

Møllegabet II –

A Submerged Mesolithic Site and a “Boat Burial” from Ærø

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TOPOGRAPHY AND HISTORICAL DATA

What is today an open bay between the two north and north-west oriented headlands, Ommelshoved and Urehoved, was at the time of habitation a protected inlet, oriented SE-NW and measuring 2 by 3 km, with its narrow mouth pointing to the north (fig. 1). This situation was due to a contemporary water level which lay 4–4.5 m below that of today.

The deep, narrow run connecting salt and brackish water was surrounded by good hunting and gathering grounds and not surprisingly this resource-strategically optimal zone was subject to intense habitation in the later Mesolithic. Langelands Museum’s systematic surveys have revealed several sites here.

Finds of large amounts of preserved organic material on the eastern side of the run “Møllegabet”, focused attention on a small west-oriented prominence. The material derived partly from the Late Ertebølle kitchenmidden, Møllegabet I and its nearby 1 m thick gyttja layer, which was deposited when the water level lay approximately 2.5 m below that of today, and partly from the Late Kongemose/Early Ertebølle settlement and waste zone, Møllegabet II and its adjacent 2 m thick gyttja layers, which were laid down when the water level lay approximately 4.5 m below today’s zero.

The excavation of Møllegabet I took place in the period 1976–1980 under the direction of Jørgen Skaarup, Langelands Museum, as the first systematic excavation of a submerged Stone Age settlement in Scandinavia (Skaarup 1980).

Møllegabet II – the subject of this paper – revealed itself at an early stage but unfortunately went unnoticed by the archaeological authorities. As the dredger “Dra-gen” in the early 20’s was removing the westernmost point of the prominence to straighten out the approaches to Ærøskøbing, the crew observed “two intact ape skeletons” appear with the material from the bottom. With our

present knowledge of the locality, there can be little doubt that these “apes” were Mesolithic human skeletons from destroyed graves. The campaigns of later years have yielded fragmented human bones where the bottom was dredged down to the underlying clay.

In 1987 the sighting at the locality of fresh flint, faunal remains and human bones recently washed out of the gyttja, prompted a new series of investigations in this “lower” coastal zone under the direction of the authors.

In 1988 information about the character of the site and heavy damage to the layers caused by the passage of the Ærøskøbing-Svendborg ferry in the run, was collected through systematic survey. In collaboration with Professor Jens Tyge Møller, The Laboratory of Geomorphology, University of Aarhus, seismic profiling of the soft sediments was attempted with a 33 and 270 kHz sediment echo-sounder. However, in most places a layer of sand covering the deposits prevented the penetration necessary for obtaining more detailed information about the sediments.

A return to the site in 1990 was intended as a campaign of settlement excavation, but already on the first day it changed to the rescue excavation of a dug-out canoe – the boat grave – exposed by erosion of the gyttja (Skaarup & Grøn 1991). The remains of the boat and a few square meters around it were excavated, and two E-W profiles were investigated by coring.

Excavation of a further 20 m² around the boat was carried out in 1991. Due to extremely bad weather, the excavation progressed slowly, and a trench intended as a section through possible preserved settlement layers did not reach the area of interest.

The excavation of the gyttja around the boat was carried out in 3 by 3 metre units with injectors mounted with 6 mm meshes on the discharge tubes. Attempts were made to register wood, bone, antler and tools three-dimensionally. Waste flint, seeds and nuts were related to the 3 by 3 metre units.

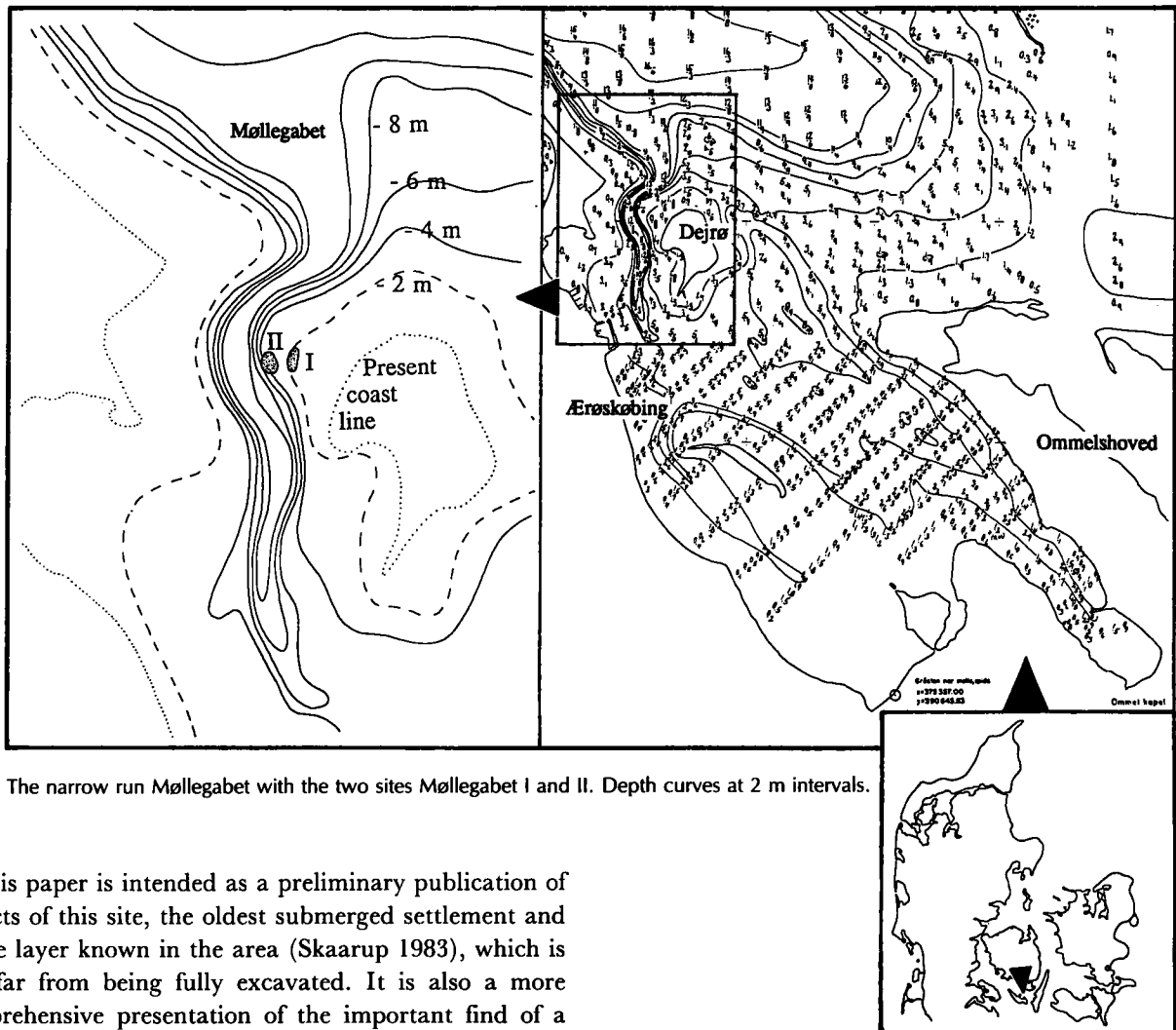


Fig. 1. The narrow run Møllegabet with the two sites Møllegabet I and II. Depth curves at 2 m intervals.

This paper is intended as a preliminary publication of aspects of this site, the oldest submerged settlement and refuse layer known in the area (Skaarup 1983), which is still far from being fully excavated. It is also a more comprehensive presentation of the important find of a presumed human burial in a dug-out canoe, which took place either in the marshy coastal zone or in shallow water outside the settlement area.

THE GEOLOGICAL SITUATION

The profiles

To get an impression of the geological situation, cores were taken along a 30 m long E-W-oriented profile a few meters to the south of the boat (fig. 2).

The whole area is covered by a layer of redeposited sand containing various kinds of cultural remains, shells and small organic particles deriving from the gyttja. Generally this layer is 20 cm thick, but to the west, close to the

deep run, it's thickness increases rather suddenly to 1.5 m.

In the higher part to the east, a layer of clayey grey sand containing many small stones was observed under the redeposited sand. This layer may possibly represent the remains of a settlement surface.

The gyttja layer starts approximately 10 m from the profile's eastern end, and assumes a thickness of 2 m, 10 m from it's western end. It seems to proceed with this thickness further to the west. Here the redeposited sand was too thick to penetrate with the borer.

The underlying substrate in the area consists of blue clay.

A more northerly 35 m long, E-W-oriented section, following the central line of the prominence, showed an

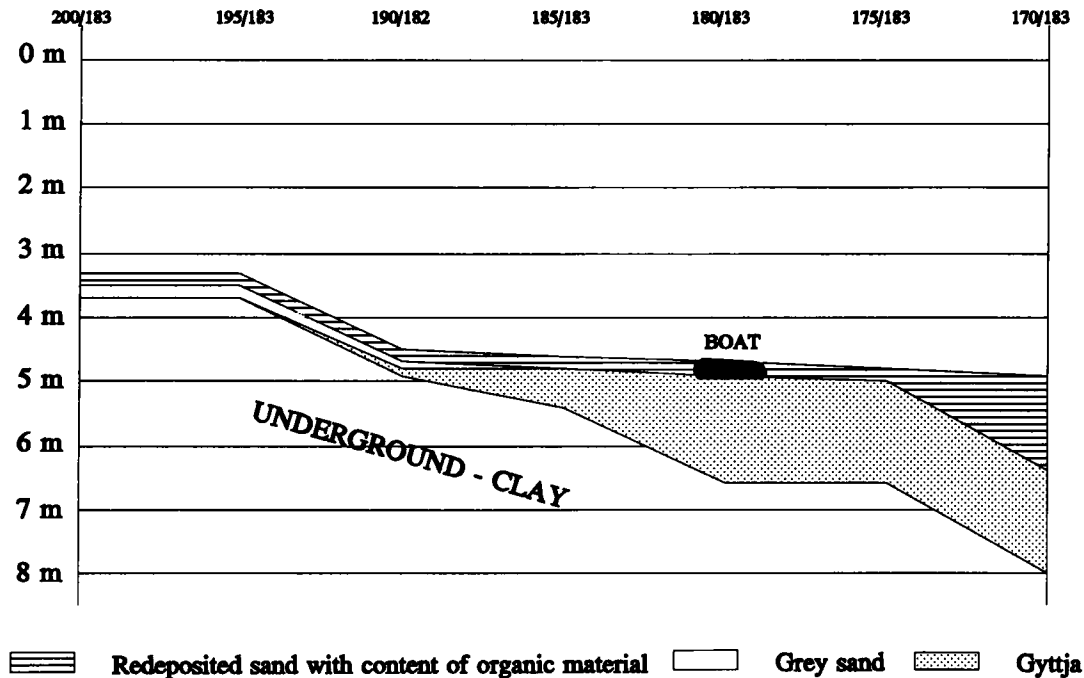


Fig. 2. The southernmost E-W profile. X-values increasing to the E.

extremely level surface of exposed clay substrate, probably created artificially by the dredger. The gyttja layer beyond its western point was found to be only half a meter thick.

This indicates 1) that the main deposits of gyttja were sedimented in calm water to the south of, and protected by, the small prominence and 2) that the surface of the westernmost 15–20 m of the latter, were removed mechanically.

The position of the culture layer

In the area excavated around the boat burial, the finds were concentrated in the upper 20–30 cm of the gyttja. Thus the main part of the waste layer was deposited on top of a more than 1 m thick, older gyttja layer. Burnt hazel-nut shells found at a depth of almost 1.10 m in the gyttja, 4 m to the SW (in point 175/183), may indicate either another waste layer here or that the layer dips rather steeply in this direction.

The grey sand layer observed in the eastern part of the profile may be a partly-preserved settlement surface. Small pits excavated here in 1990 around point 190/182 showed that, whereas the main part of the flint from the

redeposited top sand generally was rolled and more or less patinated, the flint from the grey layer was totally fresh and unpatinated.

TYPOLOGICAL RELATIONS AND CHRONOLOGY

The flint

The flint found on the surface contains both Late Kongemose/Early Ertebølle and Late Ertebølle types. However, the Late Ertebølle types are all clearly rolled and patinated, whereas the early types are fresh with little if any patination. Fragments of pottery were only found at the surface. Indicators of later activity are absent from the gyttja layers. Obviously material, which is fortunately easily distinguishable, has been washed down from the upper site, Møllegabet I. Unless otherwise stated, this later material is excluded from the following description.

A characteristic of Møllegabet II is the appearance of numerous large flakes of fresh, high quality flint. They often measure as much as 10 by 10–15 cm and are several centimetres thick. One wonders who could afford to discard good raw material in such amounts.

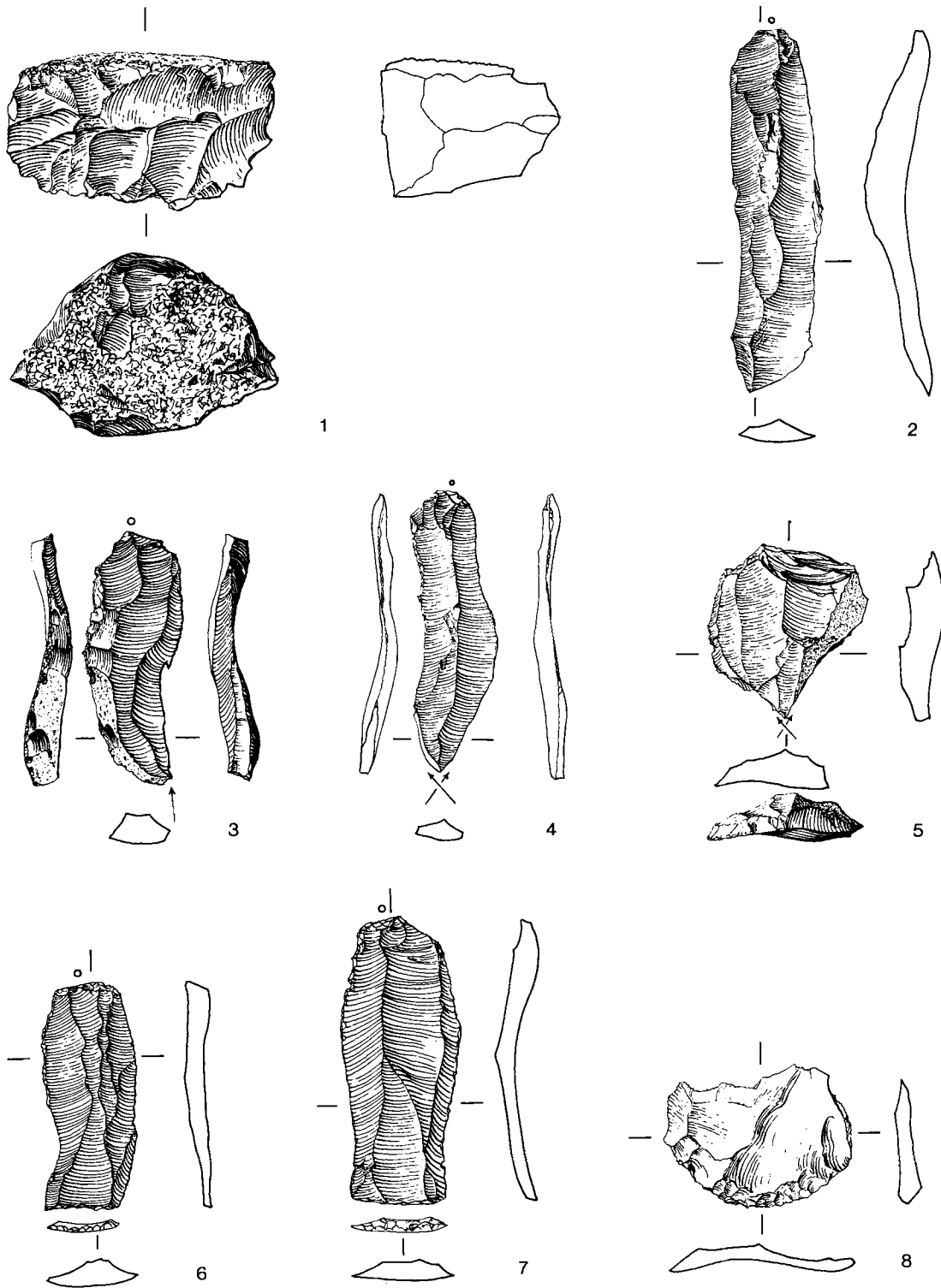


Fig. 3. 1: core; 2: blade; 3–5: burins; 6–7: obtuse tronchatures; 8: edge resharpening flake. Jens Korterman *del.* 2:5.

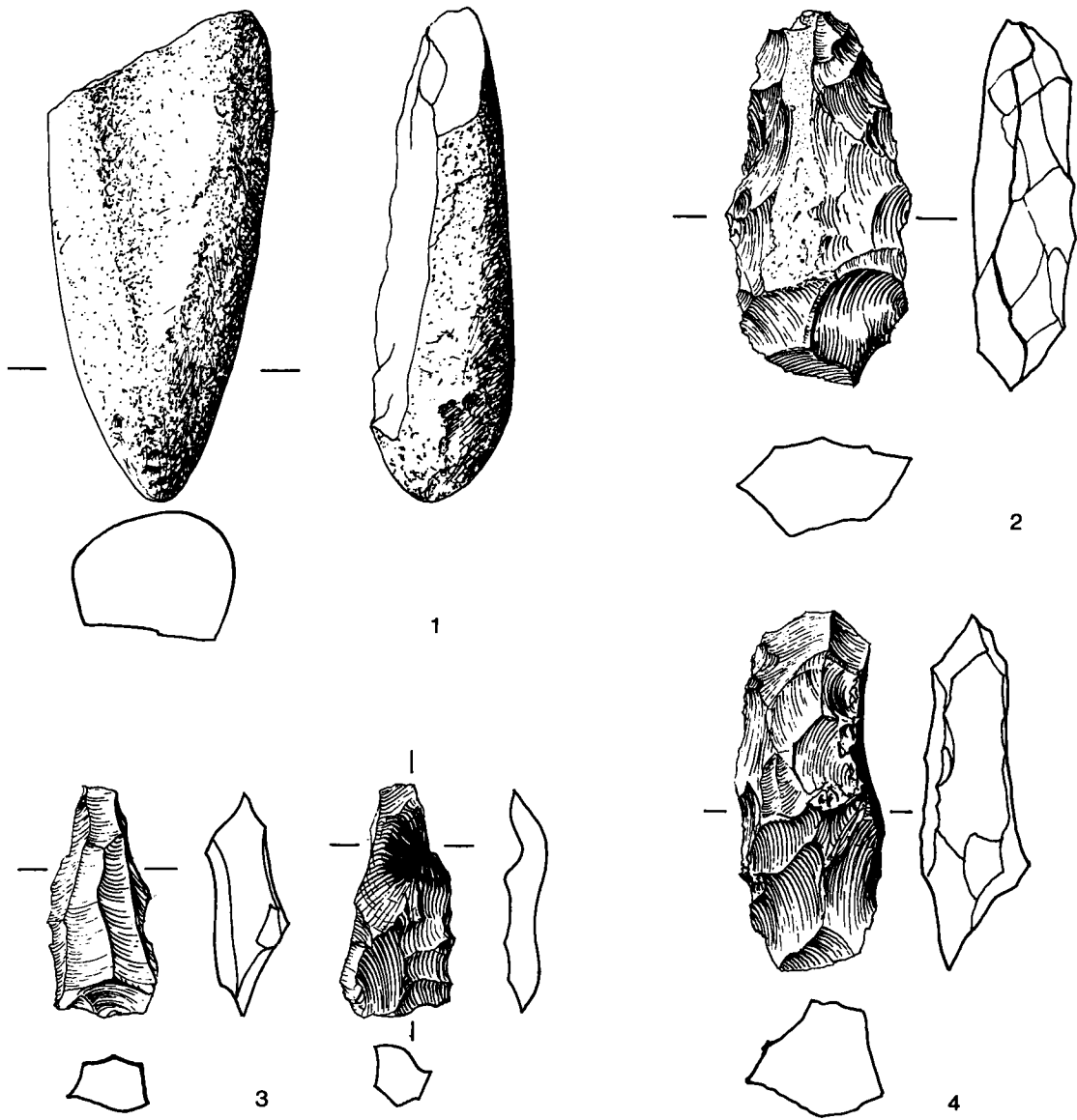


Fig. 4. 1: fragment of a greenstone axe; 2-4: core axes (3 a little insert). Jens Korterman *del.* 1:2.

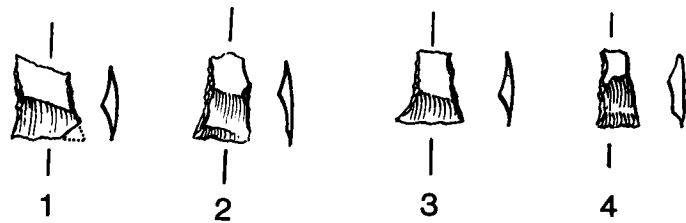


Fig. 5. 1: unpatinated arrowhead from Møllegabet II; 2-4: rolled and patinated arrowheads. Jens Korterman *del.* 1:1.



Fig. 6. 1: edge fragment of antler mattock; 2-3: awls; 4: presumed harpoon or waste from production of bone splinters; 5: flint flaker; 6: leister prong of hazel. Jens Korterman *del.* 1:2.

The intact blades are generally 10–15 cm long (fig. 3:2), slightly curved and with two ridges lying quite close to each other. They correspond to what one would normally consider as typical Kongemose/Early Ertebølle blades.

The numerous axes are all core axes (fig. 4:2-4), 6–15 cm long and none of them with a specialized edge. They include one small insert (fig. 4:3). Flake axes are absent. The chipping traces on the boat fragment indicate the use

of axes 8–9 cm broad. Since a resharpening flake from a core axe of these dimensions was actually found (fig. 3:8), at least some of the core axes found must be worn out and repeatedly resharpened items.

Typical flint artefacts are obtuse tronchatures (fig. 3:6-7), burins on obtuse tronchatures and other burin types (fig. 3:3-5), generally made from large well-formed blades. Both large flake- and core borers are present.

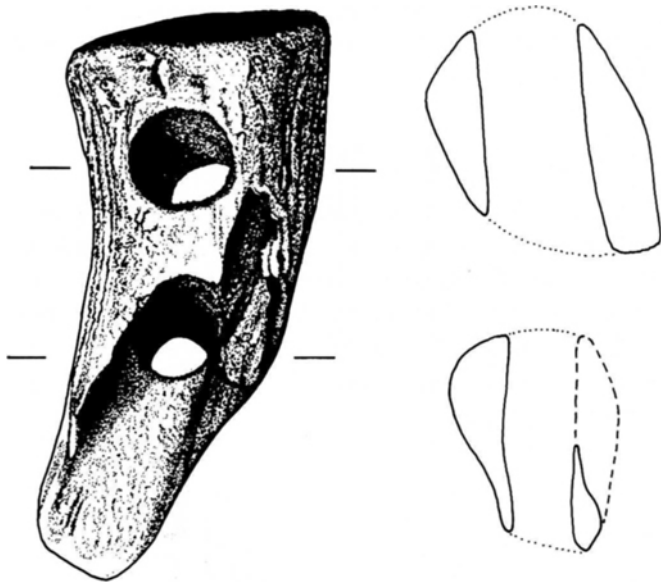


Fig. 7. Red deer antler mattock with two shaft-holes. Ole Grøn del. 1:2.

Scrapers, regular knives and oblique tronchatures are absent.

Four arrowheads were found on the site. 3 are of a clear symmetrical Ertebølle type, all rolled and patinated (fig. 5:2–4). One fresh and unpatinated item meanwhile exhibits a rhombic tendency (fig. 5:1).

Items of bone and antler

Finds of bone and antler include a number of awls typically made out of the metatarsus of a roe-deer or red deer or of bird bones (e.g. fig. 6:2–3). They also include one flint-flaker made out of an antler tine (fig. 6:5).

A presumed harpoon (fig. 6:4) may in fact be the remains of an antler tine with a number of splinters removed.

A red deer antler mattock with two shaft holes (fig. 7) is an interesting find. Apparently the first shaft hole was damaged and a new one was made behind it. Due to resharpening and wear, the edge is quite close to the original hole. An edge fragment of an antler mattock of indeterminate type was also found (fig. 6:1).

Wooden items

As was the case during the excavation of Møllegabet I, a number of leister prongs were found (fig. 6:6). They do not however deviate from the ones already published

(Skaarup 1983:148–149). A couple of more exotic items did however appear. These include a small bow, less than one metre long, and an axe shaft made from an angled branch. Some of the pointed stakes located measured as little as 2–3 cm in diameter and had regularly shaped points hardened by fire. In some cases they may be interpreted as a kind of spear, but since several were found thrust into the gyttja, in a similar fashion to the thicker stakes, they must generally be regarded as stakes.

The axe shaft (fig. 8) was found immediately outside the excavated area, sticking up from the gyttja on the bottom. It is badly preserved but it is thought to be made of wood from a species of the Apple sub-family (*Pomoideae*) which includes Rowan, Hawthorn, Quince, Apple and Pear. It was found intact, but unfortunately this fragile piece was damaged during the critical transfer from the water to the platform, and approximately 3–5 cm of the shaft were lost. It now consists of two pieces, one consists only of shaft, 59.5 cm long, with a diameter of 5.0–5.8 cm. With the exception of the lower end, which has been cut off by an axe, and the upper end close to the head, the shaft is unworked. The 21 cm long head forms an angle with the shaft which is very close to 90°. It has been shaped more delicately with an axe, but still seems to have the character of a rough-out. Its flat top was intended as a bed for attachment of an axe which may have been mounted in a socket as suggested by Brinch Petersen, or between the head and a piece like those interpreted by Troels-Smith as halves of intermediate pieces or helms (Troels-Smith 1960:112–115) or as handles for knives by Brinch Petersen. The total length of the axe shaft was 73–75 cm. A similar find, made of hazel, but with considerably more finish, was found at Maglemosegårds Vænge (Brinch Petersen *et al.* 1979:62–65, 78), and yet another parallel find, also made from hazel, is reported from an undated context in Christiansholms Bog (Troels-Smith 1960:125).

The small, slightly bent bow of Dogwood (*Cornus sanguinea* (fig. 9)) is only 86 cm long. One end has a clear horn shape, whereas the other seems to be a more straightforward point. According to Andersen this is not uncommon for mesolithic bows (Andersen 1981:128). In contrast to most other known mesolithic examples, the bow from Møllegabet II is not made from a split piece of wood (e.g. Becker 1945:65; Brinch Petersen 1979:74, 75) but has a round section with a maximum diameter of 2.6 cm, which follows the surface of the original branch. The surface has been carefully prepared but a couple of lateral

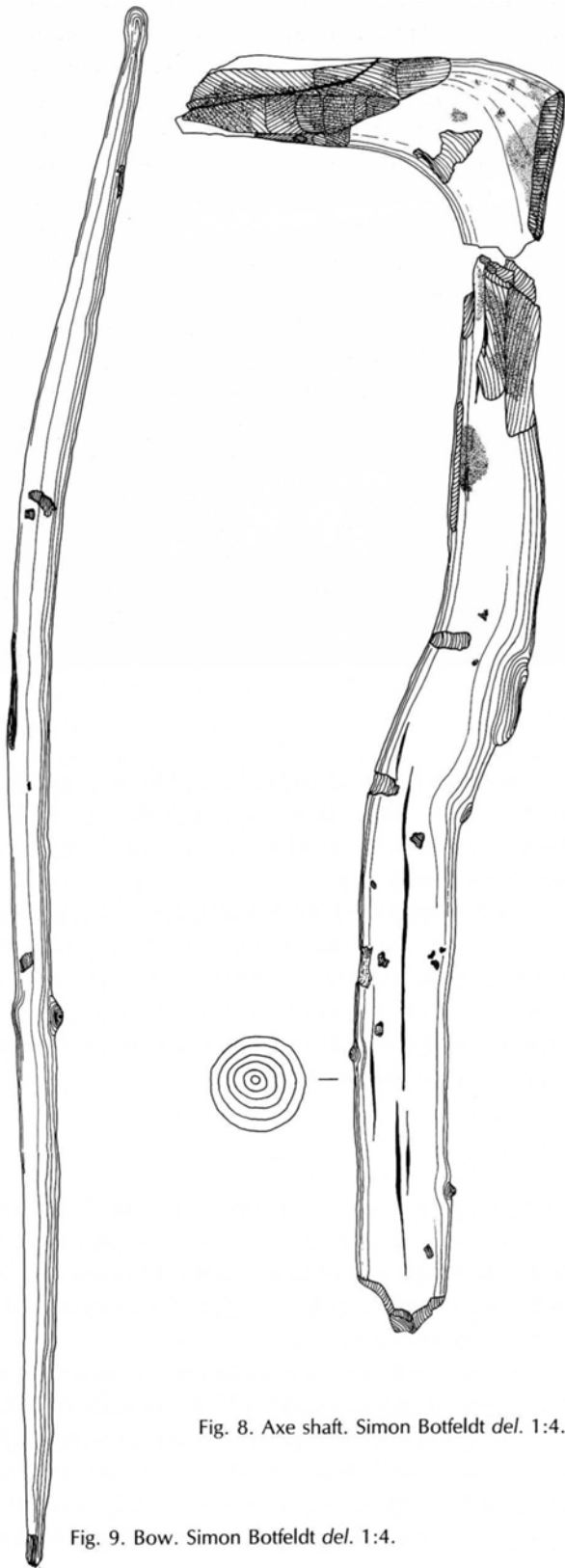


Fig. 8. Axe shaft. Simon Botfeldt del. 1:4.

Fig. 9. Bow. Simon Botfeldt del. 1:4.

shoots were left protruding up to 5 mm from it. It is obvious that the piece would have been weakened had they been removed.

Chronology

From a traditional typological point of view the material indicates a date lying at the transition between the Kongemose and Ertebølle Cultures, around 4000 (conv.) / 4850 (cal.) B.C. (Andersen & Malmros 1966:86–91, 95).

A radiocarbon date of 3960 ± 75 (conv.) / 4790 (cal.) B.C.¹ has been obtained from the boat positioned in the top of the gyttja.

SITE ECONOMY

The site has yielded important information on different aspects of the contemporary economy: hunting, fishing and gathering of plant resources.

Plant resources

During the excavation, material was sieved through a net with a 6 mm mesh. Three samples of seeds, fruits, and other plant remains from different areas of the refuse layer have been analyzed by David Robinson, The Danish National Museum. The report (NNU no. A7148), which is summarized in the following, states that the three samples have very similar relative compositions.

Hazel-nuts were well represented. Only four whole nuts were observed, three with worm holes and a fourth gnawed by a rodent. Large amounts of half or even more fragmented shells were found, none of which showed worm holes or gnawing traces. The discarding of bad nuts together with empty shells must reflect conscious handling of food items. A number of shell fragments showed traces of heating/burning, and must be taken as indicators of the well-known mesolithic tradition of hazel-nut roasting, best documented at Duvensee W.6 (Bokelmann 1981:181–183).

A similar tendency can be observed in the acorn remains, which appear in rather more restricted numbers. Large intact acorns are absent, whereas empty cups and small unripe fruits intact in their cups were recorded.

Stones of Dogwood (*Cornus sanguinea*) and specially hawthorn (*Crataegus monogyna/oxycantha*) appeared in large numbers, most of them lacking the surrounding fruit



Fig. 10. The boat immediately after it was discovered. Photo Ole Nielsen.

flesh – this may have been eaten or was possibly just not preserved. A handful stones of Dogwood were also recorded from the floor of hut I, Ulkestrup (Andersen *et al.* 1982:12).

One seed of Fat Hen (*Chenopodium album*) was found in the samples. This plant grows typically on disturbed nitrogen-rich soils, for example around middens on dry land.

Due to the large mesh size used during the excavation, information about the smaller seeds and other plant remains has been lost. It is planned to take a better sample as soon as possible.

Hunting

Mammal and fish bones were analyzed by Kim Aaris-Sørensen and Knud Rosenlund respectively, both of The Zoological Museum of Copenhagen University.

Many bones of red deer (*Cervus elaphus*), wild pig (*Sus Scrofa*), some of roe-deer (*Capreolus capreolus*), and several large antlers of red deer with heavy burin traces show that these animals were the main game. Pine marten (*Martes martes*), otter (*Lutra lutra*) and porcupine (*Erinaceus europaeus*) are represented by a few bones each.

Dogs, which were most likely used for hunting, appear in two sizes: a little spitz which is slightly larger than a Lapp-spitz and a somewhat larger animal the size of a Greenland sledge-dog.

A large fragment of the left under-jaw of domesticated ox (*Bos taurus*) was registered at a depth of at least 30 cm in the gyttja in a clearly mesolithic context. A likely explanation is that it fell unnoticed from the redeposited coversand. On the day this item was excavated the underwater visibility was almost zero.

Marine resources

Mollusca appear to have played no role at all as a source of nutrition. A few small oyster shells (*Ostrea edulis*) were found in the gyttja, but mostly with the upper and lower half lying together, indicating that the animals had suffered a natural death.

The fish bones from the waste layer were totally dominated by vertebrae, of which 95% are from cod (*Gadus morhua*). Piked dogfish (*Squalus acanthias*), mackerel (*Scomber scombrus*) and flatfish (*Pleuronectidae*) make up 5%, and eel (*Anguilla anguilla*) is represented by only one vertebra. The poor representation of eel is probably due to the fact

that bones from this fatty fish are generally found badly preserved.

Of the numerous stakes found within and outside the excavated area a large proportion probably represent the remains of large permanent fishing structures. Excavation of larger areas would probably make it possible to distinguish regular patterns in the positions of the stakes. The prongs of fishing leisters for catching eels underline the importance of this fish.

The bones of mute swan (*Cygnus olor*) and other indeterminate bones from duck/goose/swan, show that such birds were hunted.

Grey seal (*Halichoerus grypus*) is documented in the material, whereas some unrecognisable seal bones may derive from other species.

THE BOAT BURIAL

In the uppermost part of the gyttja, close to the shore, the stern of a dug-out canoe was uncovered in 1990 (fig. 10). The nearly 2.5 m long boat section lay with the stern pulled close to the prehistoric coast and with its long axis at an oblique angle to the latter. Pointed stakes were found at both ends of the boat fragment. Other stakes, found in the gyttja at deeper levels, may derive from demolished fishing weirs.

Like nearly all dug-out canoes known from the old Stone Age (Christensen 1990; Andersen 1990), the boat was made from a large straight lime trunk, shaped by a combination of cutting with axes and cleaving (LMR no.12123, NM VIII no.A7148). Due to the lack of bow, port side and edge of the starboard gunwale, it is impossible to determine the original dimensions of the craft. The breadth however, can hardly have been less than 60 cm. The sides and bottom were fashioned with astonishing craftsmanship and had been shaved down to a thickness of less than 1.5 cm.

The stern was cut off at an oblique angle to the long axis. A few centimetres from its edge three conical holes had been bored, 6–7 cm apart, in order to attach a removable stern-bulkhead.

The central part of the boat fragment was badly burnt (fig. 11). The charred areas start 0.5 m from the stern and can be observed over more than 1 metre in the direction of the bow. The fire had burnt through the bottom in several places. Whether the burning reflects ritual handling of the boat after it had been discarded and placed where it was

found, or – more prosaic – whether an already burnt out boat was used for the purpose is difficult to decide. The extension of the charring and the find of a partly-charred leister prong on the burnt part of the boat fragment is consistent with the former possibility.

In order to cut under the boat and take it up, it was necessary to excavate a 0.5 m broad, 0.5 m deep ditch around it. In the course of this some more leister prongs and a few flint artefacts appeared. Most exciting however, was the find immediately to the north of, and at the same level as, the boat, of a human sacrum along with some associated caudal vertebrae and several human rib fragments. They had probably been washed out of the boat. During the conservator's excavation of the boat in the laboratory, it was found to contain a large fragment from the right side of a human skull and a human finger bone. None of the bones were burnt.

The excavated human bones can be supplemented by a fragmented right humerus, a fragment of the right half of a pelvis, a damaged right femur, a right tibia and some further rib fragments found washed out on the bottom immediately around the boat during the initial surveys in 1987–88.

Anthropologist Pia Bennike has examined the human bones (LMR no.12123; Laboratory of Anthropology, Copenhagen, AS 21/90). There is nothing to contradict the supposition that they all originate from one individual, determined as a strong built young adult male, approximately 25 years of age. The skull fragment shows the healed traces of a 4 cm long lesion, probably the result of an axe-blow.

The uncovering of the dug-out canoe also led to other interesting observations. Along the starboard side a more than 1 m long coherent piece of bark (preliminarily determined as elm (*Ulmus sp.*)) was found lying partly under the boat. Fragments of the same piece of bark found in the gyttja over the boat indicate that a larger piece had originally been folded to cover the boat and its contents.

Directly under the boat's badly damaged western end, a very thin spade-shaped piece of wood appeared lying across the long axis of the boat, probably the remains of a paddle. Fragments of another paddle lay in the gyttja over the central part of the boat. Two antlers of red deer and one of roe-deer, each heavily worked with burins, were located a little to the south and east of, and at the same level as, the stern.

During the past 15 years a series of informative excavations from Zealand, Scania and Jutland (Albrethsen &

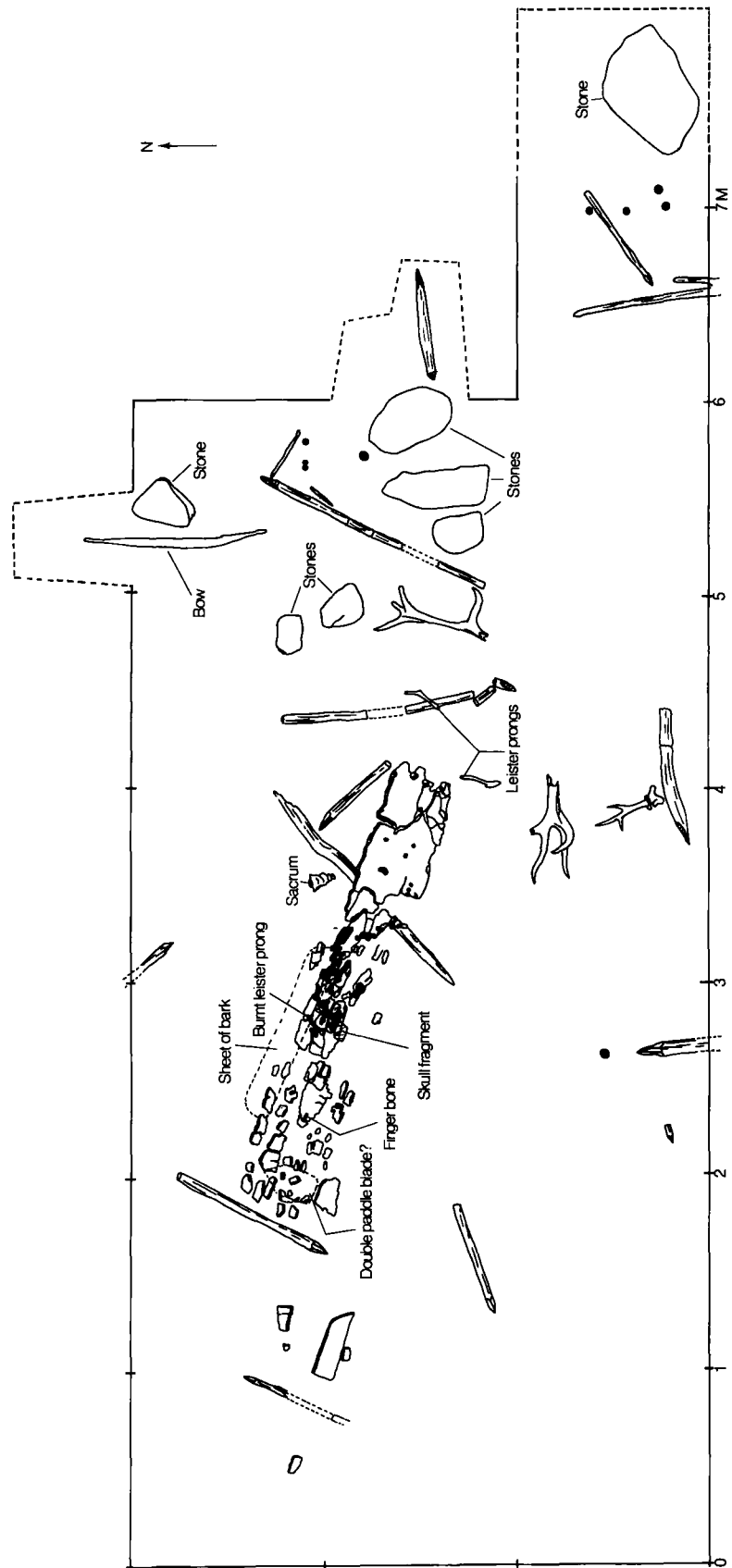


Fig. 11. The excavated area with boat, stakes, wooden tools, some human bones and the large stones.

Brinch Petersen 1976; Brinch Petersen 1990; Kannegaard 1991; Larsson 1988) have revealed a number of cemeteries from the later Mesolithic. The graves generally appear in close association with settlements. Their arrangement and equipment reflect a hunter/fisher population, subject to a complex set of death rituals.

The boat from Møllegabet II, radiocarbon dated to 4790 B.C.,¹ confirms the picture established to date, but also sheds light on a hitherto unknown aspect of these burial customs by showing that the coastal zone outside a settlement was also employed as a cemetery. Apparently one of the younger men from the settlement was buried here in the badly burnt rear part of a dug-out canoe, placed close to the coast and held in position by stakes thrust down into the gyttja. A row of large boulders in the top of the gyttja to the east of the boat have been placed deliberately and may have served as stepping-stones from the shore to the burial. The body seems to have been at least partly wrapped in, or covered by, sheets of bark. The cause of death is impossible to determine on the basis of the extremely fragmented skeleton. The healed skull lesion indicates times of unrest and the unpatinated transverse arrow-point, found with the boat, need not be a funeral gift, but may have been shot into the corpse. Since antlers are found in several of the contemporaneous graves, under or above the deceased, and most often in the head-end, those found close to the stern are likely to belong to the burial.

The boat burial was apparently not the only burial on the site. As mentioned above, two human skeletons were brought up by dredging at the westernmost point of the prominence near the settlement. A small cemetery belonging to the settlement appears to have been located there.

Contemporary parallels to the boat burial from Møllegabet are few and uncertain. During dredging in the cove Korsør Nor in 1943 a burial was found which showed some similarities to that at Møllegabet II (Norling-Christensen & Bröste 1945). In this case the deceased was also a man with healed lesions in the skull and he was covered by a layer of bark. Under the corpse there was another bark layer and at the sides there were two long "laths". This part of the construction was interpreted by the excavator as a kind of bier, but may actually be the remains of a bark canoe used in a similar fashion to the dug-out canoe from Møllegabet. The shadow of decomposed wood or bark around the body of a 40 year old man at one of the cemeteries at Skateholm, southeastern Scania, have been

recently interpreted as the remains of the severed prow end of a boat (Larsson 1988:112).

The closest parallel however, is a find from Øgård in the large bog Åmosen on Zealand. During the Second World War a 7 metre long dug-out canoe of lime tree was uncovered during industrial production of peat litter (Troels-Smith 1946:18f.). In the stern a small hearth was located on a layer of clay, a feature known from other boat finds, and possibly connected with the use of the vessels for fishing/flaring eels. The long canoe was held in position by hazel rods, thrust into the mire along its sides. In front of the boat lay the skeleton of a man, who seems originally to have been placed in it. The situation is very similar to the burial at Møllegabet, but the radiocarbon date is 3360 B.C.² (Christensen 1990:122), i.e. early in the Neolithic and nearly 1500 years younger.

The large interval of time between the two closely-related burial ceremonies reveal the arbitrary nature of the preserved finds, and gives a hint regarding the start of the Nordic tradition of boat burials, which is so tenacious that it can be traced right up into the Late Viking Age at about 1000 AD.

The use of boat burials is not specifically Nordic. It is known from numerous ancient cultures all over the world, and has for instance until this century been widespread among the aboriginal populations of the Pacific Islands (Turner 1884:306; Blackwood 1935:494f.).

The ethnographer H.A. Bernatzik, who studied the Mok of the Malayan peninsula, observed that each group from ancient time had its own special island of the dead, to which the corpses were transported. If the deceased had owned a vessel (a canoe), people severed it in the middle, broke off the gunwales, placed the corpse wrapped in mats in the one half, and arched the other half over it as a coffin-lid, whereafter it was secured by ropes. The corpse was placed with the head to the west, "because this is where the sun dies every evening". Personal belongings such as fishing spear, jars, personal ornaments, axes, which indicate the sex of the deceased, were placed beside the corpse (Bernatzik 1943:37f.).

Behind the boat burials there seems to be a common religious conception, independent of time and place, of the boat as a suitable means of transportation for the final journey – to the land of the dead.

CONCLUSION

The site Møllegabet II is a very informative locality with regard to the Late Kongemose/Early Ertebølle Period. The information obtained concerning Late Mesolithic boat burials is essential to the understanding of the complexity of ritual in this phase. The good preservation of vegetable food remains is important, since economic aspects are rarely elucidated, despite their undoubted importance.

It is regarded as crucial now to find out whether the settlement surface is preserved at the site. With the large costs inherent in underwater archaeology, and our present knowledge of well-preserved Mesolithic waste layers, it is logical to focus on locations which also yield information about life in the settlements. The justification for the increased costs must be increased output.

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NOTES

1. K-5640. The date is 5910 \pm 75 b.p. in C-14 years. Calibrated date (Pearson *et al.* 1986): 4790 B.C., with \pm 1 standard deviation 4900–4730 B.C.
2. K-1165. The date is 4590 \pm 120 b.p. in C-14 years. Calibrated date (Pearson *et al.* 1986): 3360 B.C., with \pm 1 standard deviation 3510–3100 B.C.

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