrethsen and Brinch Petersen 1977; Srejovic and Letica 1978; Rowley-Conwy 1983; Larsson 19889a; Newell et al. 1990), are absent from the northern lowlands. The environment of the plain areas did not offer the concentration of resources that could have been exploited by such occupations, and consequently a more mobile, dispersed settlement pattern was utilized.

Although, from a foraging point of view, such lowland societies exploited their environment equally richly and successfully, socially and ideologically they may have had less cohesion than more sedentary hunter-gatherer communities elsewhere, as spatially they were more dispersed. Mithen (1990) has been recently drawn a distinction between the coastal sites of southern Scandinavia and lowland sites of the upper Danube. His argument emphasizes the diverse range of foods and high biomass exploited in coastal locations, that removed large-game hunting as a prime food-procuring activity. Instead the latter activity became a means of acquiring wealth and prestige, perhaps expressed in food-sharing (see also O'Shea and Zvelebil 1984). In contrast lowland hunters engaged in large-game hunting principally as a risk-reducing, primary food procuring activity. Although there are problems with the comparability of site formation processes leading to the preservation of the faunal assemblages discussed in the study[4], there seems to be good evidence to support socio-economic differentiation between the two groups of sites. In the context of south Scandinavia, the character of the environment in coastal regions

> "released a constraint on hunting behaviour and allowed latent social competition and dynamics to become manifest. I am specifying the articulation between hunters and their social and physical environments." (Mithen 1990: 182)

Smaller breeding networks (both in area and population) would have been associated with more settled groups, and the sense of a community's identity of itself and its territory would be expected to be stronger and therefore more resistant to change. In the lowlands, larger breeding networks would have existed, with more diffuse kinship links among more

this mobile foragers. The combination of these social and ideological factors, based on a different subsistence strategy, broadly differentiated lowland foragers from their more settled counterparts, and allowed the latter to withstand the greater social impact of the LBK. Among early farming populations, social identity would have been recognizable across a far greater social and geographical distance. Further more, the clearing and working of land would have produced a strong social identity among farmers across the landscape, perhaps being strengthened by ancestral rights to resources as time progressed.

However, on present evidence, there is no reason to see the economic base of lowland foragers as being 'inferior' in terms of susceptibility to risk, than their coastal counterparts, or the first farmers. Consequently there is no support for the thesis that agriculture is adopted by hunter-gatherers in order to diminish reliance on wild game and the risks involved (Pryor 1986; Mithen 1990). Indeed there is substantial evidence to support on the one hand the 'success' with which foragers exploited both environments in prehistoric Europe, and on the other the relative dietary poverty of early farmers. Thus there is no *a priori* reason to accept Zvelebil and Dolukhanov's (1991: 263-264) proposal that after a long availability phase, indigenous foragers gradually succumbed to the attractions of the farming economy. Indeed, the high percentage (frequently more than 50%) of wild fauna found on Early Neolithic sites in Poland (Kozlowski S. and Kozlowski J. 1986; Bogucki 1987), instead of showing the continued exploitation of wild resources by transitional foragers (Zvelebil and Dolukhanov 1991: 264), could indicate the provision, by foraging communities, of impoverished pioneer farmers with crucial protein from wild resources.

Therefore, at least as far as foragers of the North European Plain are concerned, the availability model fails to have,

> "demonstrated that the causes of the agricultural transition are to be sought in the internal dynamics of the hunter-gatherer societies" (Zvelebil and Dolukhanov 1991: 271).

No convincing reasons are given why such 'internal dynamics' should have led the Mesolithic groups of the Polish plain to 'fuse' with early Neolithic farmers. The advantages of such a fusion for the farmer (land; mates; wild resources; environmental knowledge; seasonal labour), are rather more obvious than they are for the forager ('exotic' artifacts and possibly carbohydrates, Bogucki 1987: 8). In fact the model undervalues the social and ideological strength of early farming society compared to that of the lowland, mobile forager and overvalues the economic strength of the former over the latter. In the context of the Polish plain, the model stresses the evidence (admittedly tenuous - Tomaszewski 1988) for Mesolithic influences in Early Neolithic lithics and a ceramic Mesolithic, while ignoring the mounting evidence for early developed (both culturally and in terms of subsistence) farming communities such as Brzesc Kujawski.

Perhaps Mithen's (1990) second reason for the indigenous adoption of farming by lowland forager communities is more persuasive. This concerns the opportunity for social competition that the domestication and cultivation of resources (and perhaps new artifact types such as pottery) would have presented (*ibid.*: 192). In terms of the relationship of dispersed lowland foragers with farming peoples, the more diffuse social identity on the part of the former would have lessened their resistance to change. At the same time motivations for change in a climate of heightened social competition may have been presented. But this change need not have been

sudden or catastrophic as Mithen suggests for the case in the upper Danube sites (*ibid.*: 191).

The exploitation of a broad range of resources by lowland forest communities, particularly plants, as shown by the results from Deby 29 and other use-wear analyses, may have provided a context for the gradual adoption of farming, in particular small-scale planting and harvesting of domesticated plants. It is unlikely that the first contacts between lowland foragers and early farmers included biological 'fusion' and significant adoption of domesticated resources, since the advantages for the forager of such an integration are not immediately apparent. However, once secondary farming communities had become established in the lowlands, biological integration would have become more likely as farming control over the land strengthened, and foraging communities became fissioned, socially and ideologically, as well as economically. It may have been crucial for early farming groups to supplement their breeding populations, as their populations were probably dominated by young males (Green 1980; Dennell 1984, 1985; Chapman 1989). The ties that already existed between the two groups would have formed the basis for the adoption of farming techniques by foragers, perhaps involving the mixing of the two populations biologically. If the dates from Korzeecznik and Lykpwe are correct, then such a process may have continued well into the 4th millennium B.C. (calibrated), a thousand years, more or less, after the first farmers had settled the Polish lowlands.

Notes

[1]Although animals may have been kept offsite, the lack of any structural remains to suggest that animals were corralled further erodes the argument for animal and plant husbandry.

[2]Without palaeobotanical evidence it is very difficult to attempt an interpretation of plant type, particularly in light of experiments such as those of Vaughn where'despite the phylogenic diversity of of the plants used in the tests, basically the same types of polish were formed on the experimental flint edges' (1985: 35). In the final analysis examination of phytoliths by Scanning Electron Microscope provides the only 'secure' way of identifying the family of plant worked.

[3]Experimental polishes with similar development to those on the archaeological tools were produced experimentally after a relatively short duration of working (c. 3,000 strokes), but were more comparable after longer durations (5,000 - 6,000 strokes).

[4]In contrast to the sites from southern Scandinavia, the faunal data from the southern German sites of Jägerhaus, Falkenstein, Inzigkofen and Lautereck are all either from caves or rock shelters (Mithen 1990: 170).

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New AMS ^{14}C Dates for Antler and Bone Artifacts from Great Britain

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Since 1988 the authors have been conducting research into the uses of antler and bone among Late Upper Palaeolithic and Mesolithic communities in Britain. One of our objectives has been to establish the time-ranges of the major types of antler and bone implements by obtaining direct dates for individual implements using the AMS ^{14}C Dating Laboratory at the University of Oxford. In a paper presented to the Fourth International Mesclithic Symposium in Leuven (Bonsall & Smith 1990), we discussed all the results available at that time. We now present a further series of dates produced by the Oxford Laboratory (Table 1). These relate to the three most numerous categories of antler/bone implements found in Late Upper Palaeolithic and Mesolithic con-texts in Britain — antler mattocks, barbed points, and bevel-ended tools.

Red Deer Antler mattocks

The British finds have been described in detail by Smith (1989). They may be made from the basal portion of a red deer antler (antler-base mattocks) or from a mid-section of the antler beam (antler-beam mattocks), and each type may be subdivided according to whether the shaft hole is in the same plane as the tines (sub-types A, C) or at right angles to them (sub-types B, D).

At one time it was usual to attribute the British antler mattocks exclusively to the Mesolithic (Smith & Bonsall 1985). The first results of our accelerator dating programme showed this interpretation to be incorrect, and indicated their use both in the Mesolithic and in later periods (Bonsall & Smith 1990). The dates reported here are all for antler-base mattocks and increase the number of directly dated specimens of this type to 11 (5 of sub-type A, and 6 of sub-type B). They confirm that many isolated finds of antler-base mattocks are of Late Neolithic to Bronze Age date, and hint at a preference for sub-type B in the later part of the time range. They also extend the time range of the antler-base mattocks, the date of 3000±75 BP (OxA-3741) being the latest obtained for an antler mattock from Britain.

Barbed Points

Previously, 9 barbed points from British sites had been directly dated by the Oxford Laboratory, while conventional or AMS ^{14}C dates were available for a further 8 sites with barbed points (Bonsall & Smith 1990; Smith & Bonsall 1991). The majority of the 17 dated specimens fall into two distinct types: (i) barbed points of 'Maglemosian' type, with a single row of barbs and made on slender blanks characteristically obtained by the groove-and-splinter technique; and (ii) barbed points of 'Obanian' type, with either one or two rows of barbs, and made on broad, flat blanks apparently obtained by splitting long bone shafts or sections of antler beam. The 'Maglemosian' points exhibit considerable variability in the form and spacing of the barbs, and the technique by which they were made. The new dates presented in Table 1 are significant in several respects:

The point from Wandsworth lacks true barbs. Made on a splinter of red deer antler, it has a series of simple notches cut into the stem along one side leaving triangular 'teeth' (Figure 1). The date of 9050±85 BP (OxA-3736) for the Wandsworth specimen is the latest for a point of 'Maglemosian' type, and extends the

Table 1: New AMS ^{14}C determinations for barbed points, red deer antler mattocks and bevel-ended tools from Great Britain. With the exception of OxA-2607 all dates are on samples collected by the authors.

Site	*Type*	*Material*	*Context*	*Lab. No.*	*^{14}C Age BP*	*Age range (2σ level)*
Barbed Points:						
Victoria Cave (N. Yorkshire)	Biserial	Antler	(see footnote)	OxA-2607	10,810±100	11,010–10,610
Wandsworth (River Thames)	Uniserial	Antler	Unassociated find	OxA-3736	9050±85	9220–8880
Cumstoun	Biserial	Antler	Unassociated find	OxA-3735	6665±70	6805–6525
Bevel-ended tools:						
Isle of Risga, Argyll		Antler	Shell midden	OxA-3737	5875±65	6005–5745
Ulva Cave, Argyll		Antler	Shell midden	OxA-3738	5750±70	5890–5610
Carding Mill Bay, Oban		Antler	Shell midden	OxA-3740	5190±85	5360–5020
Carding Mill Bay, Oban		Bone	Shell midden	OxA-3739	4765±65	4895–4635
Antler mattocks:						
Southery Fen, Norfolk	*A-Ba* A	Antler	Unassociated find	OxA-3745	3460±70	3600–3320
Peterborough 2, Norfolk	*A-Ba* B	Antler	Unassociated find	OxA-3742	3430±75	3580–3280
Brentford (River Thames)	*A-Ba* B	Antler	Unassociated find	OxA-3744	3245±75	3395–3095
Putney 2 (River Thames)	*A-Ba* B	Antler	Unassociated find	OxA-3743	3155±70	3295–3015
Fetwell, Norfolk	*A-Ba* B	Antler	Unassociated find	OxA-3741	3000±75	3150–2850

Note: The context of the Victoria Cave harpoon is given as '(the lower part of) the upper cave earth' by Garrod (1926), and by Jacobi (in Hedges *et al.*1992) as 'close to the cave mouth . . . in the lower part of a lower breccia'.

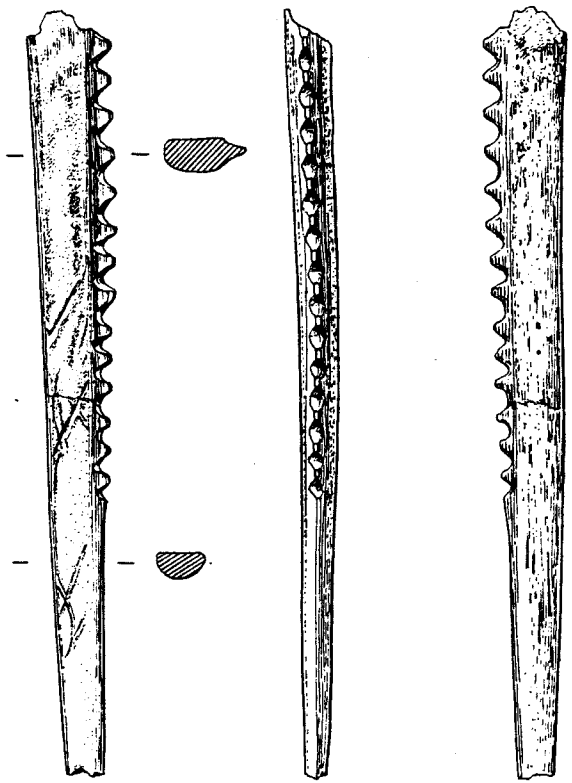

Figure 1: Barbed point of red deer antler from the River Thames at Wandsworth (scale ~ 2:3). This piece has been dated as 9050±85 BP (OxA-3736).

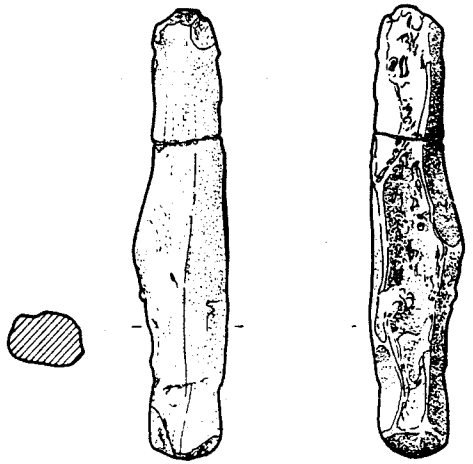

Figure 2: Bevel-ended tool from Ulva Cave, Argyll (scale ~ 2:3). This piece has been dated as 5750±70 BP (OxA-3738).

overall time range of this type from ca. 12,400 to ca. 9000 BP. Other dated examples of 'notched' points include specimens from Waltham Abbey (9790±100 BP: OxA-1427) and Star Carr (ca. 9500 BP), and it is interesting that these also fall late in the series.

The flat, biserial point dredged up from the bed of the River Dee at Cumstoun, south-west Scotland, ca. 1895 (Munro 1898: 231–2; Lacaille 1954: 156–7) is often compared to barbed points recovered from 'Obanian' shell middens in cave and open-air sites around Oban Bay and on the islands of Oronsay and Risga. The date of 6665±70 BP (OxA-3735) is statistically indistinguishable (at the 1σ level) from that of 6700±80 BP (OxA-1949) for a bilaterally-barbed point from MacArthur's Cave, Oban, and provides confirmation that the time-range of this type extends back to at least ca. 6700 BP.

The bilaterally-barbed harpoon from Victoria Cave, North Yorkshire, discovered during excavations in 1870, has also been compared to pieces from 'Obanian' sites in western Scotland. Breuil (1922) emphasized the much closer resemblance between the Victoria Cave find and harpoons from Azilian sites in south-west France, however, and most workers have since accepted a Late Upper Palaeolithic context for the piece. This is now confirmed by the date of 10,810±100 BP (OxA-2607; see comments by Jacobi in Hedges et al. 1992) which suggests human activity at the site during the final cold phase of the Lateglacial. It also confirms Victoria Cave as one of the most northerly Final Palaeolithic sites in Britain.

Bevel-ended tools

Bevel-ended tools are the most numerous artifacts found in 'Obanian' middens in western Scotland. Typically, they are made on elongated water-worn pebbles or on narrow splinters of bone or antler, and are usually less than 10cm in length. Both forms exhibit pronounced bevelling at one end, and occasionally at both ends, produced by abrasion, although it is uncertain whether this has resulted from heavy use or from deliberate working. Consequently, their functional interpretation has been a source of much debate; they have been variously described as 'punches' or 'flaking tools' used in flint working, as wood-working implements, as tools for removing limpets from their shells ('limpet scoops') or for detaching them from rocks ('limpet hammers'), and as 'rubbers' or 'polishers' for working animal skins.

Four examples made from antler or bone have been assayed in the course of our artifact dating programme — one from a site on Risga investigated in the 1920s, the others from recently excavated sites on the island of Ulva and at Carding Mill Bay, Oban. The date of 5875±65 BP (OxA-3737) from Risga is in close agreement with a date of 6000±90 BP (OxA-2023) for a red deer antler mattock from the same site (Bonsall & Smith 1990). The dated specimen from the midden in Ulva cave (Figure 2) is one of only two artifacts of 'Obanian' type identified from the site so far. It comes from the upper part of the midden and the date of 5750±70 BP (OxA-3738) agrees with a conventional ^{14}C date of 5690±60 BP (GU-2602, adjusted for the marine reservoir effect) on a bulk sample of limpet shells from the top 10cm of the midden (Bonsall *et al.* 1992). The dated specimens from Carding Mill Bay 1 are from different levels of a stratified midden deposit; the dates of 5190±85 BP (OxA-3740) and 4765±65 BP (OxA-3739) are in the correct stratigraphic order, and are in broad agreement with conventional radiocarbon dates on charcoal from this site (Connock et al., in press; Bonsall & Sutherland 1992). OxA-3739 is the latest date obtained for an implement from an 'Obanian' site, and suggests that at least one element of the 'Obanian' toolkit continued in use after the date of ca. 5300 BP conventionally assigned to the Meso–Neolithic transition in northern Britain.

The overall time-range of ca. 5875–4765 BP indicated by these dates must be regarded as a minimum for the use of bevel-ended tools in western Scotland, since examples of this type were also recovered from midden deposits in MacArthur's Cave and Druimvargie Rockshelter, Oban, for which there are AMS ^{14}C dates on barbed points of 6700±80 BP (OxA-1949) and 7810±90 BP (OxA-1948), respectively (Bonsall & Smith 1989).

Concluding remarks

The dates presented in this paper constitute important new data bearing on the time ranges of three major categories of antler/bone artifacts in use among Late Upper Palaeolithic and Mesolithic communities in Britain and, in some cases, they provide the first direct dating of human activity at particular locations (cf. Smith & Openshaw 1990). A number of questions, however, remain unresolved — among them: (i) were antler-base mattocks manufactured in Britain during the period ca. 8500–4200 BP; (ii) did the antler-beam type remain in use after the Mesolithic; (iii) in the light of the date for the Victoria Cave specimen which appears anomalous in spatial or temporal terms, or both, what is the time range and functional significance of biserial forms of barbed point; (iv) what were the overall time ranges of artifact types found in the west Scottish 'Obanian' sites, and what changes can be detected in the 'Obanian' toolkit over time? We intend to focus on these issues as our AMS ^{14}C dating programme continues and, where possible, to extend the spatial and temporal range of the programme in order to document further the Late Upper Palaeolithic and Mesolithic re-settlement of the British Isles.

Acknowledgements

We should like to thank the museum curators who gave permission for the implements in their care to be sampled: Miranda Armour-Chelu and Juliet Clutton-Brock (British Museum Natural History), David Devereux (Stewartry Museum, Kirkcudbright), Barbara Green (Castle Museum, Norwich), Euan McKie (Hunterian Museum, Glasgow), and Nick Merriman (Museum of London). We are also indebted to Rupert Housley and the technical staff of the Oxford University Accelerator Unit for dating the samples. Figure 1 was drawn by Philip Compton and Figure 2 by Gordon Thomas.

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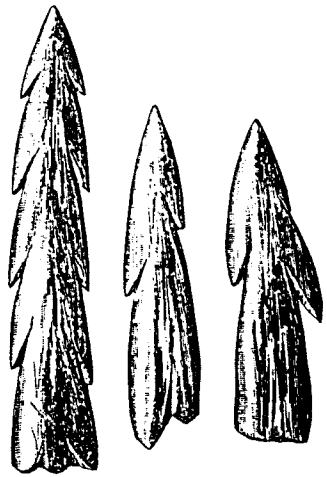

Barbed 'harpoon heads' of bone or antler found during 1881-82 excavations at the site of Caisteal nan Gillean I, Island of Oronsay, Scotland. P.A. Mellars, 1987. **Excavations on Oronsay. Prehistoric Human Ecology on a Small Island**. Edinburgh, University Press. Page 160.

Man & Sea in the Mesolithic — coastal settlement above and below present sea level

An Intenational Conference
14-18 June 1993
Kalundborg, Denmark

This symposium will focus on foraging coastal adaptations with special attention to the Mesolithic of Northwest Europe. The symposium was announced in the last issue of Mesolithic Miscellany (May 1992) and soon after the organizing committee was flooded with applications. We have received an overwhelming number of proposal from persons all over the world — many more than the meeting place and the program can provide space and time for. Many highly qualified lecturers have asked to be placed on the waiting list, hoping for a chance to be admitted to the program when the deadline for payment of fees has expired on 31 January 1993.

The provisional program among other things contains sessions on the following topics: human exploitation of marine resources; topographic location of coastal settlements; shoreline displacement and changes in the marine environment; submerged Stone Age settlements. In addition there will be several geographically oriented sessions dealing with coastal settlement in the Mesolithic and Paleolithic.

There may still be space for a lecture on marine nutrients in relation to the chemistry and/or morphology of human bone. The list of lectures and participants as well as guidelines for the presentation of papers will be circulated in December.

It appears from the abstracts that have been received that many northwest European scholars plan to present fundamental new research results at the symposium. The organizing committee also looks very much forward to the substantial reports submitted by a number of research groups in the former Soviet Union, hitherto unknown to most Western scholars. We also look forward to the presentation of parallels from ethnographic and archaeological records around the world.

In general the symposium will demonstrate Mesolithic man's heavy dependence on and intensive exploitation of aquatic resources — fishing especially would appear to be of fundamental importance to the economy of the Mesolithic and earlier periods. Details of the symposium program and the format of papers will be circulated to participants in December of this year. Payment of fee and correspondence on registration and papers should be addressed to:

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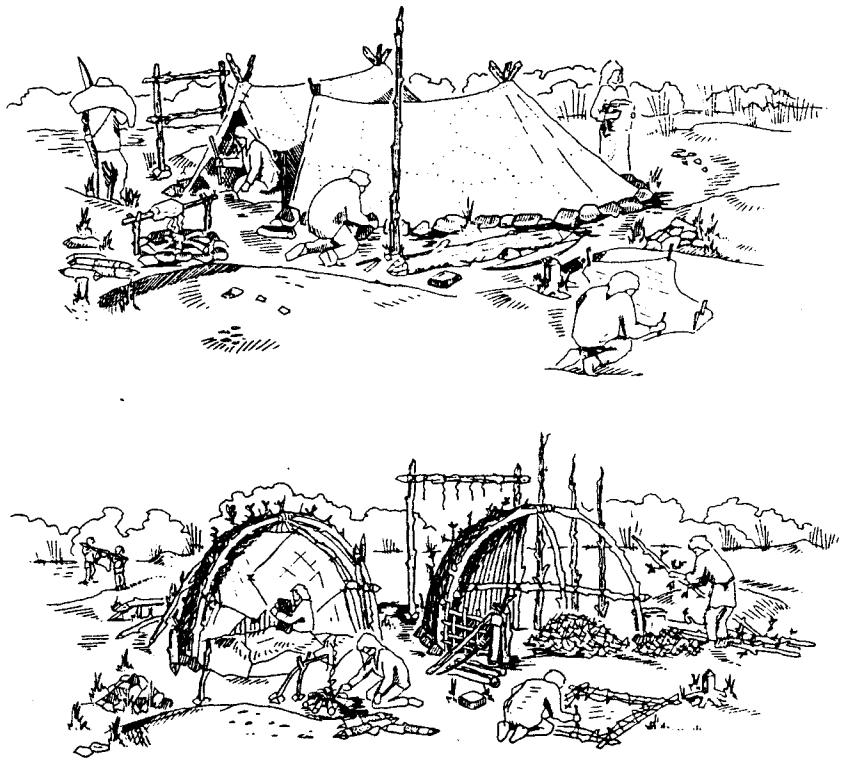

Two possible interpretations of the prehistoric structural remains at the Mesolithic site of Kinloch, Island of Rhum, Scotland. From C.R.Wickham-Jones, 1990, **Rhum. Mesolithic and Other Sites at Kinloch. Excavations 1984-86.** Societyof Antiquaries of Scotland, Monograph Series Number 7. Edinburgh. Page 160.

International Round Table

Highland Zone Exploitation in Southern Europe

Second Circular

Over 25 scholars from Italy, Austria, Switzerland, France, Germany, Poland, Great Britain, and the USA have responded to the First Circular. Thus we can confirm that the Round Table on Highland Zone Exploitation will take place at the Natural History Museum of Brescia from 29 April to 1 May 1993.

Contributors are asked to bear in mind the aims of the meeting as outlined in the First Circular, "an examination of the ways in which, over the course of time, man has exploited the plant, animal, and mineral resources of the highland zone; and the impact of such activity on this specialized environment. The aim is to achieve and publish an improved synthesis between the different disciplinary contributions; and to extend discussion beyond the emphasis on pastoralism of the last Round Table, so as to embrace all the varied resources of the highland zone, and define the changing conditions governing its exploitation and environment.

Contributors are expected to bring the final version of their articles to the Round Table in order to have the proceedings published as soon as possible. They are also requested to follow the Instructions to Contributors. A two page summary, preferably in English, typed on UNIA4, double-spaced sheets, should be submitted by the end of December, to have the preliminary reports circulating at the opening of the session.

The official languages of the Round Table will be English, Italian, French, and German. Each paper should not last more than 30 minutes. The Third Circular will be sent at the end of February 1993.

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Recent Publications

Armit, Ian, and Bill Finlayson. 1992. Hunter-gatherers transformed: the transition to agriculture in northern and western Europe. **Antiquity** 66: 664-676.

The quantity and quality of material from the late Mesolithic and early Neolithic in southern Scandinavia has dominated the study of this important period in Northwest Europe. Recent evidence from the west of Scotland suggests that, despite a rich and varied resource base similar in many ways to that in southern Scandinavia, a very different process of change occurs. The evidence suggests a very gradual transformation, with selected parts of the farming socio-economy being adapted at varying rates. The situation is compared with that in various parts of Europe and is considered to fit in well with a pattern of great regional diversity in the transition from the Mesolithic to the Neolithic.

Barton, R.N.E. 1992. **Hengistbury Head, Dorset, 2: The Late Upper Paleolithic and Early Mesolithic Sites.**

Biagi, Paolo. 1991. The prehistory of the early Atlantic period along the Ligurian and Adriatic coasts of northern Italy in a Mediterranean perspective. **Rivista di Archeologia** 15: 46-54.

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

Cziesla, E. 1992. Spät-Paläolithikum und Mesolithikum der Euregio. **Spurensicherung. Archäologische Denkmalpflege in der Euregio Maas-Rhein.** Mainz: Verlag Philipp von Zabern.

Cziesla, E. 1992. **Jäger und Sammler in Landkreis Pirmasens.** A contribution to the Mesolithic of Germany.
was a change in the organisation of flint transport and flaking in the Azilian.

As at Duruthy, the Magdalenian occupations of Dufaure took place during the cold season. Other Magdalenian sites in the pre-Pyrenean lowlands were also winter habitations, as was the "logistical" camp site of Les Eglises in the Ariège Pyrénées.

D'Errico, Francesco. 1992. Technology, motion, and the meaning of Epipaleolithic art. **Current Anthropology** 33: 94-109.

Ferrari, Alessandro, and Andrea Pessina. 1992. Considerazioni sul primo popolamento Neolitico dell'Area Friulana. **Atti Soc. Preist. Protost. Friuli-V.G. Trieste** 6:23-59.

Meiklejohn, C., J.H. Baldwin, and Catherine T. Schentag. 1988. Caries as a probably dietary marker in the Western European Mesolithic. In **Diet and Subsistence: Current Archaeological Perspectives**, ed. by B.V.Kennedy and G.M. LeMoine, pp. 273-279. Calgary: The Archaeological Association of the University of Calgary.

Mithen, S.J., and B. Finlayson. 1991. Red deer hunters on Colonsay? The implications of Staosnaig for the interpretation of the Oronsay middens. **Proceedings of the Prehistoric Society** 57: 1-8.

Mithen, S.J. 1991. 'A cybernetic wasteland'? Rationality, emotion and Mesolithic foraging. **Proceedings of the Prehistoric Society** 57: 9-14.

Perlès, C., with contributions by P.C. Vaughn, C. Renfrew, and A. Aspinall. 1990. **Les industries lithiques taillées de Franchthi (Argolide, Grèce). Tome 2: Les industries du Mésolithique et du Néolithique initial.** Bloomington, Indiana: University of Indiana Press. Excavations at Franchthi Cave, Vol. 5.

Following the publication of Franchthi's Upper Paleolithic industries, whose latest phases were already characterized by the presence of numerous microburins and geometric microliths, this volume studies the unusual Mesolithic sequence. In the lower and final Mesolithic all microliths virtually disappear and the assemblage is dominated by crude notches, denticulates, and end-scrapers. The middle Mesolithic phase does have numerous microliths, but mostly of unusual shapes and technique (squares, rectangles, non-geometric microliths). Yet, very early trapezes (mid-9th millennium BP) are also present, but without microburins. A detailed diachronic analysis points to correlations between changes in subsistence strategies and lithic assemblages and leads to interpretative hypotheses which are tested against data from other Greek Mesolithic sites or, more generally, other Mediterranean assemblages poor in microliths. The problem of cultural continuity between the Mesolithic and the Initial Neolithic is then examined,

with a reassessment of other so-called 'preceramic' assemblages. A wear-traces analysis by P. Vaught explores the functions of Mesolithic tools, while the origin of Franchthi obsidian, shown to come from Melos, is addressed in a wide ranging synthesis by Aspinall and Renfrew.

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

An account of the period between 12,500 and 5,500 years ago discussing the environmental frameworks and the key sites in an accessible and attractively presented way. The result moves the late Paleolithic and Mesolithic away from just the study of stone tools and towards the interaction of foraging peoples with their landscapes.

Starnini, E. 1992. 3.1 Passo Guiche - Monte Fascie. In **Archeologia Preventiva Lungo II. Percorso di un Metandotto**, ed. by R. Maggi, pp. 32-38. Genova: Quaderni dell Soprintendenza Archeologica della Liguria.

Starnini, E. 1992. 3.2. Nasoni - Monte Rotondo. In **Archeologia Preventiva Lungo II. Percorso di un Metandotto**, ed. by R. Maggi, pp. 39-42. Genova: Quaderni della Soprintendenza Archaeologica della Liguria.

Straus, Lawrence Guy. 1992. **Iberia Before the Iberians: The Stone Age Prehistory of Cantabrian Spain.** Albuquerque: University of New Mexico Press.

Straus, Lawrence Guy. 1992. L'Abri Dufaure et la Falaise du Pastou dans le Système Aparatif Règional des Pyrénées au Magdalénien. **Colloque de Chancelade**, 10-15 oct. 1988, p. 355 à 343.

The Abri Dufaure is part of a major cluster of Magdalenian and Azilian sites at the foot of the Pastou Cliff, in the south of Les Landes. The chronostratigraphic sequence at Dufaure is parallel to that of Duruthy: from Dryas I to Preboreal (14,600-9,600 B.P.). Dufaure has yielded artifact assemblages from the middle Magdalenian through the Azilian. From Dryas I until the end of Alleröd, the faunal assemblages are increasingly dominated by reindeer, while in the Azilian, at Dufaure and Duruthy, the whole archeological level is dominated by red deer and boar, although reindeer continues to be present. Horses and bovines are relatively important in the levels dating from Dryas I and saiga antilope is present.

The surface of the rockshelter per se (dug by Breuil and Dubalen), of the terrace and of the talus slope was paved repeatedly during middle and final Magdalenian times. This pavements were the scene of various activities. There was a distinct shrinking of the inhabited area of the site during the Azilian (as at Duruthy). Petrographic analyses show that almost all the lithic raw materials were collected locally.

Weber, Thomas. 1991. Uberlegungen zum mesolithischen Grabbrauch--das Grab von Unreburg, Kr. Strassfurt. In **Bestattungswesen und Tottenkult in Ur- und Frühgeschichte Zeit**, ed by F. Horst and H. Keibrig, pp. 35-39. Berlin: Akademie Verlag.

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