

LES SÉANCES DE LA SOCIÉTÉ PRÉHISTORIQUE FRANÇAISE

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La Société préhistorique française, fondée en 1904, est une des plus anciennes sociétés d'archéologie. Reconnue d'utilité publique en 1910, elle a obtenu le grand prix de l'Archéologie en 1982. Elle compte actuellement plus de mille membres, et près de cinq cents bibliothèques, universités ou associations sont, en France et dans le monde, abonnées au *Bulletin de la Société préhistorique française*.

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- à l'assemblée générale annuelle – L'assemblée générale se réunit en début d'année, en région parisienne, et s'accompagne toujours d'une réunion scientifique. Elle permet au conseil d'administration de rendre compte de la gestion de la Société devant ses membres et à ceux-ci de l'interpeller directement. Le renouvellement partiel du conseil se fait à cette occasion.

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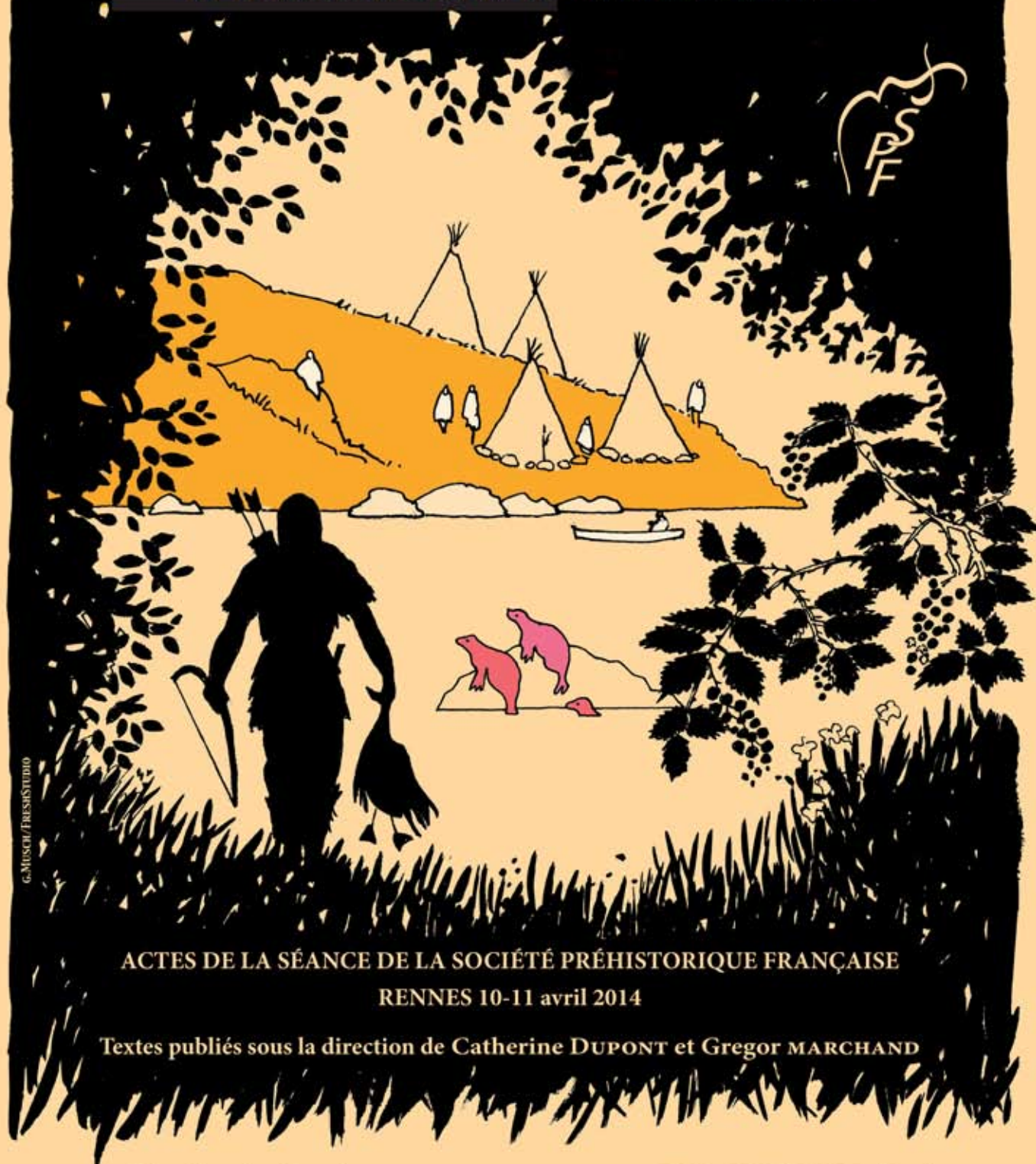
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ARCHÉOLOGIE DES CHASSEURS-CUEILLEURS MARITIMES

DE LA FONCTION DES HABITATS
À L'ORGANISATION DE L'ESPACE LITTORAL

ARCHAEOLOGY OF MARITIME HUNTER-GATHERERS

FROM SETTLEMENT FUNCTION
TO THE ORGANIZATION OF THE COASTAL ZONE



ACTES DE LA SÉANCE DE LA SOCIÉTÉ PRÉHISTORIQUE FRANÇAISE

RENNES 10-11 avril 2014

Textes publiés sous la direction de Catherine DUPONT et Gregor MARCHAND

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6

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L'organisation de cet événement a également été soutenue financièrement par de nombreux organismes publics et des projets de recherche : le projet européen « Arch-Manche » (Interreg IVA 2 Mers, fonds FEDER), le projet « SeaMeso » de la Maison des sciences de l'homme en Bretagne, le CNRS (DR 17), l'Observatoire des sciences de l'Univers de Rennes (OSUR), le ministère de la Culture (service régional de l'Archéologie de Bretagne) et la région Bretagne. L'université Rennes 1 a permis l'utilisation de l'amphithéâtre Donzelot. Enfin, nous tenons à remercier la Société préhistorique française d'avoir accepté de labelliser cet événement « Séance de la Société préhistorique française ».

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*Archéologie des chasseurs-cueilleurs maritimes.
De la fonction des habitats à l'organisation de l'espace littoral
Archaeology of maritime hunter-gatherers.
From settlement function to the organization of the coastal zone*
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The submerged lands of the Channel and North Sea: evidence of dispersal, adaptation and connectivity

Garry MOMBER, Lauren TIDBURY and Julie SATCHELL

Abstract: This paper reviews human recolonisation and dispersal around the North Sea and Channel region following the major Devensian stadial. During the coldest phase of the glaciation, people were forced to refugia in southern parts of Europe. When the climate ameliorated, people slowly moved north and west. After several thousand years groups of people arrived around the North Sea and Channel and became established. Sea levels remained low while the Boreal forest growth responded to the ongoing climatic fluctuations. By the end of the Windermere/Allerød warm phase comparable cultural technologies of the Upper Palaeolithic Magdalenian, Hamburgian, Federmesser, Creswellian and Ahrensburgian are found across great distances. This also applies to the Early Mesolithic Maglemosian, Sauveterrian and Azilian who either had extensive ranges or had close associations with analogous groups. These territories either crossed or abutted the North Sea and Channel region when it was largely dry. Towards the end of the Windermere or Allerød warm phase and into the colder Younger Dryas the two seas and adjacent lands would have become increasingly significant to humans. Arguably it became central to late Upper Palaeolithic techno-complexes. The relatively rapid resurgence of human activity in the region following the Older Dryas, Inter-Allerød cool period and Younger Dryas stadials, suggests a continual presence in the region, despite an absence from the archaeological record. It is probable that the Channel and North sea region acted as a refugium for populations when conditions allowed. Sea level rise and the advance of Boreal, then temperate vegetation of the Atlantic period interrupted herd migration routes and imposed new restrictions on free movement over long distances. This resulted in more localised technological adaptations as populations grew and human activity becomes more evident on both sides of the two seas. Despite this, cultural evidence shows that long distance links were maintained, notably by the Tardenoisien. The impact of change was most acute in the lands that were to become drowned. This forced people to adapt if they were to survive in the new environments. Discoveries from the submerged sites of Yangtze Harbour and Bouldnor Cliff revealed specialisation and high levels of sophistication. The high quality preservation at the Late Mesolithic site of Bouldnor Cliff has enabled the recovery of artefacts fashioned by methods not seen on the mainland UK for another 2,000 years. In addition, cultural influences and DNA evidence suggest a widespread social network that extends to the fringes of the Neolithic world.

Keywords : Bouldnor Cliff, Mesolithic, Upper Palaeolithic, sea-level rise, climate change, human dispersal, Europe.

Résumé : Cet article analyse la recolonisation et la dispersion humaine tout au long de la Mer du Nord et de la Manche suite à la principale période de la glaciation devensienne. Pendant la période la plus froide de la glaciation, la population se vit contrainte de se réfugier dans la zone sud de l'Europe. Quand le climat s'améliora, ces populations commencèrent à se déplacer peu à peu vers le nord et l'ouest. Après quelques milliers d'années, des populations arrivèrent dans bassin côtier de la mer du Nord et la Manche et s'y sont établies. Le niveau de la mer est resté bas et dans le même temps, la forêt boréale s'étendait en raison des fluctuations climatiques en cours. Vers la fin de la période de réchauffement Windermere/Allerød, les techniques et cultures du Paléolithique supérieur (Magdalénien, Hamburgien, Federmesser, Creswellien, Azilien et Ahrensburgien) se rencontrent sur de grandes distances. Ce constat est aussi valable pour le Mésolithique ancien (Maglemosien, Sauveterrien). Ces territoires traversaient ou étaient contigus aux rivages de la mer du Nord et de la Manche, lorsqu'ils étaient en grande partie exondés. Vers la fin de la période tempérée de Windermere (ou Allerød) et lors du refroidissement du Dryas récent, les mers et leurs territoires adjacents pourraient avoir joué un rôle crucial pour les humains, notamment en ce qui concerne les technocomplexes de la fin du Paléolithique supérieur. Les repeuplements rapides de ces zones à la suite des périodes froides du Dryas ancien, de l'Inter-Allerød et du Dryas récent suggèrent une présence continue dans la région, malgré l'absence de traces archéologiques. Il est fort probable que les régions de la Manche et de la mer du Nord aient servi de refuges pour les populations quand les conditions le permettaient. La remontée du niveau de la mer durant la période climatique du Boréal, puis la prolifération de la végétation de la période climatique de l'Atlantique, interrompit les routes migratoires des hardes de grands mammifères et a imposé de nouvelles restrictions aux déplacements sur de longues distances. Il en a résulté des adaptations technologiques spécifiques à l'échelle régionale, au fur et à mesure de l'accroissement démographique des populations sur les deux rives de la mer. Malgré cela, des échanges culturels apparaissant de manière évidente montrent que les liens sont restés actifs, principalement lors

du second Mésolithique. L'impact du changement fut plus sévère dans les terrains inondés et leur immédiate périphérie, ce qui a forcé les populations à s'adapter s'ils voulaient survivre dans ce nouvel environnement. Les découvertes dans les sites immergés de Yangtze Harbour et Bouldnor Cliff témoignent d'une spécialisation et d'un haut niveau de sophistication. Le niveau archéologique du site mésolithique tardif de Bouldnor Cliff montre une préservation d'une qualité exceptionnelle, qui a permis la récupération d'objets travaillés avec des méthodes qui disparaîtraient ensuite pendant 2 000 ans sur le territoire britannique. Par ailleurs, les influences culturelles et les analyses d'ADN suggèrent un réseau social s'étendant alors jusqu'aux limites des mondes néolithiques.

Mots-clés : Bouldnor Cliff, Mésolithique, Paléolithique supérieur, remontée du niveau de la mer, changements climatiques, peuplement humain, Europe.

DURING THE Pleistocene there have been repeated major climatic oscillations that influenced the movement of people, animals and plants. These phases saw sea level fall by over 120 m and average temperatures fluctuate dramatically resulting in the shifting of habitats and the redistribution of resources. Groups of early hunter-gatherers moved to exploit opportunities that became available as environments changed (Lambeck, 1995; Shennan et al., 2000; Lambeck and Chappell, 2001; Hubbard et al., 2009). When the sea dropped large areas of seabed became dry land that could be exploited (fig. 1). On average, during the last million years, sea levels were in the order of 40 m lower for over 90% of the time (Bailey, 2011). This made stretches of the southern North Sea and Channel dry enough for habitation and human dispersal between Britain and mainland Europe.

The earliest evidence of human movements across the two seas area dates back almost a million years (814,000-970,000 BP), and was found off the coast of eastern England at Happisburgh (Parfitt et al., 2005). Phases of occu-

pation in Britain continued throughout the Pleistocene in response to intermittent periods of climatic amelioration, reflecting the attraction of the northern hemisphere when conditions allowed (Cliquet et al., 2011; Momber, 2014; Stringer, 2006). The archaeological record left behind included worked stone tools recovered from caves and terrace deposits in many parts of the country (Bailey, 2011; Bates, 2003). The finds from open air contexts are generally associated with fluvial systems, many of which, including the Thames, the Solent River and the now obsolete Bytham River followed courses that led to the areas that now occupy the two seas. Acoustic and geophysical surveys seaward of this Bytham River in the North Sea show a network of river channels, plains, wetlands and estuaries within a palaeolandscape that would have exerted a positive and attractive force on prehistoric hunter-gatherers (Gaffney et al., 2007; Gupta et al., 2008; Tizzard, 2013). This extensive resource has great potential to harbour a well preserved archive of data that can contribute to our understanding of human dispersal and

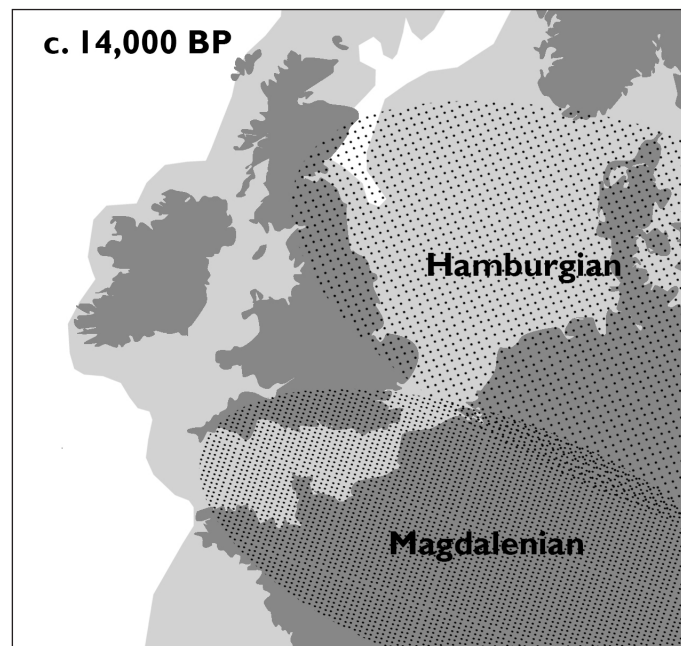


Fig. 1 –Map showing cultural distribution across northwest Europe that was well established by 14,000 BP. The dry land in the two seas area is indicated in light grey (image J. Noble-Shelly after G. Momber).

Fig. 1 – Carte illustrant la répartition des groupes culturels qui étaient bien établis dans le Nord-Ouest de l'Europe vers 14000 BP. Les zones exondées dans l'aire de la Manche et de la mer du Nord sont indiquées en gris clair (image J. Noble-Shelly d'après G. Momber).

colonisation. There has already been a wealth of finds recovered from the seabed. The discoveries off Fermanville, France (Cliquet et al., 2011) and in Area 240 off the east coast of England (Tizzard et al., 2011 and Tizzard, 2013) predate the Last Glacial Maximum (LGM) while the majority date to the Holocene (Cliquet et al., 2011; Glimmerveen et al., 2004 and 2006; Louwe Kooijmans, 1970-1971; Mol et al., 2006; Momber et al., 2009; Peeters and Momber, 2014). The unearthing of archaeological finds from the seabed complements studies into the recolonisation of North-West Europe following the Devensian glaciation (Arts, 1988; Coles 1998; Deeben 1988; Housley et al., 1997). The artefacts recovered to date have come from relatively few locations. With such sparse evidence it is easy to infer that population densities were small, and occupation was limited, however, the individual sites have proved to be very rich. Therefore, rather than suggest a small population, it could imply there was a relatively large amount of activity but the sites have yet to be found because they are deeply buried. Therefore, there could be many more well preserved sites remaining encapsulated within the palaeolandscape. Indirect evidence for extensive occupation in the submerged lands is provided when assessing the waves of common technological characteristics that have been found adjoining and traversing the Channel and North Sea zones.

CLIMATE CHANGE AND HUMAN DISPERSAL

The LGM peaked around 22,000 years ago and made occupation of Northern Europe untenable. The climatic warming that followed resulted in intermittent resurgences of people that were interrupted by cold ‘Heinrich events’ phases caused by rafting ice sheets moving away from the poles and changes in the ocean currents (Thiagarajan et al., 2014). These events caused dramatic environmental changes and unless they were able to adapt, it had the impact of slowing or curtailing the dispersal of cultures.

The initial ingress of Upper Palaeolithic people to venture near the two seas area appears to have occurred around 17,000 years ago. The climate had warmed sufficiently for Magdalenian hunter-gatherer occupation at Rozel in Normandy and Hallines in Pas-de-Calais (Fagnard, 1988), although caution is applied to these dates as they were acquired several decades ago and their accuracy has been questioned (Miller, 2012, p. 211). As climatic conditions improved between 16.5 and 14.67 ka BP, the archaeological record shows that more groups moved through France and towards the United Kingdom. The sea level rise was starting to accelerate following the end of the Ice Age but the two seas area was still dry making occupation possible. Indeed it is arguably probable that occupation did take place in the lands now flooded, being that sites are becoming more visible in the along the river systems of the Paris Basin, northern Rhineland and Belgium to

the east at this time (Miller, 2012). The earliest evidence that the channel was crossed comes from Kents Cavern in southern Britain where human remains have been dated to $14,275 \pm 120$ BP.

The British Windermere climatic upturn (otherwise known as the Bølling/Allerød interstadial) between 14.67 and 12.9 kyr showed a marked improvement in temperature and an increase in population densities, notwithstanding an interruption by the next ‘Older Dryas’ cold spell. This happened around 14.1 to 13.9 ka cal. BP, but despite the cold, a strong Magdalenian presence was maintained demonstrating that populations were prepared to adapt and survive when they could rather than move. The minor Older Dryas stadial was relatively short lived and when the warm conditions returned, over the next half millennium, a population expansion of Magdalenian sites was witnessed south of the loess belt and into Britain, notably at Sun Hole at Cheddar Gorge (Jacobi and Higham, 2011). Further north, a new culture is now identified (fig. 1). This is the Hamburgian which ranged from Northern France, the Netherlands, Northern Germany, Poland and as far west as Roberthill and Howburn in Scotland (Audouze and Enloe, 1991; Ballin et al., 2010; Rensink, 1995; Street, 1998). The Hamburgian, that are generally characterized as a subgroup of the Magdalenian, adapted to the colder environmental conditions north of the loess belt. By the end of the Windermere interstadial around 12.9 ka cal. BP additional groups included the Federmesser, the Epigravettian, the Azilian and the Creswellian (Barton et al., 2003; Bodu and Mevel, 2008; Jacobi, 1991; Stapert, 1985; here fig. 2).

Federmesser sites ranged from Britain to the Ukraine, and from northern France to Denmark. They have largely been found adjacent to rivers and lakes where a wide and varied spectrum of foodstuffs have been recorded at short-lived dwelling places whereby indicating high mobility and seasonal resource exploitation (Baales, 2004; De Bie and Caspar, 2000; Crombé et al., 2003 and 2013; Deeben, 1988). Of particular interest to this discussion are the sites in the Paris Basin and the complex in Western Belgium where commonalities in burin technologies suggest movement between the two and possibly beyond (De Bie and Caspar, 2000; De Bie and Van Gils, 2009). The marine shells recovered from the Belgian site of Bois Laiterie provide evidence for an active presence on the lands now lost below the two seas to the west (Miller, 2012, p. 220). At the time, sea levels were around 50–60 m lower than today (Lambeck and Chappell, 2001). In some cases this put the coastline hundreds of kilometres away and exposing large tracts of land that would have presented ideal lowland fluvial conditions for hunting and gathering.

The Azilian culture emanated from the Basque region and is a technology that is believed to be a derivation of the Late Magdalenian. The culture was wide ranging being found in the foothills of the Alps and in the Paris Basin where it superseded the Epigravettian, after which it persisted until the end of the Pleistocene. Creswellian technologies are also believed to be affiliated with the Late Magdalenian but this cultural complex appears

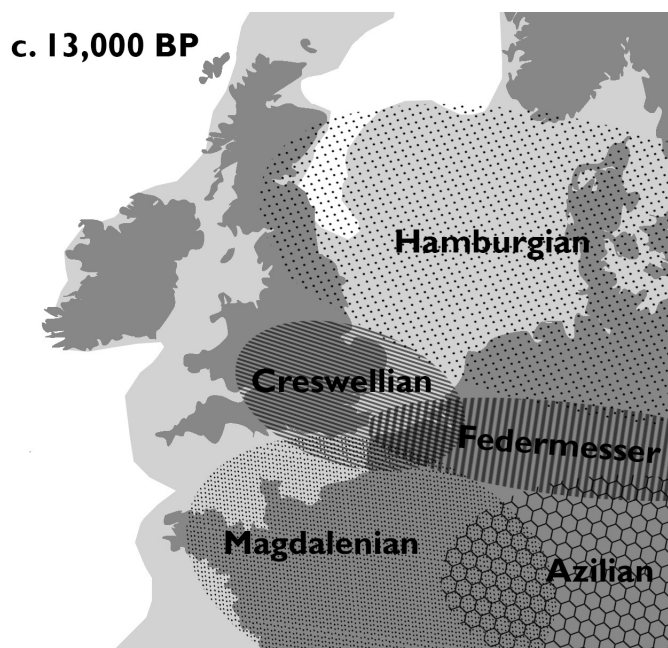


Fig. 2 – Map showing increased variations in cultural signatures towards the end of the relatively warm Windermere or Bølling/Allerød interstadial. Large areas of the two seas area are accessible for human occupation (image J. Noble-Shelly after G. Momber).

Fig. 2 – Carte illustrant les variations culturelles vers la fin de l'interstadial plutôt clément de Windermere ou Bølling/Allerød. De vastes zones dans l'aire de la Manche et de la mer du Nord étaient accessibles pour l'occupation humaine (image J. Noble-Shelly d'après G. Momber).

to have had a heartland in the centre of the North Sea (Peeters and Momber, 2014). The name is derived from the caves of Creswell Craggs in North East England but the technology has been identified further south in England, in the Netherlands and Belgium (Jacobi, 1991; Barton et al., 2003).

Around 13,000 years ago there was another short lived cool period that brought permafrost south of the loess belt once more. The curtailment of drainage systems resulted in the drying of rivers and lakes, and in Belgium this impacted on the Federmesser who relied on them (Crombé et al., 2013). The hunter-gatherer communities would have had to move further south or perhaps, towards the permafrost free areas in the lowlands of the two seas area, if they were to survive. The cold was followed by a final warm phase of the Windermere that pre-empted the Younger Dryas stadial. It lasted little more than a century before the deep climatic downturn heralded changes in subsistence strategies as forested areas in the north were replaced with tundra and human resource exploitation patterns were adapted to meet the new challenges and new opportunities. The growing expanses of open land enabled large herds of reindeer to move across the North European plain and when climatic conditions allowed, a mobile culture classed as the Ahrensburgian followed them (fig. 3). The Ahrensburgian ranged from north-east France, Belgium, The Netherlands, northern Germany and across the North Sea in Britain; where they are synonymous with the 'long-blade' tradition (Barton, 1998; Jöris and Thissen, 1997). Like the Federmesser groups that went

before them, the river valleys and lakes of mature river systems would have provided very favourable terrain for the mobile hunting strategies (Arts, 1988; Baales, 1999). These changing subsistence methods evolved through the transition from the Pleistocene to the Holocene and they were favoured by the Early Mesolithic.

THE ARRIVAL OF THE MESOLITHIC

The Holocene of Northern Europe began with a sharp rise in temperature around 11,450 cal. BP (Alley and Clark, 1999; Alley, 2000; Alley et al., 2003). For a final time, the temperate ecosystems moved back north revitalising the landscape and increasing the resource base. The improved living space in the lowlands lasted for thousands of years before the terrain was covered by advancing waters and the UK was separated from mainland Europe.

The first Mesolithic culture that arrived in north-west Europe as the Holocene took hold were the Maglemosian (fig. 4). Their presence has been recorded on both sides of the North Sea basin from Scotland to Poland (Bang-Anderson, 2003; Clark, 1936; David, 2009). The Maglemosian people spearheaded an ongoing influx of human migrants that did not need to rely on caves for shelter but could live in the open (Clark, 1954; Conneller, 2009a; Leakey, 1951; Rankine, 1953; Reynier, 2000). At this stage there was no shortage of space and the notion that the well-watered

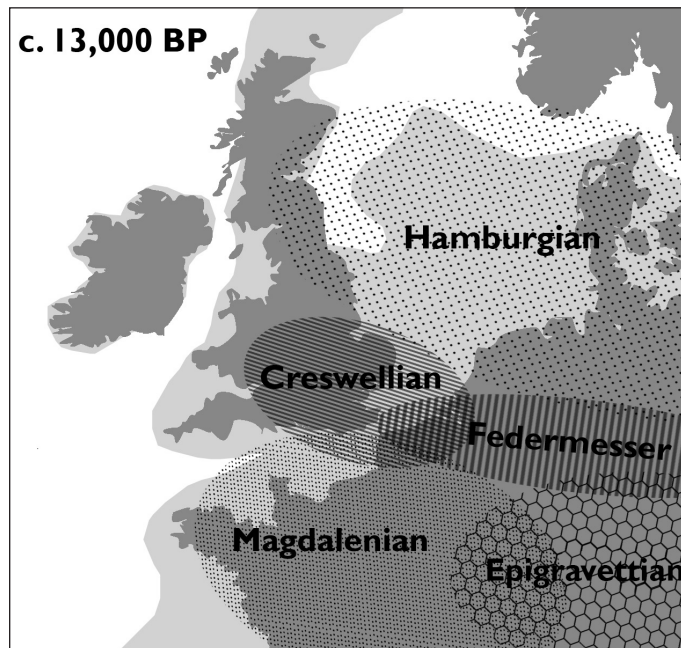


Fig. 3 – Immediately prior to the Younger Dryas cold phase, the Ahrensburgian culture dominated the lands across the north-west European loess belt and into the UK. During this period it is possible that the two seas area offered an exploitable refuge when the higher land was frozen and depleted of running water (image J. Noble-Shelly after G. Momber).

Fig. 3 – Précédant immédiatement la phase froide du Dryas récent, la culture de l’Ahrensbourgien dominait les territoires de la ceinture loessique dans le nord-ouest de l’Europe et jusqu’en Grande Bretagne. Il est possible que les deux zones maritimes offraient un refuge exploitable pendant cette période quand les terres plus élevées étaient couvertes de glace et privées d’eaux courantes (image J. Noble-Shelly, d’après G.Momber).

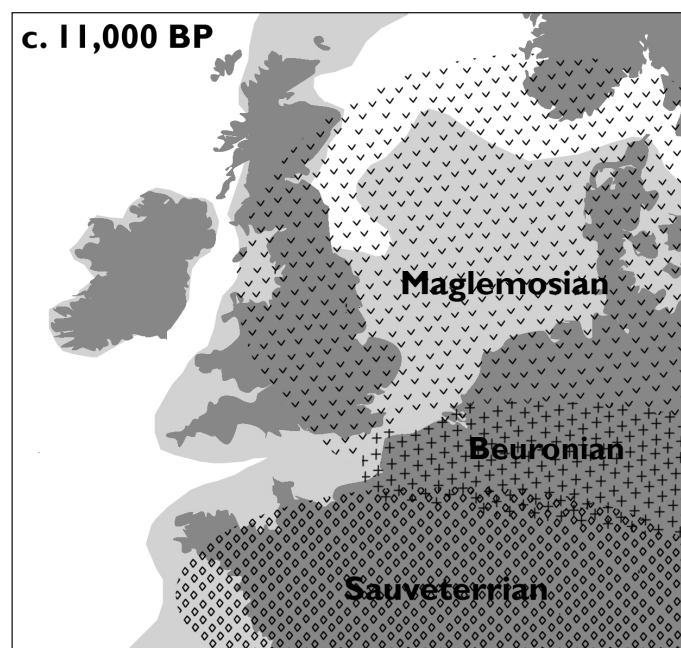


Fig. 4 –As the Younger Dryas came to an end, Mesolithic hunter gathers were quick to exert a presence in the areas previously occupied by the Upper Palaeolithic cultures (image J. Noble-Shelly after G. Momber).

Fig. 4 – À la fin du Dryas récent, les chasseurs-cueilleurs mésolithiques se sont installés rapidement dans les zones occupées auparavant par les cultures du Paléolithique supérieur (image J. Noble-Shelly d’après G. Momber).

plains of the North Sea basin formed a significant spring board to Britain is reinforced by discoveries of large Early Mesolithic sites like Starr Carr in Yorkshire c. 11,000 BP (Conneller et al., 2012). These were soon followed by the appearance of Mesolithic structures at East Barnes in East Lothian and Elgin, Aberdeenshire around 10,000 BP (Suddaby, 2007), and Howick, Northumbria around 9,800 BP (Waddington, 2007a and 2007b). The Mesolithic dwellings were constructed around a time when light, postglacial vegetation allowed relatively free movement between the UK and Europe.

As was evident with the cultural groups of the Upper Palaeolithic, Early Mesolithic, Maglemosian movement into and across the two seas area would have taken place. It is most probable that a corresponding influence of Sauveterrian technologies emanating from France, or the Beuronian, occupying the southern edge of the loess belt, would have extended into the Channel region during the first few thousand years of the Mesolithic (Valdeyron, 2008). This was the case with the Tardenoisien that superseded them and was dominant along the Channel coast of France and into Belgium from around 8,000 BP (Hinout, 1989a; Verhart, 2008). Evidence of elements associated with this culture can be found in various localities along eastern stretches of Britain and around the Greensands of south east England leading Clark to introduce the Middle Mesolithic classification (Clark, 1932). When Tardenoisien sites appeared in the British landscape the sea level was around 10–15 m lower (fig. 5). Coastlines were still many kilometres further offshore and large tracts of habitable land connected Britain with the mainland.

The Middle Mesolithic was relatively short lived being focused around the time that Britain became severed from mainland Europe by sea level rise. Following this time, until the arrival of the Neolithic, UK sites are dominated by the British Late Mesolithic tool kit.

The large structures built in the North of the UK during the early part of the Mesolithic are not so evident in the south of the country. This is most probably due to the earlier arrival of boreal forests that fragmented the landscape and would have removed the resources provided migrating herds. The dissection of this landscape by broad leaf woodlands and the progressive rise of the sea along deepening estuaries facilitated the increase of cultural divergent technologies and regional identities of the Late Mesolithic that were emerging in Britain, and the European mainland (Bell, 2007; Clark, 1936; Conneller, 2009b; Gumiński and Michniewicz, 2003; Jacobi, 1981; Lübke, 2009; Momber, 2011 and 2014; Schulting, 2009; Suddaby, 2007; Warren, 2007; Wickham-Jones, 2009).

EVIDENCE FROM THE SEABED

From the time the Magdalenian first reached the edges of the Channel through to the period when the Tardenoisien traversed the north European landmass, the two seas provided viable resources to exploit within fluvial and lacustrine environments. Knowledge of this lost world extends back over a hundred years when tree remains were frequently 'caught' in fishing nets or were

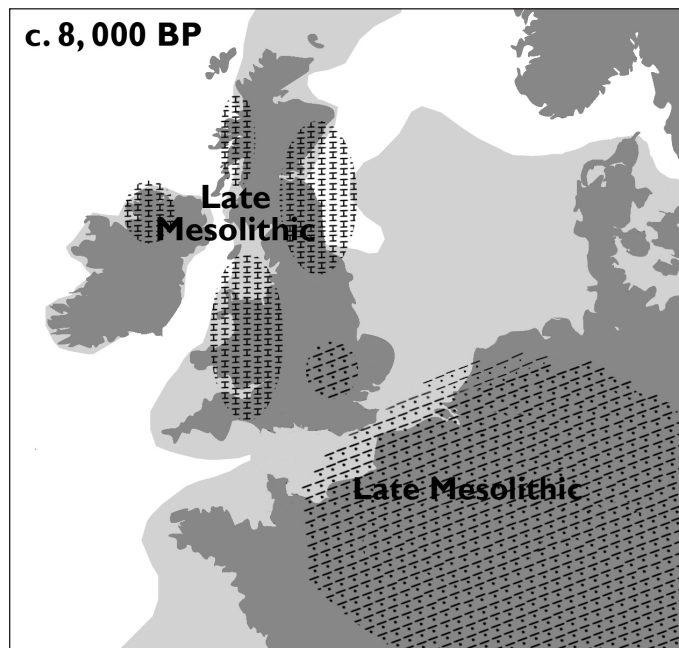


Fig. 5 – By 8,000 BP, the area of dry land between Great Britain and the continent was reducing quickly. However, common technological traits are seen across the two seas area (image J. Noble-Shelly after G. Momber).

Fig. 5 – Vers 8000 BP, la zone exondée entre la Grande Bretagne et le continent s'est rapidement réduite. Cependant, il est possible d'identifier des caractéristiques technologiques communes entre les deux zones maritimes (image J. Noble-Shelly d'après G. Momber).

observed along the British coasts at low tide (Bailey, 2004; Clark 1936; Flemming, 2004; Reid, 1913). These indicated the existence of submerged forests and they were referred to as 'Noah's Woods' by locals at the time. Submerged forests were not only known from the British coast, but also from the Netherlands (Peeters, 2007) and Baltic where a substantial number of sites have been located (Fischer, 2004; Lübke, 2009; Pedersen et al., 1997). Occasional finds of bone and antler implements of undisputable Mesolithic age were trawled-up from the sea floor, providing definite proof for a human presence in the palaeo-landscapes before they were drowned (Clark, 1936; Gaffney et al., 2009; Louwe Kooijmans, 1970–1971). One of the earliest finds was the 'Colinda point' on the Leman and Ower Banks in 1931 and dated to $11,740 \pm 150$ BP (Godwin and Godwin, 1933). Other finds have been made on the Brown Bank and Eurogeul area off the Dutch coast and there was a steady rise in the number of finds since the mid-1980s (Glimmerveen et al., 2004; Verhart, 1995 and 2004). However, the most instructive find occurrences currently known are 'De Stekels' near Brown Bank and Maasvlakte-Europoort off the Dutch coast, and Bouldnor Cliff in the Solent, Britain.

More than hundred artefacts and human remains have been trawled-up from the De Stekels area over the past two decades (Glimmerveen et al., 2004). The artefacts consist of lithics, bone and antler. Tools include perforated and socketed adzes along with mace heads. There is

a good state of preservation that suggests limited transport of objects since the exposure at the seafloor. The human remains comprise two lower jaws and several cranial fragments which may point to the presence of Mesolithic burials, and possibly a cemetery.

At Maasvlakte-Europoort, Rotterdam in the Netherlands, over 500 bone and antler implements, mainly harpoon points, were collected in the 1970–1980s (Glimmerveen et al., 2004; Verhart, 1995 and 2004). The exceptionally high number of harpoon points from Maasvlakte-Europoort has parallels at Star Carr, Britain, and Hohen Viecheln, Germany. Current investigations of Mesolithic finds from the Yangtze extension zone of the Rotterdam Harbour demonstrate the presence of an intact Late Glacial to Early Holocene sequence (Vos et al., 2010). In 2011, excavation uncovered several thousand flint and bone fragments. It is located on the side of a relict fluvial dune system that ran deep into the two seas landscape. It has since been covered by over 15 m of water. These sites in the southern North Sea not only highlight the potential for well-preserved discoveries but they also provide direct evidence of active populations using the waterways that are now drowned.

Bouldnor Cliff is another key site (Momber et al., 2011). This lies 11 m below British Ordnance Datum, off the northwest coast of the Isle of Wight (fig. 6, fig. 7, and fig. 8). Excavations here have been minimal, yet the discoveries have been very tantalising pointing to high

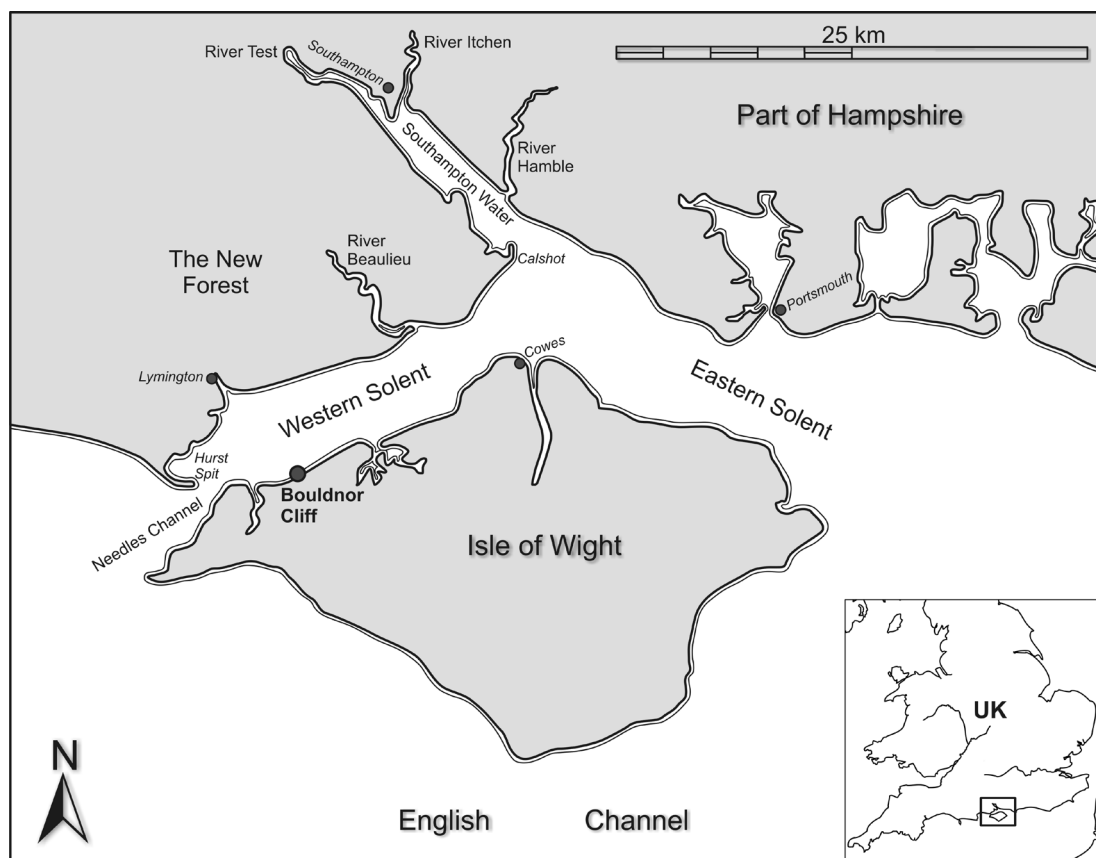


Fig. 6 – Map showing the location of the Solent and Bouldnor Cliff (image J. Whitewright after G. Momber).

Fig. 6 – Localisation sur la carte du Solent et du site de Bouldnor Cliff (image J. Whitewright d'après G. Momber).



Fig. 7 – Garry Momber, Maritime Archaeology Trust, with flints recovered from the sea floor after eroding from the submerged 8,000 year old Bouldnor Cliff site (photo courtesy Michael Pitts).

Fig. 7 – Garry Momber, Maritime Archaeology Trust, avec des silex recoltés sur le fond de mer érodé provenant du site submergé de Bouldnor Cliff daté d'il y a 8 000 ans (cliché courtoisie de M. Pitts).

levels of sophistication and links with the continent. Of the retouched tools recovered and analysed in 2003, one was an obliquely blunted blade that was not dissimilar to the Azilian category of truncated pieces (*pièces tronquées*) as recorded from sites in the Paris basin (Tomalin, 2011). The same form of blade is also found at the Powell site at Hengistbury Head (Barton, 1992, p. 229). By contrast, a detached cutting tip of a bifacially prepared flint axe blade has been carefully formed with shallow skimming flakes. The regular blade edge has a weak S-shaped profile and it appears that the cross-section of the axe was a shallow regular ellipse. ‘The care and symmetry displayed in this work is usually associated with Neolithic craftsmanship. The occurrence in a Mesolithic context is certainly unusual but perhaps not without continental analogy’ (Tomalin, 2011).

Evidence for the use of tranchet axes was provided by flakes that had been detached during axe sharpening. Confirmation of their more widespread use has been provided by the many flint picks and axes that have been dragged up from the Solent during oyster fishing over the past few decades. These tools were used to manage and fashion timber and are abundant in the Maglemosian culture to the north while there is also evidence of their use south of the Channel. The abundance of these tools in

the Solent compares favourably with sites from northern France. Pick production is to be found on the Lower Seine at the Mesolithic site at Acquiny (Eure) in a context dated 8460 ± 170 BP, while comparisons can also be drawn with the pics à crosse which are present in Middle Sauveterrian contexts such as that at Grotte de Larchant, south of the Seine (Hinout, 1989a). After the opening of the Atlantic Period around 7500 BP picks can also be detected in the valley gravels of the Final Tardenoisian site of La Ferme de Chinchy at Villeneuve-sur-Fère in the Aisne department (Hinout, 1989b), at the Montmorencian sites of the Montmorency Forest in the Oise valley (Guyot, 1998), and within the L’Organais assemblage at Sainte-Reine-de-Bretagne (Kayser, 1989).

Studies of the lithic assemblage from Bouldnor Cliff to date suggest a range of influences from the European continent and the same is true of the organic material that was also preserved. The site has yielded some thirty-five pieces of worked wood and the number is growing as more pieces are rescued from the submerged archaeological horizon that is eroding out. The timbers contain some enigmatic workings and cuts of which there are no comparisons in the UK and the most significant timbers are those that have been fashioned by tangential splitting (fig. 9 and fig. 10). One particular piece that dated



Fig. 8 – A selection of flakes and bladelets recovered from the seabed at the Bouldnor Cliff site (photo G. Momber).
Fig. 8 – Une sélection d'éclats et de lamelles retrouvés sur le fond de mer sur le site de Bouldnor Cliff (cliché G. Momber)

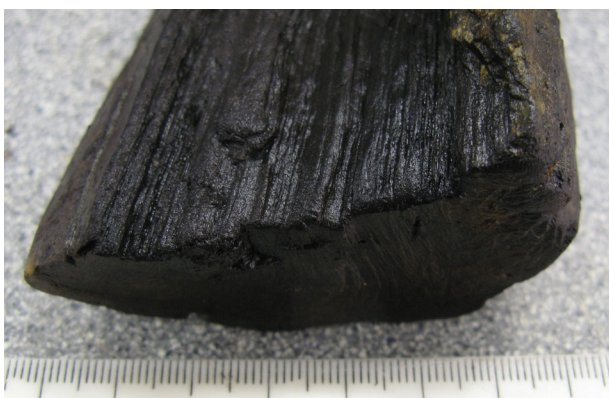


Fig. 9 – Tangentially split round wood; scale in centimetres (photo S. Rich).
Fig. 9 – Rondin en bois fendu de manière tangentielle; échelle en centimetres (cliché S. Rich).

to 8190–7950 cal. BP (BETA-249735), measured 0.94 m long and 0.41 m wide. It represents a fraction of a much larger timber that was converted from the trunk of a tall slow grown oak that would have been a couple of metres wide and in the order of several tens of metres high (Taylor, 2011). The surviving piece has suffered degradation in a fresh water environment contemporary with its deposition while recent exposure has resulted in the wholesale loss of most of the original structure to marine erosion (fig. 11). Alongside the timber, archaeological evidence includes wood chippings, charcoal, carbonized wood, stockpiles of heated flints, and fragments of string made out of vegetable fibres. The material remains demonstrate wood was being worked on the site where timber was being hollowed out most probably to construct a log boat. If this is the case, it would make it the oldest boat building site in the world but the wood



Fig. 10 – Split and cut timber from the archaeological assemblage (photo G. Momber).

Fig. 10 – Bois de construction fendus et coupés provenant de l'ensemble archéologique (cliché G. Momber).

working technology used to split the oak tangentially is even more remarkable. This is something that is not seen again in the UK until the Neolithic, over 2,000 years later, when it is used for Haddenham Long barrow c. 5600 BP (Evans and Hodder, 2006, p. 185–87). Moving further back in time, however, when the sea was lower, larger expanses of land remained dry and Early Mesolithic cultural signatures were more directly linked to their European counterparts (as previously discussed), there is also evidence of sophisticated timber management. At Star Carr, c. 11,000 cal. BP, aspen/willow branches were split and laid on peat to make a platform with one of the pieces of timber being split twice to form a plank (Conneller et al., 2012).

A further discovery at Bouldnor Cliff has been the extraction of sedimentary ancient DNA (sedaDNA). The process of recording DNA from submerged sediments had never been conducted before but it proved successful when tested on sediments from Bouldnor Cliff. The samples came from an archaeological horizon within a relic fluvial sand-dune context that was capped by peat deposits which formed above them as sea level rose (Allaby et al., 2015; Momber et al., 2011). Evidence of *Canis* (either dog or wolf), *Bos* (believed to be aurochs), deer, members of the grouse family, rodents and wheat (einkorn) was recorded. The faunal assemblage is to be expected but the presence of wheat is not. The find demonstrates there was farmed wheat, that emanated from the Middle East, at a

UK site 2,000 years before previously recorded. The lack of other examples within British palaeosols and the high concentration of sedaDNA in the particular area investigated indicates it was a discrete sample rather than cultivation. Viewed from continental Europe, however, the difference in dates is not so extreme. The Neolithic Cardinal culture is first seen to travel from the Mediterranean into Western France around 7600–7400 BP (Tresset and Vigne, 2007) with Neolithic practices recorded in western France around 7400 cal. BP (Marchand, 2007) while farming is evident in the Rhine/Maas delta region around 7300 BP (Louwe Kooijmans, 2007). Human dispersal was focused along inland waterways and coastlines at this time. It is therefore not inconceivable that goods and influences reached the Isle of Wight from Western France or the Lower Rhine basin with the aid of watercraft along coastlines and via the estuary at the western end of the 'proto channel'.

DISCUSSION

The arctic conditions during the Devensian glaciation pushed human populations into southern European refugia. The retreat of the ice sheets and moderate climatic amelioration that followed saw gradual re-colonisation as hunter gatherer groups cautiously venturing north-



Fig. 11 –Part of the timber assemblage from Bouldnor Cliff. The tangentially split timber is the large flat piece in the centre left (photo G. Momber).

Fig. 11 – Une partie des bois de construction du site de Bouldnor Cliff. Le bois fendu de manière tangentielle est la grande planche au centre à gauche (cliché G. Momber).

west. As the Bølling/Windermere warm phase took hold around 14,500 years ago the numbers of people increased in northern France and incursions into and across the two seas were probable. Despite the climate downturn of the Older Dryas, which did not impact Britain to the same extent that it did in the north of continental Europe, occupation in the region continued. The return of the warmer Allerød period saw new, mobile cultures quickly transgress the north European plain and the two seas area. This swift response to improving conditions infers that people did not retreat too far to the south during these periods and it remains a possibility that dry areas of the two seas continental shelf presented a northerly refugium. A similar pattern followed the Younger Dryas interstadial, and the distribution of Creswellian sites on both sides of the North sea supports the notion that a techno-complex could have been centred in the drowned lands between them (Peeters and Momber, 2014).

The archaeological evidence shows the Upper Palaeolithic and Mesolithic cultural networks were extensive during the colder tundra and boreal climate prior to and following the Younger Dryas. The wide ranging cultural footprint left by the Hamburgian, Ferdermesser, Ahrensburgian, Maglemosian and Creswellian demonstrate connections from Scotland to the edges of Russia and from England to Northern France. Through time, increasing forestation, rising waters and multiplying hunter gatherer groups would have created boundaries that compromised extensive migrations of animals and humans. This would have influenced the changing

technologies and effected subsistence strategies but the growing population upheld opportunities for far reaching social connectivity. The impact on human dispersal and subsistence strategies that resulted from these changes in the two seas area is far from being resolved. A great deal more needs to be learnt about the impact of environmental changes and the cultural distribution in the two seas region. The recent palaeo-environmental, sedaDNA and archaeological discoveries, however, are helping to identify the potential of the drowned paleo-land surfaces to provide sorely needed information.

The new discoveries should be viewed against a backdrop where the relative archaeological importance of the submerged landscapes has been questioned for many decades. This was compounded by a longstanding belief that surface deposits would have been destroyed when sea levels rose. However, analysis of the geophysical survey data from the North Sea and Channel have countered this by showing that large cohesive landscapes do remain below a covering of Holocene sediment (Gaffney et al., 2009; Gupta et al., 2008). In addition, the limited areas of submerged terrestrial deposits that have been investigated, being Yangtze Harbour and Bouldnor Cliff as well as discoveries from areas such as Browns Bank, show there were significant areas of activity; and they do survive. The large assemblage of harpoons from the Maasvlakte-Europoort off Rotterdam show that these Mesolithic people were exploiting marine resources and were well adapted to take advantage of the coastal or estuarine environment. The discoveries at Bouldnor Cliff

reveal levels of technology that were superior to anything discovered on the contemporary uplands of Britain at that time. This could be because there is not any comparable material that has survived from that period or it could suggest greater human adaptation in response to acute environmental changes in the lowland areas. These modifications to their surroundings would have necessitated the development or use of new and varied technologies. Some of these adaptations would have been local while others would have been learnt through contact with other groups. The range of tool types in the Bouldnor Cliff collection suggests influences from different cultures although the current assemblage is rather too limited to define definitive links. However, the recovery of einkorn sedaDNA from an 8,000 year old Bouldnor Cliff context indicates Neolithic influences and demonstrates an extensive communication network. This find is enigmatic and unexpected as corn is not grown in Britain for another 2,000 years.

CONCLUSION

This paper provides a backdrop to human dispersal around the two seas area at the end of the Pleistocene and into the Holocene. Common cultural traits with large geographical distributions are associated with the Magdalenian, Hamburgian Federmesser, Azilian Creswellian, Ahrensburgian, Sauveterrian, Maglemosian and Tardenoisien. All of these technologies have been found adjoining or traversing the Channel and North Sea zones. This appears to have changed in the Late Mesolithic as the postglacial landscapes becomes sub-sectioned by rising sea level and increased deciduous forestation. The impact caused cultural idiosyncrasies to diversify in the archaeological record as hunter-gatherers adapted. The new discoveries suggest that adaptation resulted in an increase to the complexity of social behaviour. However, this area of research is still in its early stages. The two seas area played a geographically central role for many of the cultures and retains well preserved sequences of deposits that can be interrogated. These have been beyond our reach and beyond national research agendas until recent times.

Conclusions relating to the whole of the two seas area are invariably limited as only a very small section of the drowned terrestrial deposits have been investigated, yet research has shown that extensive fluvial systems remain

buried below Holocene sediments. In addition, the archaeological evidence from the submerged landscapes demonstrates that the region was occupied and exploited. The material recovered includes well preserved organic material that can cast light on the Mesolithic lifestyle in a way that very few terrestrial sites can. The assemblage from the Late Mesolithic site at Bouldnor Cliff has revealed a technological ability that predates material from mainland Britain by 2,000 years and has influences from diverse cultures, notably from northern France and continental Europe. The submerged sediments have also preserved sedaDNA which contained samples of einkorn indicating far reaching social networks that enabled corn to be transported from Neolithic populations thousands of years before it was grown in the UK.

The case studies presented highlight the value of the submerged resources to provide archaeological evidence in support of studies that previously referred to the drowned lands as little more than a bridge between modern nations. This has been unfortunate but as technology develops so too does the opportunity to sample and analyse material from a time when a common European heritage transcended borders. The prehistoric archaeology that remains below our continental seas is international in its origins and should be researched on an international scale. Underwater work in the two seas area is in its infancy yet the results have demonstrated how important these drowned landscapes are to our understanding of human dispersal and adaptability at a time when the Europe was taking shape.

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