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BOG SITES AND WETLAND SETTLEMENT DURING THE MESOLITHIC: RESEARCH FROM A BOG IN CENTRAL SCANIA, SOUTHERN SWEDEN

THE BOG COMPLEX AGERÖDS MOSSE AND RÖNNEHOLMS MOSSE

The bogs Ageröds Mosse and Rönneholms Mosse together form a north-westerly arm of the Ringsjön Basin of central Scania, southernmost part of Sweden, the bottom of which is approximately 25 m deeper than the surrounding terrain (fig. 1). The whole bog complex, which, with its total area of 12 km^2, is one of Scania's largest, actually constitutes a single bog. It indicates the extent of a prehistoric lake, within the

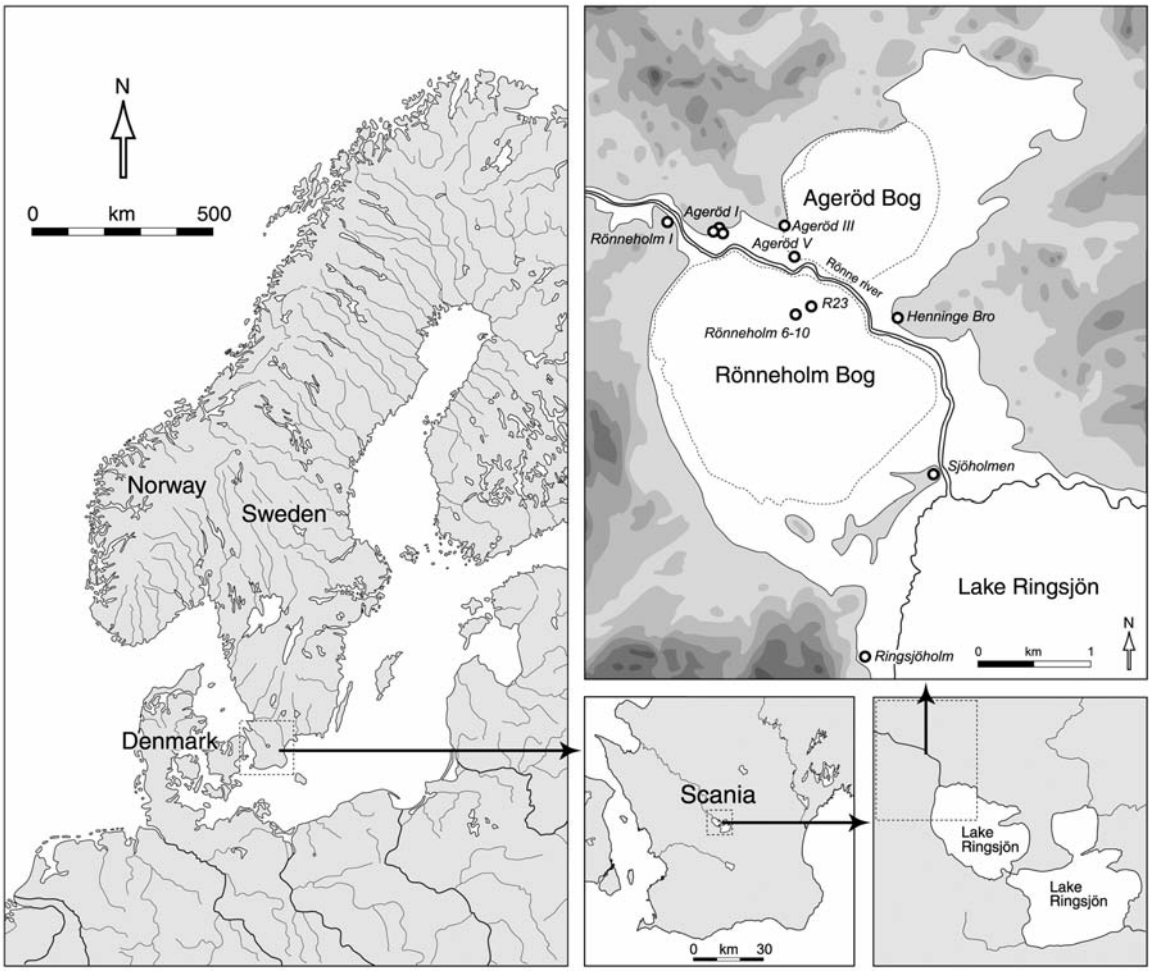

Fig. 1 Location of selected sites in the bogs Ageröds Mosse and Rönneholms Mosse (Skåne län/S). The white area north-west of Lake Ringsjön, on the enlarged map, shows the extent of the ancient lake before it filled in. Topographic elevation on enlarged map: 5 m.

Fig. 2 Air photograph of the north-western section of the former lake, with just visible river Rönne å dividing the bog complex into Ageröds Mosse, in the background, and Rönneholms Mosse, in the foreground, where peat is extracted in elongated parcels. – (Photo A. Sjöström).

region of Ringsjön that was later filled by organic sediment, ultimately becoming transformed into a raised bog. The river Rönne å, the main drainage of the Lake Ringsjön system, divides the basin into a smaller northern part, i.e. Ageröds Mosse, and a larger southern part, i.e. Rönneholms Mosse (fig. 2).
The lake that included the bogs Ageröds Mosse and Rönneholms Mosse was shallow, which resulted in a successive filling up with organic material that started during the Preboreal chronozone and finished during the Subboreal chronozone (Nilsson 1967). However, due to climatic changes and water level fluctuations, there was considerable variation in the rate and extent of filling. The filling was not restricted to the shallow waters just beyond the former firm shores: organic litter also accumulated in certain parts of the lake, creating islands of various sizes, which could be used by humans. Until the middle of the Early Atlantic chronozone the lake was very attractive for hunting, fishing and gathering. Later, during the Subatlantic chronozone, increasing precipitation caused the accumulation of peat, forming a dense cover of moss peat. A raised bog was formed, with layers several metres thick. Through peat-cutting and intensive drainage the bogs have lost their former character of raised bog. The margins of the bogs have been put to use primarily as pasture, but also for agriculture.

PREVIOUS RESEARCH

In the 1930s several settlements were discovered by an amateur archaeologist on the north-western periphery of the bog Ageröds Mosse, on a moraine ridge near the former outlet of the river Rönne å. The most interesting finds were gathered in a field adjacent to the former shoreline. In the late 1940s, fieldwork was primarily concentrated on a settlement area named Ageröd I, dated to the late Maglemose culture (Althin 1954a). New sites were found located in the north-western part of the bog Ageröds Mosse (Ageröd III-VII) and in the western part of the bog Rönneholms Mosse (Rönneholm I-III). The sites date from the Maglemose culture to the early Ertebølle culture (Althin 1954b; Larsson 1978; Derndarsky 2000). An important factor was that scholars from other branches of science, such as quaternary geology and osteology, joined the project (Nilsson 1967; Larsson 1977-1978, fig. 28).
In 1970 a new period of excavation of some sites at Ageröd I was initiated, as well as at Ageröd V in the central part of the bog. In the refuse layer of the latter site the condition of preservation, not only of bone

and antler, but also of wooden artefacts, was excellent (Larsson 1983). Ageröd V is dated to the transition from the Kongemose culture to the Ertebølle culture.

NEW RESEARCH

Peat-cutting in Ageröds Mosse stopped already in the early 1960s. However, it was intensified in Rönneholms Mosse. Initially, the peat was cut manually, producing rectangular blocks that were used as fuel. Most suitable for fuel were the moss peat layers. In later years the peat has been used for improving soil in gardens and sold in bags in milled condition. Therefore, quite another type of peat extraction has been introduced.

The area was originally covered by a 4 m thick peat layer from a raised bog (Nilsson 1935). In 1993 the first finds were made in the peat production field in Rönneholms Mosse. Today, the exploitation has reached the layers formed during the filling in of the lake in all parts of the bog. The exploited area of the bog is nowadays c. 1.4 km^2.

The method generally used for cutting peat in the bog is the so-called Peco method, where a thin layer of 10-15 mm is milled each time, about ten times every season. The production field is divided into long parcels by drainage ditches every 20 m, the longest of these measuring c. 1.5 km. The milled, dried peat is successively removed from the parcels to several long stacks, where it is stored and transported to the peat factory by railway all the year round.

The surface of the exploited area varies by more than 1 m, due to differences in cutting intensity and variation in the layers. In some areas all the peat and most of the gyttja have been removed, while in other areas some layers still remain, which means that while surveying the bog one moves across different time horizons.

From an archaeological perspective the »Peco« method is excellent because it is possible to obtain an overview of the flat cutting surface, and the sites can be detected before too much damage has been done. The successively deepened drainage ditches also serve the role of test trenches, where the occupation layers can be seen before the milling machine reaches them. Since 1993 the bog has been surveyed annually and hundreds of stray finds and small sites have been found and excavated. Somewhat larger sites have also been found along old shorelines on former peat islands in the central part of the bog, and some of these were excavated in 1997-1998 and 2009-2010 (**fig. 1**). The sites are dated by find material combined with radiometric analysis to the period from the late Maglemose culture to the late Kongemose culture.

Stray finds

The stray finds of bone, as well as flint and stone tools discovered in the gyttja and peat layers are remains of fishing and hunting activities in the open and overgrowing ancient lake. They have been dumped, lost or deliberately deposited in open water and on the marshy peat islands in the lake.

In the course of the survey a number of stray finds have been discovered. Most numerous are wooden sticks of various lengths that display signs of burning at one end. They are square in cross-section, split from larger logs, apparently all from pine (Larsson 1983, 72). They might have been used as torches when spearing fish by night. These sticks were found in hundreds all over the bog surface and at a few of the concentrations. Most were just lying on the surface, but in some cases they have been stuck into the surface, sometimes with the burnt end downwards, sometimes with this end upwards. The earliest dates to the Preboreal chronozone.

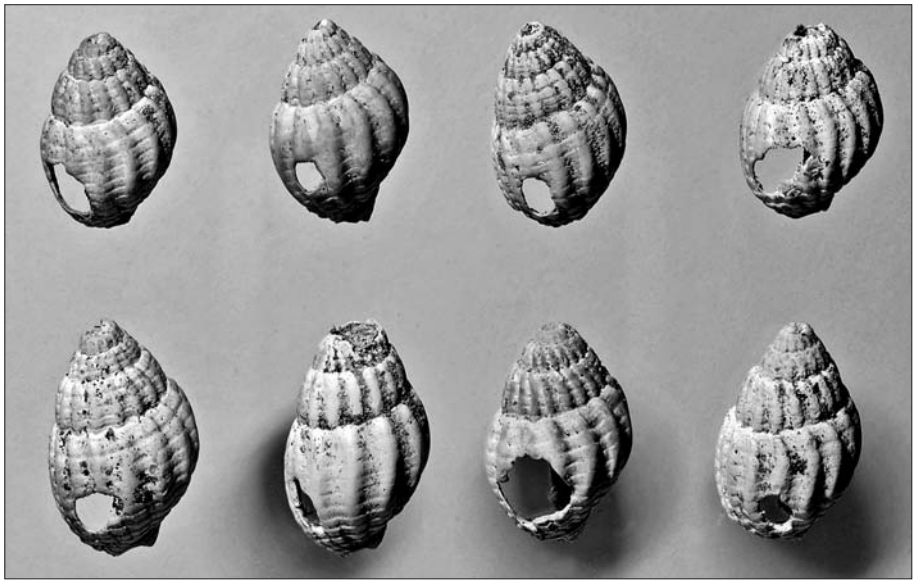

Fig. 3 Rönneholms Mosse. Perforated shells of the species *Nassarius reticulatus*, a marine gastropod mollusc, found in the lower part of the stratigraphy (Boreal chronozone). – (Photo A. Sjöström).

A number of stones were registered in the gyttja, most of them used as sinkers, e.g. on nets. However, a few of them, with a maximum dimension of 0.2-0.5 m, probably served as anchor stones for canoes.
A number of bone tools have also been identified. Most numerous are the distal ends of large-barbed leisters, of the same type found on a settlement from the latest Maglemose culture (Larsson 1978, 132 fig. 82, 7). Only one has a shape similar to the frequent fine-toothed leister type well-known from Danish bogs and sites dated to the Maglemose culture (Andersen / Jørgensen / Richter 1982, fig. 64, 6-7). The find material also includes a harpoon with large barbs of a type dated to the Maglemose culture (Andersen / Vang Petersen 2009). A small number of bone points were discovered, one with traces of resin in the proximal end showing it had been fastened to a shaft. Another group of bone tools are the slotted points, which range from small fragments to intact finds. The blade part of a decorated slotted dagger is also included. Among the single finds there are also a couple of wooden shafts of unknown function.
A find of special interest were nine shells found together with picked perforations at the same part of the shell (**fig. 3**). They belong to the species *Nassarius reticulatus*, a marine gastropod mollusc. Therefore, they have been brought to the inland as an adornment from the sea and lost or deposited in the lake during the Boreal chronozone.

Blade depositions

A deposition of 13 blades was found in the late 1940s by a peat worker close to the site Ageröd V. Several that could be refitted had been made from one core (Althin 1954a; Larsson 1983; Sjöström 2004).
In Rönneholms Mosse four blade depositions have been found in the layer of fine detritus gyttja. Three of them, consisting of 10, 13 and 31 blades, were unearthed as single finds. Unfortunately, they were all uncovered by the peat-cutting machines and are therefore somewhat damaged. However, they had been laid down away from any site. Several of the blades in the depositions could be refitted, showing that each deposition had been produced from one core. It is not clear whether they were laid down in the water, or on land during a period of low water. Nevertheless, from the stratigraphic position in the gyttja, they can be dated to the late Maglemose/early Kongemose period.
The largest deposition, consisting of 108 blades, was found in the periphery of the site Rönneholm 8, dated to the middle Kongemose period (**fig. 4**). In technical terms the blades are of very good quality, and the

Fig. 4 Rönneholm 8. A large hoard with 108 blades found close to site. – (Photo A. Sjöström).

longest blade measures 18 cm. They were horizontally positioned, generally with the proximal part to the north and the ventral side upwards. Most of the blades can be refitted to form parts of seven cores. There are so far no indications that they were produced on any site in the bog. The blades from the respective cores had been positioned together within the deposition. This shows that the person who laid the blades down arranged them in a certain order. Even if the blades in the deposition are of very good quality, the refitting of the blade sequences shows that just some of the most symmetric blades are missing.

The new finds of blade caches in Rönneholms Mosse indicate a deposition pattern that can be linked to some kind of ritual activity. The best-looking symmetrical blades obtained in the course of blade production were selected for a special purpose and excluded from cache deposition. This shows that, even if the

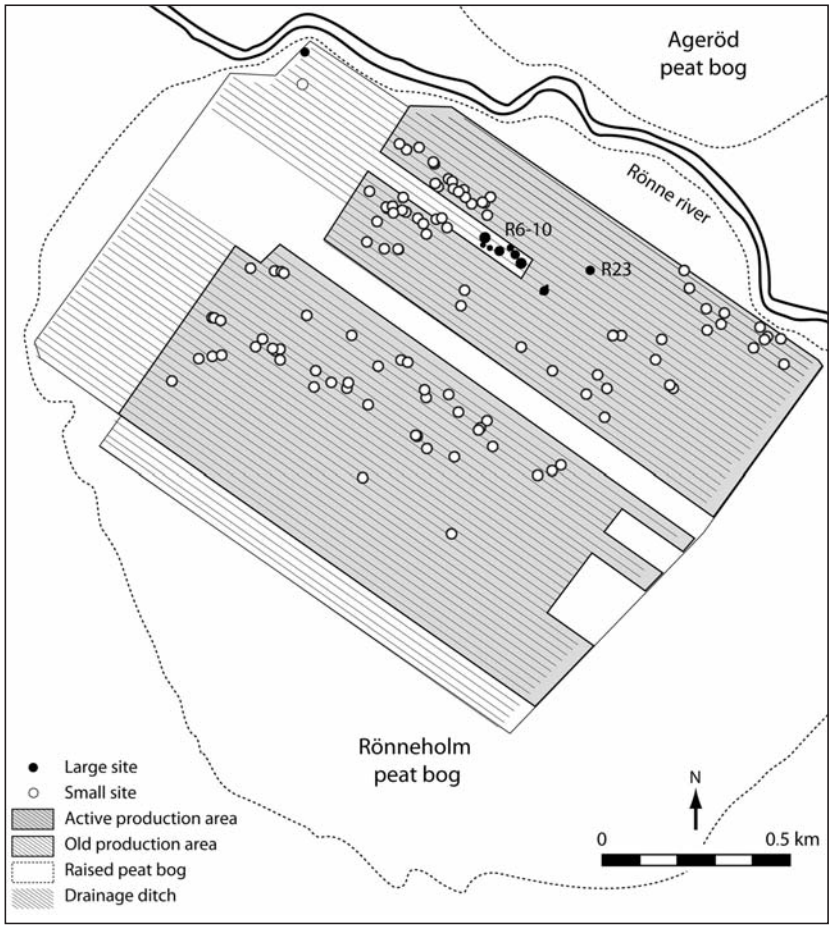

Fig. 5 Rönneholms Mosse. Distribution of the small and the larger sites in the peat production area of the bog.

deposited blades were of good technical quality and could have been used for tool production, they seem to have been neglected. The excluded blades were more important and have been intended for some kind of function, probably as knives in ritual or ceremonial tasks. The blades that had surrounded these important blades could not be used for profane activities, but had to be deposited in the lake.

The small sites

In recent years, when peat-cutting has reached the lower gyttja layers in some parts of the bog, many small sites have been found and more than 100 of them have been excavated (**fig. 5**). The remains on these sites normally constitute a thin layer of finds, c. 0.5-3.0 m^2 in size, consisting of a mixture of worked flints, hazelnut shells, stones, bones, pine torches, and charcoal. In the centre of the concentrations there are frequently indications of a hearth, in the form of charcoal, charred hazelnut shells, and burnt flints (**fig. 6**). Often a hearth platform, made of sand and some gravel, can be discovered in the concentration. Very seldom are finds scattered outside the concentrations, and then only some metres away. These small sites have been found all over the peat production field, which indicates that this type of small site most likely also existed outside this area, across the whole territory of the ancient lake (**fig. 5**).

The discovery of such a large number of sites was a surprise and, since the gyttja layers have still only been partly affected by cutting, more sites can probably be expected in the near future.

The majority of the small sites were found in a 10-20 cm thick layer of fine detritus gyttja and in the transition to the layer of reed peat above. They are not situated on any natural elevations in the layer of gyttja.

Fig. 6 Rönneholms Mosse. A small site with a hearth and some waste. – (Photo A. Sjöström).

Neither is there any indication of structures to raise the height of the surface at the sites and make the habitation area drier. Since fine detritus gyttja is deposited in relatively deep water, there must have been a period of low water in the ancient lake basin during the time the sites were occupied, at the end of the Maglemose period. No indications of a low water level during this phase have been detected in palaeohydrological studies made in this region (Nilsson 1964). The situation could be explained in terms of a very short period of local low water, which is hard to identify in a large shallow basin with a flat bottom. At the time of the annual high water level in Lake Ringsjön the shallow western part was probably flooded, providing conditions for extremely rich wildlife, with good fishing possibilities. When the water level rose again, after the low water period, the sites were not much affected by wave action.

The small sites can preliminarily be divided into three types: camp sites, torch sites, and production sites (Hammarstrand Dehman / Sjöström 2009). Small sites with a distinct layer containing finds, including both organic and minerogenic remains, or with hearths, were defined as camp sites (**fig. 6**). The sites varied both in size and quantity of finds. The largest find concentration measured 2×1.5 m, and the smallest one was only 0.2 m in diameter. The most frequent finds were worked flint, small stones and torches, and sometimes animal bones and hazelnut shells were also discovered. The hearth structures normally consisted of a thin layer of sand, occasionally with small stones. There are no clear indications that the hearths were used as hazelnut roasters (Larsson 1983, 26). More likely, they were lit in order to produce smoke. A wetland like the shallow lake must have been an extremely suitable area for mosquitoes. The most effective way to get rid of these insects was to stay close to smoke that they resented.

The size of the torch sites varied, from a few decimetres to slightly more than 1 m in diameter (**fig. 7**). These sites could also contain a lot of stone, gravel and some flints. Strangely, none of the flints at the torch sites had been affected by fire. The length of the torches varied between c. 5 and 20 cm, and they were triangular or square in cross-section.

Fig. 7 Rönneholms Mosse. Hearth made of sand with a concentration of pine torches at a small site. – (Photo K. Hammarstrand Dehman).

Production sites, with no signs of hearths, were primarily used for fabrication and repair of tools, and generally not as camp sites. Of course, some tool production was done at camp sites. Only a few production sites have been found in the bog, and these measure up to 2 m in diameter. At these sites, production of microblades and microliths, for example, took place (Hammarstrand Dehman / Sjöström 2009).

Even if the small sites are very limited in size, there must have been activities in the immediate area around them. The remains represent the central activities of the occupations, which were mainly focused around a hearth. The limited distribution of the finds shows that they were all occupied for a very short period, maybe only for hours or for a single night. No wooden posts were discovered at the sites, so probably no solid structures were made for weather protection, as at the somewhat larger sites in the bog. Even if these sites were very temporary, in many cases considerable effort went into the construction of the hearths of sand and stones, in relation to the duration of use. The material in some of the hearths, weighing up to a few kilogrammes, had to be transported up to 1 km into the central part of the lake.

A very limited set of tools has been found at the small sites. Apart from blades that were used as knives, mainly microblades and microliths have been discovered. The flint material is dominated by relatively small pieces of waste. Some of the small pieces of flint and bone that were found in the sand hearths could originate from sandy culture layers at neighbouring large sites on land, where the sand had been taken. Also, no large bones have been excavated. However, brown bear, aurochs, elk, reed deer and wild boar are represented, the last of which predominates. Bones from smaller mammals, such as fox and badger, are present, as well as bones from a small number of birds, like great crested grebe and brent goose. Surprisingly enough, fish bones are rather few, with pike as the most common, followed by perch, while eel is represented by just a single find (Magnell 2010).

The larger sites

The largest sites were found in the central part of Rönneholms Mosse, more than 0.5 km from firm land (fig. 1). During the Kongemose period they were established on the shores of reed and *Carex* peat islands in the infilling lake. At the northern shore of a former large island, seven habitation areas were excavated, several of which had stratigraphically separated layers (site complex Rönneholm 6-10; fig. 1). Another site, dated to the Kongemose culture, 300 m east of the site complex Rönneholm 6-10, was excavated in 2009 (Rönneholm 23; fig. 1).

There is a similar island, with a site complex of the same age, 400 m to the north in Ageröds Mosse, represented by the sites Ageröd IV-VI (Larsson 1979-1980; Larsson 1983; fig. 1).

Fig. 8 Rönneholm 6. Hazel stake with one-sided sharpening at the tip. – (Photo A. Sjöström).

Rather soon it became clear that the find circumstances in the bog Rönneholms Mosse were exceptional, since the once existing raised bog layer of several metres had sealed the artefacts in their original position. Because of the former several-metres-thick cover of peat in the raised bog, post-depositional disturbance was minimal. Several hoards, waste-dumps, knapping areas and hut structures were found, and many flints could be refitted on the spot. Since the find circumstances were so special and the sites relatively small, henceforth the position of all artefacts and ecofacts were documented precisely and in detail.

The method gives unique opportunities for future studies in intrasite spatial behaviour and flint utilisation. Our excavations and refitting studies show that it is difficult to understand in advance which artefacts are going to be most interesting. The position of the very small flint pieces has turned out to be just as important, or even more important, than that of traditional tools, when trying to understand spatial distributions on sites.

Almost all the larger sites are located on peat islands, right along the ancient shoreline. At the site complex in the bog Rönneholms Mosse a number of sites are located close together, separated by distances of a few metres, so the people ought to have known or seen where the older sites were situated. There is minimal overlapping of the sites, which are oval in shape, measuring c. 7×12 m, with negligible refuse layers formed in the ancient lake.

The appearance of the hearths differs between the sites, from fires lit directly on the peat to more solid platforms made of sand and stones. Some hearths produced hazelnut shells and charred seeds of yellow water lily, as well as parts of wild apples. The preservation of bone was extremely bad due to the acid peat, and they were only found as small burned pieces in hearths and in the deeper layers, close to the alkaline layer of calcareous gyttja at the bottom.

Several wooden posts were excavated in upright position at the sites Rönneholm 6-10. Most of these are thin hazel stakes and, with the exception of one large exemplar, were found within the richer flint concentrations. The hazel stakes had a diameter of c. 30-40 mm and had generally been pointed at the base with an axe (fig. 8). Even if the diameter is rather small, the stems may originally have been rather long. In shady hazel bushes with old, crooked stems it is possible to find younger, almost completely straight stems that can reach a length of no less than 5 m, even if the basal diameter is just 40 mm.

Fig. 9 Rönneholm 6. View from the north with the hut structure at the site marked by flints and stones still *in situ*, with site Rönneholm 8 in the background. – (Photo A. Sjöström).

Hazel stakes of this type have been found on several bog sites and submarine sites in southern Scandinavia and were intensively used for different purposes throughout the Stone Age (Jørgensen 1956; Andersen / Jørgensen / Richter 1982; Sørensen 1987; Pedersen 1995; Andersen 1996; Mårtensson 2001). At the Maglemose sites Ulkestrup I and II (Reg. Sjælland) in Denmark the stakes standing in the find concentrations were interpreted as hut structures and the ones at the shoreline as anchor poles (Andersen / Jørgensen / Richter 1982). Their function as roof supports has been questioned due to the narrow diameter and the fact that their occurrence is not limited to the supposed hut structures (Stapert 2004). Several of the scattered stakes at the Rönneholm sites do not form any clear hut outlines, and they could naturally have had various functions. Older huts could also have been destroyed by younger occupations, resulting in a sporadic distribution. Nevertheless, there is a clear connection between the occurrence of stakes and the number of finds. They did not appear at sites with limited numbers of finds, and not any were excavated on the many small sites in the detritus gyttja. This shows that the function was closely linked to the intensity and/or length of occupation.

Only at a couple of sites the distribution of stakes could clearly be understood as indicating the remnants of huts. Only the one at site Rönneholm 6 has been fully excavated, and this is one of the most distinct hut structures found in southern Scandinavia.

Site Rönneholm 6

Based on the discovery of oblique arrowheads of Vedbaek-type, Rönneholm 6 can be dated to the later part of the Kongemose culture. Seven radiometric dates of posts and hazelnut shells, ranging from 5728-5462 cal BC (6630 ± 105 BP; LuA-4915) to 5995-5660 cal BC (6930 ± 95 BP; LuA-4921), confirm the dating (OxCal. 4.1).

The site consists of a thin layer, covering an area of about 4×7 m, of flints (12 564 pieces, 18.4 kg), stone, hazelnut shells and charcoal, close to an old shoreline. In the centre of the concentration an oval hut structure measuring 3.5×4 m was found (**fig. 9**). Outside the hut there were two dump-zones. Even though the surface in the hut was relatively horizontal, a slightly higher area was excavated in the centre. Larger flints were concentrated along the western and eastern wall-lines, formed not only by the wall-effect by tossing of waste, but also by deliberate placement of useful material (Larsson / Sjöström in print). Along the line of flints several wooden posts were arranged in an oval at intervals of c.1 m. One inner post may have supported the roof.

The posts of the hut structure were made of hazel stems pointed with an axe. They were not leaning towards the centre of the structure, as if the hut were conical, like a tipi. The fact that they had used thin

Fig. 10 Rönneholms Mosse. An arrow with four triangles attached by resin and a lanceolate as a plausible tip. – (Photos A. Sjöström).

hazel stems and that the posts were leaning somewhat outward from the centre, indicates that the hut structure was dome-shaped. Hazel stems can easily be bent at an angle of 90° and tied together to form an arch. This form of hut construction gives more volume and a higher roof along the inner sides of the wall. The technique of building huts of this type, as wigwams and wikiups, was commonly used among some tribes of North American Indians (Nabokov / Easton 1989).

In the central part of the hut a concentration of small burned flints, 0.7 m in diameter, was found, indicating a hearth. The fire had been made directly on the ground without any foundation of sand or stones. Most of the charred hazelnut shells were also discovered in the central part of the hut, south of the hearth. In between this central field, which is clearly seen in the flint distribution, and the walls, there was a smaller amount of flints, indicating sitting and sleeping areas.

The flint production was focused on microblades made from handle cores and transverse arrowheads. The majority of the larger blades were brought to the site and used as knives. Later, when the edges had become blunted, they were intentionally broken into small fragments and mainly used as groove chisels. This type of tool was used to make the V-shaped grooves in slotted bone points and arrows, in the same way as blades with polished edges, called rulers (Sjöström / Nilsson 2009). Some of the refits show a spatially restricted use of the tools, while others are more complex due to reutilization, cleaning, and dumping. The refitting of more than 1800 flints reveals a complex spatial pattern on the site. Refitted sets of flints, restricted to the interior of the hut, show that the living area indoors was structured. Very few objects belonging to the sets of knapped flints have been moved from the eastern to the western part of the hut interior. This could indicate that some of the flint material belonged personally to two or more individuals occupying the hut at the same time, and that the living area was divided up between them.

The site Rönneholm 8, which seems at first sight very similar to its neighbour Rönneholm 6 in terms of find composition and distribution, shows a very different character when looked at in detail. The character and spatial distribution of the refitted sets of flints indicate that Rönneholm 8 was used several times during

short stays, although during a longer period of time than Rönneholm 6. The latter seems to have been more intensively occupied during a continuous period, in which situation a hut would have been more useful.

Site Rönneholm 23

Rönneholm 23 was only partly excavated, but some interesting observations can be made on the basis of the 12×18 m investigated area (Sjöström / Hammarstrand Dehman 2010). The uppermost layer can be dated to the later part of the Kongemose culture by the finds of transverse arrowheads of Vedbaek-type and a radiometric dating of a hazelnut shell, namely 5636-5482 cal BC (6630 ± 55 BP; Lu S-6660). Most of the finds were discovered in a 5-m-wide zone along an old shoreline. Four hearths, made of small stones and sand, were found close together within a distance of 3 m. Several of the ten pointed posts were standing under and very close to the hearths, in a pattern that does not reflect any hut structure. The posts were also of varying diameter and leaning in different directions. The posts along the shoreline had probably been used as stands of some kind, maybe for cooking purposes or for drying fish and fishnets. Flint production at the site had been focused on the making of microblades. Some blades had been collected by the flintknapper and put in small piles. The spatial pattern of hearths, posts and flints indicates that the site was used repeatedly during a relatively short time.
In the northern part of the site, outside the find-rich area, a compact oblong pile of raspberry seeds had been dumped. The pile was crescent shaped, c. 0.8 m long, 0.1 m wide and 0.01 m thick. The character of the pile and the number of seeds indicate that the juice from more than 10 l of raspberries had been extracted from the raspberries before they were dumped. The seed mash could have been squeezed in a soft vegetable strainer in order to produce some kind of drink that may have been fermented.

Hafted microliths

The surveys have revealed patches of loosely spread artefacts that in most cases are the remains of more or less preserved parts of refuse layers that accumulated in the water just outside a settlement.
In such a patch, a very special find was made during the excavation in 2009. The object consisted of pieces of wood and microliths, some attached by resin to the pieces of wood and some lying somewhat separate. The flints and wood could be joined together to form the point of an arrow with a length of 10.2 cm (**figs 10; 11, 1**). The arrow was made of a one-year-old branch of hazel. A V-shaped furrow has been cut into the wood, which can be followed from the break all the way to the tip. The furrow has been filled with resin, in which four microliths altogether have been fixed. They are all made from microblades, varying in length and width between 1.8 and 2.4 cm and 0.5 and 0.6 cm, respectively. They are triangular, obliquely retouched at the proximal end and also somewhat retouched along the shorter side of the triangle. The microliths were obliquely fastened to the arrow in such a way that they formed barbs.
A fifth microlith was also discovered in close contact with the other finds. In contrast to the other microliths, it has not only oblique retouch of the distal end, but also continuous retouch forming an almost rounded margin. The shape is intermediate between a triangle and a lanceolate. There is no resin attached to this microlith. Its position on the arrow, if it was really fixed to it, is somewhat uncertain. Its original position does not provide any clue. The point of the arrow is not very sharp, and the fifth microlith could have been glued to a piece of resin simply fastened to the tip in order to increase the penetration of the arrow.
Such a find of the point of an arrow is very rare. A huge number of microliths have been discovered worldwide, but there is only one other find showing how they were attached to an arrow.

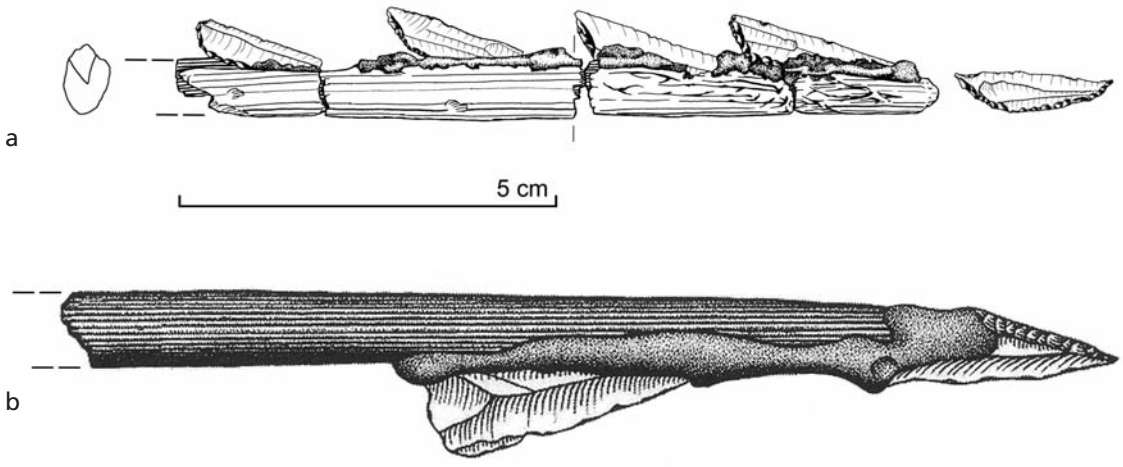

Fig. 11 Arrows from Rönneholms Mosse (**a**) and Loshult (**b**). – (Drawings K. Kàm Tayanin / B. Wallebom).

In 1951 a remarkable find was made in the bog Lilla Loshults Mosse (**fig. 11, 2**) in the northernmost part of the county of Scania, southern Sweden. Two arrowheads were excavated in the course of peat-cutting. The finds were made at a depth of about 2 m from the surface. The arrow-shafts were discovered in fragments. A number of pieces could be refitted into two larger parts with a length of 43 and 45 cm, respectively. They are most probably parts of the same arrow, with a part missing in between. This arrow must have had a length of at least 90 cm.

Since the first report, these flint tips have been described as microliths – »Microlithen als Pfeilspitzen [microliths as arrowheads]« (Petersson 1951; Malmer 1969). The question is: what is a microlith? If the definition is broad and includes all kinds of retouched microblades, then all four flints in the two arrows should be accepted as microliths. However, if we regard as microliths only those tools made using the microburin technique, then just one out of four flints should be defined as a microlith. All the others are microblades, with the bulb of percussion more or less preserved (Larsson 2009)[1].

On one of the arrows the tip is still well-preserved. A lump of resin, in which the true microlith – a triangle – was inserted, covers the tip of this arrow. The resin also overlays a lower part of the arrow, where a microblade with the narrow part including the bulb of percussion has been fastened to the shaft. The blade was inserted as a barb, with the pointed part towards the tip and with the retouched side stuck into the resin. An X-ray photograph shows that the microlith was just fastened with resin, without any furrow (Larsson 2009, fig. 5). The photograph also depicts that the tip of the shaft was reduced in thickness and rounded. This observation might support the assumption that the fifth microlith from Rönneholm could have been attached to the tip.

A find from Prejlerup (Reg. Sjælland/DK) is of interest for the discussion of function. When an intact skeleton of an aurochs was excavated, altogether 15 intact or fragmentary microliths and a small part of the arrow-shaft were discovered along with the skeleton (Aaris-Sørensen / Brinch Petersen 1986, 112-114). The finds include triangles, as well as lanceolates. As regards the position of the microliths, two triangles were found in a line at a distance of 3 cm and could have belonged to the same arrow-shaft. The distance between the lithic tip and the barb in the well-preserved arrow from Loshult is about 3 cm (**fig. 11, 2**). The arrow-shaft fragment from Prejlerup was no more than 4 cm long, but a piece of resin was still fixed to the wooden shaft. The skeleton has been dated to 7595-7284 cal BC (8410 ± 90 BP; K-4130).

The arrow-shaft most similar to those from Loshult and Rönneholm is a find from Vinkel (Reg. Midtjylland/DK; Troels-Smith 1961). It was discovered in a bog during peat-digging and is dated to the Early

Boreal chronozone. The shaft, cut from a pine stem, has a length of 102 cm and a diameter of about 0.7 cm. It is bevelled flat at the tip, and a notch has been cut at the back to receive the string of the bow. Traces of lashing to fasten a feather are evident just above the notch. Fragments of arrow-shafts have also been found at the Early Mesolithic site of Holmegaard IV (Reg. Sjælland/DK; Becker 1945). On one tip a furrow cut into the wood was identified and fragments of flints were still fixed in the resin that filled the furrow.
According to the radiocarbon dates, 8279-7794 cal BC (8915 ± 80 BP; Lu S-7195) and 8004-7604 cal BC (8770 ± 70 BP; Lu S-7217), the Loshult arrows should be dated to a middle part of the Maglemose culture, close to the Early Boreal/Late Boreal (BO1/BO2) transition. The microliths from Rönneholm have a shape very similar to those of the latest Maglemose culture (Larsson 1978, fig. 35). Two samples have been dated. A sample from resin got the value 7032-6645 cal BC (7905 ± 60 BP; Lu S-8992) and another from wood was dated to 6862-6589 cal BC (7855 ± 60 BP; Lu S-8993).

FINAL REFLECTIONS

The bog complex Ageröds Mosse and Rönneholms Mosse is the most informative area for the study of Mesolithic settlement around and within an overgrowing lake that can be found in southern Sweden. Until the 1960s the only way to identify sites was either to walk along the former shoreline or to hope for finds made by the peat-cutters. With the new method of extracting peat, where a thin layer is milled each time, about ten times every season, it became possible to inspect large areas and follow the extraction. Thereby, even small sites and sites with a thin occupation and refuse layer have been identified.
Bog sites, even very small ones, have been recognized in Germany (Bokelmann 1986; Bokelmann / Averdieck / Willkomm 1985). However, the large number of very small sites used for a short time is exceptional. Mesolithic people would have utilized many overgrowing lakes in a similar way, but until now this has not been examined in such detail as in Rönneholms Mosse, with about 100 documented sites, and most probably many more sites to be found. Based on these small sites and other larger sites (although even these might be regarded as small) we are able to study activities in short periods, in some cases perhaps on a daily basis. We might be able to follow the exploitation of different parts of the lake environment by studying the differences and similarities of the activities taking place and how they relate to the chronological and chorological situations. This knowledge could also be of importance for a re-study of the larger sites close to the firm shoreline, and of how they relate to the movements and use of the inner part of the lake. There is every reason to hope that future surveys and excavations will reveal even more evidence, contributing significantly to our knowledge of Mesolithic people.

Note

1) The discussion about microliths and microblades and how to differentiate between them is also relevant for another composite tool, namely the slotted bone point. Claims have been presented that microliths were used as inserted edges. However, if we apply the same strict definition as above, then it was only about retouched microblades that were used.

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Zusammenfassung / Abstract / Résumé

Mesolithische Fundstellen in Torfmooren und Feuchtböden:
aktuelle Untersuchungen aus einem Torfmoor in Zentralschonen, Südschweden

Die Moore Ageröds Mosse und Rönneholms Mosse, die insgesamt eine Fläche von 12 km^2 umfassen, nehmen in Zentralschonen (Südschweden) den nordwestlichen Arm des Ringsjö Beckens ein. Bereits in den 1940er- und 1970er-Jahren wurden am Rand wie auch innerhalb des Ageröds Mosse mehrere frühmesolithische Fundstellen untersucht. Als man dann begann, im Rönneholms Mosse großflächig Torf zu gewinnen, waren dort ab der Mitte der 1990er-Jahre neue Forschungen notwendig geworden. Hierbei sind mehrere größere (*base camps*) und über 100 kleinere Fundstellen erfasst und ausgegraben worden. Letztere beinhalteten meist nur eine Feuerstelle und etwas Fundmaterial (Abfall) darum herum. Auch Streufunde sind häufig entdeckt worden, so z.B. Knochengeräte, aber ebenso mehrere Depots aus eng zusammenliegenden Feuersteinklingen sowie isolierte Reste von Abfallschichten. Ein besonderer Fund ist eine Pfeilspitze aus Haselholz mit den noch erhaltenen aufgeklebten Mikrolithen. *Übersetzung: M. Baales*

Bog sites and wetland settlement during the Mesolithic:
research from a bog in central Scania, southern Sweden

The bogs Ageröds Mosse and Rönneholms Mosse with their total area of 12 km^2, form a north-westerly arm of the Ringsjön Basin of central Scania, in the southernmost part of Sweden. In the 1940s and 1970s excavations of Early Mesolithic sites around and within the bog Ageröds Mosse were carried out. In the middle of the 1990s new excavations were initiated in the bog Rönneholms Mosse for peat exploitation. A number of base camps and more than 100 small sites, most of them merely including a hearth and some refuse, have been identified. Stray finds of bone tools, deposits of flint blades, as well as parts of refuse layers have been discovered. One remarkable find is an arrow of hazel wood with microliths glued to the tip.

Sites mésolithiques de tourbières et de sols humides:
recherches actuelles sur une tourbière de Scanie centrale dans le Sud de la Suède

Les marécages d'Ageröds Mosse et de Rönneholms Mosse s'étendent sur une superficie de 12 km^2 en Scanie centrale (Sud de la Suède) et englobent le bras sud-ouest du bassin de Ringsjö. Plusieurs sites du Mésolithique ancien ont fait l'objet d'études dans les années 1940 et 1970, au cœur comme à la périphérie des marais d'Ageröds Mosse. Le développement de la production de tourbe à Rönneholms Mosse à partir du milieu des années 1990 a rendu de nouvelles opérations de recherche nécessaires. Lors de ces travaux, plusieurs grands camps de base ainsi qu'une centaine de petits sites ont été repérés puis fouillés. La plupart étaient composés d'un simple foyer entouré de quelques artefacts résiduels. De nombreux mobiliers épars ont également été mis au jour, comme par exemple des restes osseux ainsi que plusieurs dépôts de lames de silex entassées les unes contre les autres et des restes isolés de couches de dépotoirs. L'extrémité d'une flèche en noisetier sur laquelle le microlithe était encore collé constitue une découverte exceptionnelle. *L. B.*

Schlüsselwörter / Keywords / Mots clés

Schweden / Mesolithikum / Maglemose-Kultur / Kongemose-Kultur / Torfmoor-Fundstellen
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