

Underwater landscapes: unrecognized cultural heritage and research resource

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Maritime archaeologists have until recently focused on the excavation of sites on land, but advances in underwater techniques of survey and excavation now allow direct investigation of submerged sites and even landscapes, where preservation, especially of organic remains, is often better than in land sites. The potential importance of underwater archaeology is demonstrated by recent research on submerged Mesolithic sites in Denmark.



Figure 1 Denmark, showing the location of Mesolithic sites mentioned in the text.

Why investigate prehistoric landscapes under water, when they can be studied more easily and cheaply on dry land? Is the greater expense and difficulty of working under water justified by the information that submerged sites can provide about early cultural developments? Or should one, as some maritime archaeologists do, exclude from maritime archaeology submerged landscapes and focus on seafaring and the maritime culture related to it? This was a central theme discussed by Danish maritime archaeologists in the 1980s and early 1990s. The finds from an underwater excavation (begun in 1976) of a Late Mesolithic shell midden at the site of Møllegaet I, and those from a water-deposited layer of waste at Tybrind Vig (Fig. 1), excavated two years later, had demonstrated that organic materials were excellently preserved at some submerged Mesolithic sites. For example, boats, wooden stakes, axe handles and bows, textiles, bones and plant remains were found preserved under water as well as, or even better than, those found in peat bogs (before preservation conditions in most peat basins were ruined by the introduction of efficient land drainage after the Second World War).

The question was: how much more information could we get out of submerged sites compared with those on land? Møllegaet I and Tybrind Vig had provided detailed information about what Late Mesolithic people ate, how they located their settlements to exploit natural resources effectively, and what their tools and ornaments looked like. The excavations also added some new facets to our knowledge, for example concerning textiles and burials. But was that sufficient to justify the higher excavation expenses involved? Was the potential of underwater archaeology so great that it could add whole new dimensions to our understanding of the Stone Age and thus justify significant investments of time and money?

In this article I briefly describe two examples to support the point of view that studies of landscapes and settlements can with advantage be carried out under water, provided that the areas and periods to be

investigated are carefully chosen. However, it is important also to be aware that not all areas under water have sufficient archaeological potential to justify detailed study.

Submerged Mesolithic settlements

The excavation of Mesolithic dwellings with floors of bark and branches began in peat bogs in southern Scandinavia and northern Germany early in the twentieth century, for example the Ulkestrup I dwelling in Denmark (Fig. 2).¹ These excavations culminated in the first half of the century and declined significantly after the Second World War, when the peat bogs lost their importance as fuel reservoirs, and their basins were drained to increase agricultural production. During this process many important sites were reduced to no more than stone scatters.

Because sea level in much of southern Scandinavia had risen by 30–40 m during the Mesolithic and Neolithic periods, it was logical to think that modern excavation methods and investigation strategies would be most productive if they were applied to well preserved settlements from these periods in former land areas now submerged. In the 1980s and early 1990s it was generally assumed that, as sea level rose, wave action would have erased all *in situ* features of these settlements. But many locations existed on the coasts of that time which were attractive for human settlement precisely because they offered protection against the destructive action of waves. Furthermore, freshwater basins that were submerged relatively late appeared also to have potentially good archaeological preservation.

These expectations began to be realized in 1987 when the Langelands Museum at Møllegaet succeeded in locating, on the 4.5 m terrace below the Møllegaet I shell midden, a deeper and older settlement phase, Møllegaet II, which dated to about 5000 BC during the earliest period of the Ertebølle Culture. Flint tools and waste material (debitage) that appeared to be freshly worked were found 20–30 cm below the surface of the terrace, indicating the existence of a well preserved settlement. Two so-called ape skeletons of human size (actually Mesolithic burials), which had

been found in the 1920s during dredging at exactly this location, gave a hint of what would be discovered during the excavations that took place from 1990 to 1993.

In 1990–91 a Mesolithic dugout canoe (made from the trunk of a lime tree, *Tilia* sp.) was excavated in a concentration of wooden stakes, deer antlers, flint axes, a few human bones, a large sheet of birch bark, one end of a hunting bow, a small bow (perhaps for a drill) and the prongs of an eel spear (Figs 3, 4). The human bones included a skull fragment and a sacrum (part of the pelvis) that were concentrated in and immediately around the remains of the dugout and appeared to represent the right side of a young male. The larger stones in the eastern part of the excavated area seem to have been deliberately arranged, as were two zones with thinner stakes thrust into the ground (indicated by ovals marked by dashed lines in Fig. 3).² The canoe was dated to 4800 BC, and its discovery supports the implication of the human bones found in the 1920s that there was a Mesolithic burial place on the site.

In 1992–93 the extremely well preserved remains of a Mesolithic dwelling, dated to 5100 BC, were excavated a few metres north of the dugout. The dwelling had been constructed in a pit, 20 cm deep and 5 × 3 m in extent, scooped out of underlying layers of sediments. An earth-built platform was found in the northern half of the structure, covered by pieces of bark and in some parts a layer of twigs. In the westernmost part of the platform we found what appears to be the remains of the front of a platform consisting of thin split-hazel branches. The lower parts of four stakes, assumed to be wall supports, were found along the edge of the dwelling pit, as well as two internal stakes possibly related to two internal hearths. Nuts, fruit stones, and bones of fish, birds and mammals (mainly wild boar and red deer), as well as organic artefacts, were preserved inside the dwelling (Figs 5, 6). The distributions of these finds and the stone tools and debitage, which included over a hundred



Figure 2 The south corner of the floor of the Mesolithic (Maglemose Culture) Ulkestrup I dwelling, Zealand, eastern Denmark. The floor consisted of bark and bundles of branches with large quantities of flint tools and debitage on it and two hearths. It was excavated in a peat bog in 1947 and dates to the seventh millennium BC.

arrow points, showed that two parts of the platform had been kept clean. These are interpreted as two sleeping areas. Flint knapping had been carried out inside the

dwelling in two areas on the floor below the platform, where the arrowpoints were significantly concentrated. The symmetry of the whole interior of the dwelling sug-

gests that it had housed two families.³

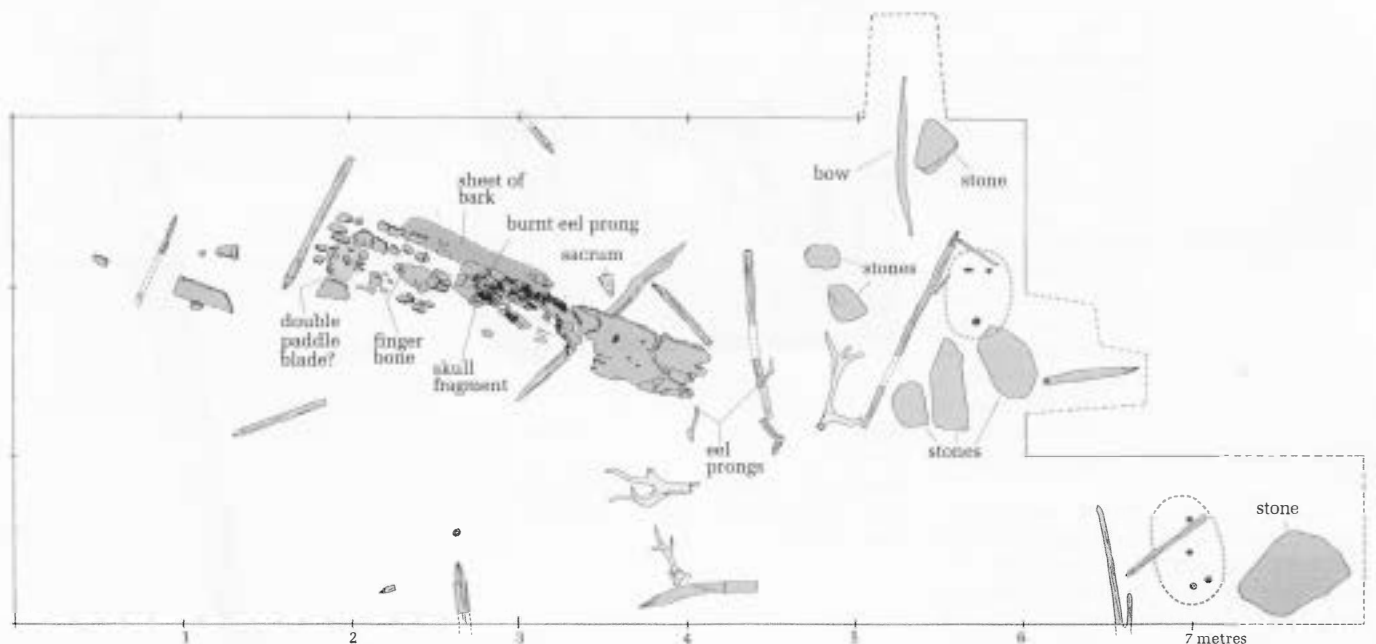


Figure 3 Plan of the Møllegaet II structure excavated under water in 1990–91 and interpreted as a Mesolithic burial in a dugout canoe that was probably originally placed above the ground on stakes.

Submerged and preserved cultural landscapes

It is probable that a major reason for the excellent preservation of the Møllegabet II dwelling is that, at about 5000 BC, sea level was rising at a rate of several metres per century in the region of what are now the central Danish waters between Jutland and Zealand (see Fig. 1). This would have reduced the impact of destructive wave action on the beach where the dwelling was located.

Another consequence of the rapid rise of sea level is that the trees that fell because of drowned root systems were covered by salt water before they could decay. Tree stumps are preserved under water over large areas and it is not unusual to find the trunks lying beside them. We therefore decided to start collecting samples for dendrochronological dating⁴ from the fallen oak trunks in the area east of the Møllegabet site. The largest trunk we took up was 16 m long, with a base diameter of 60 cm, and the dendrochronological dates as a whole from this area showed a significant concentration at about 5000 BC.

To be able to survey for Mesolithic (and Neolithic) sites in such submerged cultural landscapes, the development of seismic techniques was necessary to locate them. Langelands Museum, and later the Research Centre for Maritime Archaeology in Roskilde, obtained promising results with sub-bottom profilers – acoustic high-resolution systems – that can be used to discern what is below the surface of the submerged landscape. At the Late Mesolithic site of Blak II in the Roskilde Fjord (see Fig. 1), where Søren Sørensen had excavated parts of the submerged cultural layer to a depth of 1.5 m, it was possible to trace the continuation of this well documented layer outside the excavated area.⁵

Similar preservation of cultural landscapes submerged in other parts of the Baltic, as well as in other marine and lacustrine areas, is increasingly being reported. However, such well preserved cultural landscapes are mainly found in areas sheltered from wave action, as well as where sea level rose particularly rapidly in the early postglacial period. A priority for future underwater research is to map systematically where such landscapes are preserved and to determine which phases of sea-level rise are most relevant to their discovery. Without adequate information about the dimensions of the problem, it will be difficult to argue for the need to develop a strategy for protecting this very valuable underwater archaeological resource.

The intriguing possibility exists that we can learn more about the lives of our early prehistoric ancestors by investigating the submerged remains of their settlements and cultural landscapes than will ever be possible from such areas of prehistoric settlement as have been preserved on dry land. There is therefore an urgent need to



Figure 4 Wooden artefacts found in the burial area at Møllegabet II: (a) prongs of an eel spear, (b) a miniature bow made from a branch of red cornel (dogwood) (*Thelycrania sanguinea*), perhaps used as a drill for boring holes or making fire.

develop methods that will allow us to carry out systematic investigations under water to uncover the full archaeological potential of submerged preserved landscapes.

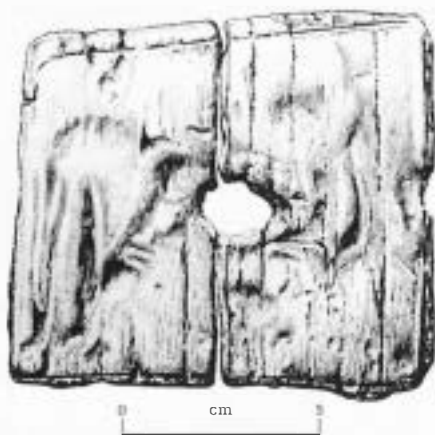
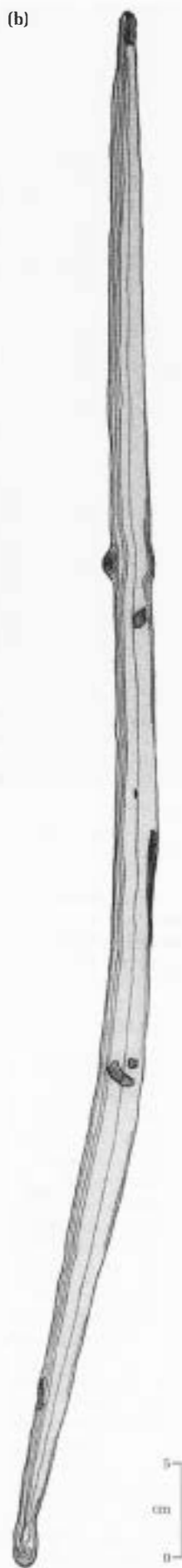


Figure 5 A worked sheet of elm bark found in the remains of the dwelling at Møllegabet II; the square shape and carefully cut hole in the centre suggest that it was a float for a fishing line.



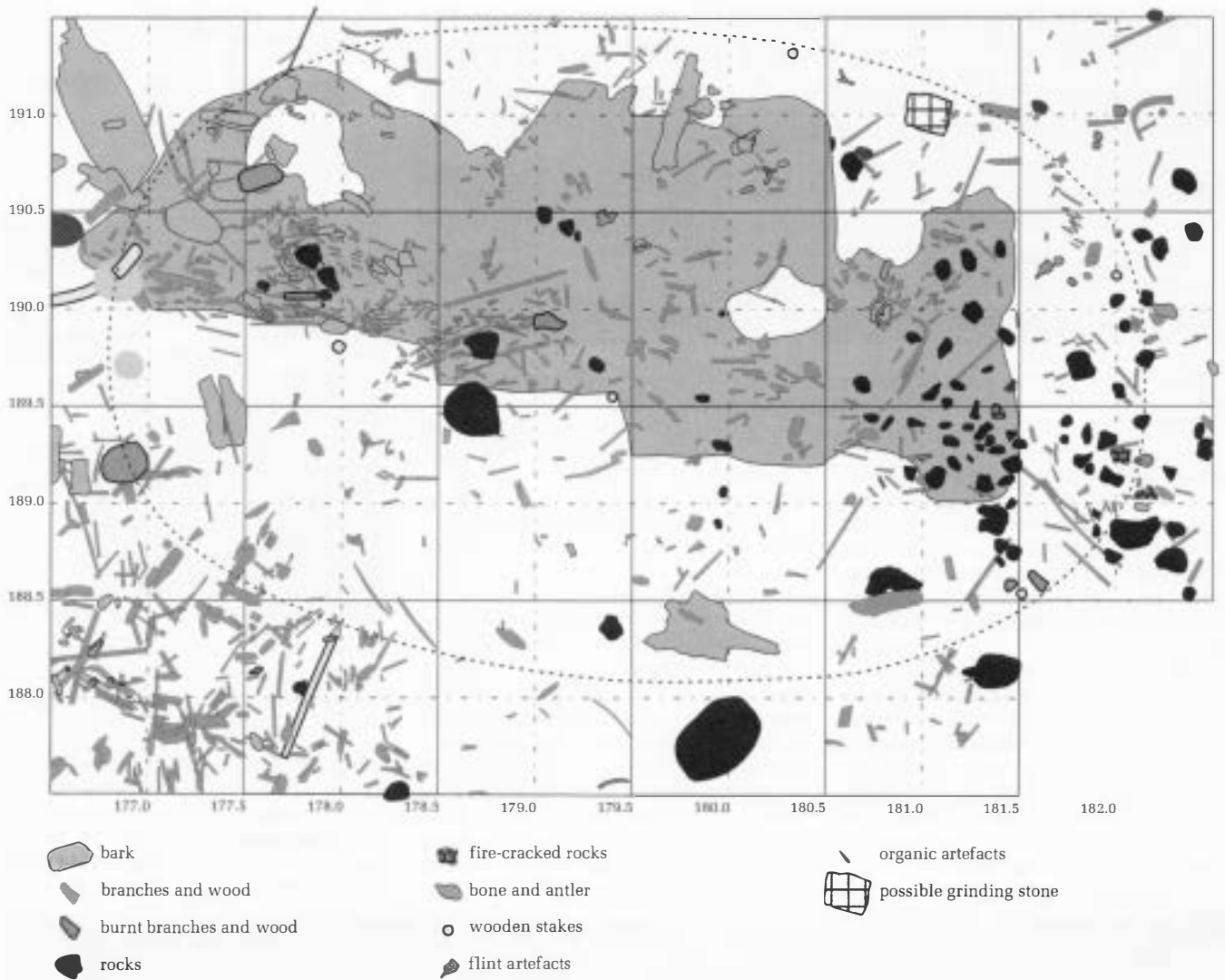


Figure 6 Plan of the Mesolithic dwelling at Mollegabet II excavated under water in 1992–93, showing the outline of the dwelling pit (dotted line) and the distribution of flint and wooden artefacts and other objects (coordinates in metres).

Notes

1. K. Andersen, S. Jørgensen J. Richter, *Maglemose hytterne ved Ulkestrup Lyng* (Copenhagen: Det Kongelige Nordiske Oldskriftselskab, 1982).
2. O. Grøn & J. Skaarup, "A submerged Mesolithic site and a "boat burial" from Ærø", *Journal of Danish Archaeology* 10, 38–50, 1992.
3. For fuller accounts of the excavations at and interpretation of this site, see O. Grøn, *The Maglemose Culture: the reconstruction of the social organization of a Mesolithic culture in northern Europe* (Oxford: British Archaeological Reports, International Series 616, 1995); "Mesolithic dwelling places in south Scandinavia: their definitions and social interpretation", *Antiquity* 77, 685–708, 2003; and J. Skaarup & O. Grøn, *Mollegabet II. A submerged Mesolithic settlement in southern Denmark* (Oxford: Archaeopress, British Archaeological Reports, International Series 1328, 2004).
4. Dendrochronology is based on the analysis of the annual growth rings of long-lived trees and ancient preserved timbers, and is a particularly valuable dating technique because it can provide precise dates in

- calendar years. For a brief explanation of the technique, with historical examples from England, see the article by Martin Bridge on pp. 17–20 of *Archaeology International* 2000/2001.
5. See pp. 17 and 20 in S. Sørensen, *Kongemosekulturen i Sydskandinaviens* (Copenhagen: Egnsmuseet Faergedaarden, 1996).