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Göransson, Hans
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The Middle Neolithic landscape at Alvastra in Östergötland

By Hans Göransson


At Alvastra, south of the hill Omberg in the province of Östergötland, are the remains of a megalithic tomb only two kilometres to the west-south-west of a well-known pile dwelling. It was built during an early part of the Middle Neolithic A and is roughly coeval with the pile dwelling. Having worked with seed analyses and pollen-analytical investigations within the Alvastra Pile Dwelling Project for many years, I decided to describe that era’s landscape. However, I extended my pollen-analytical studies to other areas in southern Sweden – also to areas where no megalithic tombs are found.

Hans Göransson, Gasverksgatan 10 A, SE–262 31 Ängelholm
goransson.hans@yahoo.se

Two kilometres to the west-south-west of Alvastra spring mire in which the renowned pile dwelling is situated there are the remains of a megalithic tomb (fig. 1). The area has seen intensive mire-stratigraphical and archaeological investigations over a century (Magnusson 1964; compilation by Browall 1986; Göransson 1987).

In the following, Götaland refers to the part of Sweden which lies to the south of a line from the northern end of the island of Gotland through the northern part of Lake Vättern and on to the Norwegian border. Uncalibrated radiocarbon dates BP are used (T1/2 = 5568 ± 30, 0-year = AD 1950) in order to facilitate correlation with pollen diagrams. The archaeological time scale for the Stone Age used in the present paper is Early Neolithic 5150–4550 BP, Middle Neolithic 4550–3750 BP, Late Neolithic 3750–3450 BP. This time scale is valid for Götaland and was proposed by the archaeologists on the Ystad Project (Berglund 1991). I am aware that an end date for the Neolithic closer to 3400 BP has since become widely accepted.

A well-dated pollen diagram from the ombrotrophic Dags Mosse bog immediately to the north of the Alvastra spring mire constitutes a reliable prehistoric calendar. (Lake Täkern never reached the pile dwelling; von Post 1913, p. 12. The large ground water reservoir of Heda to the east is the prerequisite for the existence of the mire.) Ombrotrophic peat is built up of plants which have been fed only by precipitation. Such peat gives particularly reliable radiocarbon dates. From the Dags Mosse diagram, Neolithic radiocarbon years may be transferred to all pollen diagrams from the Alvastra area and to other diagrams from eastern and southern Götaland (Göransson 1989). I have worked according to the same principles as within the Ystad Project (Berglund 1991). Then the time was not yet ripe to apply the Prentice-Sugita model and the simulation model POLLSCAPE (Sugita 1998; Sugita et al 1999).
Fig. 1. Topographical and hydrological map of the Alvastra area. From Göransson 1995.
Regional and local pollen diagrams
Regional pollen diagrams are derived from pollen-analysed sediment cores which are taken centrally in medium-sized or large basins. When pollen analysis is performed on cores from very small basins, the resulting local pollen diagrams tend to deviate from those from medium-sized or large basins. There may exist intermediate types of pollen diagrams which are both local and regional.

In all regional pollen diagrams from Scania in the south to Östergötland in the north a number of Neolithic pollen-analytical levels are rather easily observable (Göransson 1991). These levels or index horizons were first described by Tage Nilsson (1961; 1964) for Scania. He found that the levels were synchronous within that province. As I have demonstrated in several papers, these index horizons are also apparently synchronous from Scania to Östergötland and very likely over much larger areas (e.g. Göransson 1991, p. 24). In the following I use Nilsson’s 1961 designations for these horizons as they are well established in Scania. The datings of six distinct index horizons from three ombrotrophic bogs are given in tab. 1. Ageröds mosse is a bog in central Scania, Mabo mosse is in north-easternmost Småland and Dags mosse is in western Östergötland.

I introduced the designations “U-decl.” and “U-acc.” (Göransson 1991). U-decl. means the initial fall of the elm curve. The classical elm decline (index horizon U-acc.) means the steep fall (the accelerating fall) of the elm curve. The Early Neolithic is found between index horizon U-decl. and index horizon SB1 f. SB1 f marks the onset of forest regeneration after the elm decline and the start of the Middle Neolithic. SB1 c marks the last part of the regeneration phase when the elm curve declines again during the later part of the Middle Neolithic. Note that the megalithic tombs were built during the regeneration phase (see below). Below, U-decl. is referred to as “the elm decline”.

The Dags Mosse diagram
The Dags Mosse diagram is a regional pollen diagram, as the ombrotrophic *Sphagnum* bog comprises approximately 650 acres (260 hectares). A section of the diagram is presented in fig. 2. The period under study here starts at the elm decline, which roughly corresponds to the beginning of the Neolithic.

As seen in the diagram, the elm (*Ulmus*) and lime (*Tilia*) curves fall to a minimum at index horizon SB1 g while birch (*Betula*) has a maximum at this level (in some other diagrams *Pinus* or even *Alnus* have a maximum at SB1 g). The important index horizon SB1 f corresponds to the level where the *Ulmus* and *Tilia* curves begin to rise again after the elm decline while *Betula* is falling. This is the very level where forest regeneration starts after the elm decline and it constitutes the shift from the Early to the Middle Neolithic in pollen diagrams from southern Sweden.

Index horizon SB1 e is slightly, although distinctly, later than SB1 f. It is characterised by a further rise of the *Ulmus* and *Tilia* curves and a decline of *Betula*. Often the *Quercus* curve has a peak at this level. The forest history between SB1 f and SB1 e is thus characterised by a steady increase of pollen of ash (*Fraxinus*), lime (*Tilia*), elm (*Ulmus*), oak (*Quercus*) and hazel (*Corylus*). As will be discussed in the following, this does not reflect any overgrowth of an abandoned cul-

<table>
<thead>
<tr>
<th>Index horizon</th>
<th>Ageröds mosse</th>
<th>Mabo mosse</th>
<th>Dags mosse</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB1 c</td>
<td>4000 ± 90</td>
<td>not dated</td>
<td>4000 ± 55</td>
</tr>
<tr>
<td>SB1 e</td>
<td>not dated</td>
<td>not dated</td>
<td>4450 ± 60</td>
</tr>
<tr>
<td>SB1 f</td>
<td>4510 ± 80</td>
<td>4520 ± 60</td>
<td>4590 ± 60</td>
</tr>
<tr>
<td>SB1 g</td>
<td>not dated</td>
<td>4740 ± 60</td>
<td>not dated</td>
</tr>
<tr>
<td>U-acc.</td>
<td>5060 ± 90</td>
<td>not dated</td>
<td>5220 ± 60</td>
</tr>
<tr>
<td>U-decl.</td>
<td>not dated</td>
<td>5130 ± 60</td>
<td>5180 ± 60</td>
</tr>
</tbody>
</table>

Table 1. Datings of six distinct index horizons

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tural landscape with “virgin forest” – it means the opposite: a more effective use of the natural resources.

**The date of the megalithic tomb in the Dags mosse diagram**

The Alvastra megalithic tomb was built and in use during an early part of the Middle Neolithic (Arne 1924; During 1986; Janzon 2009). In the Dags mosse diagram – and in all other diagrams from medium-sized or large basins in Götaland – this era is found at the level SB1 f and up to level SB1 c. Thus the vegetation during the time when the Alvastra megalithic tomb was built is reflected in the Dags mosse diagram at – and between – these levels.

**Pollen-analytical dating of the pile dwelling**

Naked four-row barley and emmer wheat – the cereals cultivated by the people at Alvastra during the Middle Neolithic A (MN A) – spread extremely small amounts of pollen during flowering time as the pollen becomes trapped within the chaffs. Only when the ears are threshed or treated roughly are any great amounts of pollen released. Also, during the harvest pollen may be released when the ears are cut off and thus disturbed.

Great amounts of cereal pollen were found in the occupation layer of the Alvastra pile dwelling (Magnusson 1964; Göransson 1995, p. 67 f). During warming (drying) on the hearths and threshing (or other) activities on the floor of the pile dwelling, huge amounts of cereal pollen were thus released – during ten to fifteen threshing seasons. Most of this pollen fell to the floor, forming a cereal pollen peak (fig. 3).

Only a few metres outside the floor of the pile dwelling, cereal pollen values are much lower and tree pollen dominates strongly. The quota of cereal pollen in the spring mire at the “Alvastra time level” is, however, much greater than we

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Fig. 2. A section of the Dags Mosse diagram. A series of Neolithic pollen-analytical levels (“index horizons”) are easily observable from Dags Mosse in Östergötland in the north to Ageröds mosse in Scania in the south. These levels are synchronous over that area. Note that in some diagrams pollen of Cerealia type is labelled “Poaceae > 43μm”.

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ever find in any pollen diagram from south Sweden during that epoch. Thus, 32 m to the north-east of the eastern trench, five cereal pollen grains were found among 874 tree pollen grains, forming a small peak (fig. 4). With the aid of this cereal-pollen peak it has been possible to pinpoint exactly the time of the above-mentioned activities on the floor in the forest-historical succession – at index horizon SB1 e.

**Middle Neolithic A cereal cultivation is not reflected in the Dags mosse diagram**

The megalithic tomb was built about index horizon SB1 e and the pile dwelling was in use exactly at this index horizon. Gunborg Janzon (pers. comm.; 2009) believed that the two structures were coeval. Despite the presence of a large farming population in the area during MN A, the pollen diagram from the Dags Mosse bog shows a distinct regeneration of elm, lime etc. and no signs of cultivation of cereals or of grazing (fig. 2) during this time (SB1 e). The same goes for almost all other regional pollen diagrams from southern Sweden during that era. MN A farming is thus characterised by rather high values for elm, lime, oak, hazel and ash. Because of the filtration effect (Tauber 1965) or curtain effect (Göransson 1991) of growing forests, only very seldom are there any finds of cereal pollen from MN A in pollen diagrams from medium-sized or large basins.

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**Fig. 3.** Pollen diagram from the occupation layer of the Alvastra pile dwelling. The occupation layer was found between c. 0.4 and c. 0.95 m below the surface of the spring mire (c. 98.69 and c. 98.24 m a.s.l). The whole occupation level corresponds to index horizon SB1 e. Note the cereal pollen peak which reaches about 75%. Still higher values are seen in another diagram from the occupation layer.
Fig. 4. This pollen diagram is from a core taken 32 m to the north-east of the eastern trench. During MN A cereal pollen suddenly makes its appearance with abnormally high values for such a large basin at such an early date. The cereal pollen grains (which form a small peak) were transported by the wind from the platform to the investigation point. This small cereal pollen peak marks the date of the pile dwelling at index horizon SB1 e.

Palaeoethnobotanical material from the pile dwelling
In order to describe the cultural landscape during MN A it is necessary to turn to the pile dwelling and to a very local pollen diagram from Isberga. Palaeoethnobotanical investigations of the carbonised cereal grains (caryopses) from the 1976–80 excavations of the pile dwelling showed that the overwhelming majority of the barley was of the naked four-row type (*Hordeum vulgare var. nudum*). Out of c. 8600 cereal caryopses that I studied, 1256 were emmer wheat (*Triticum dicoccum*) while the remainder thus consisted of naked four-row barley. Both naked four-row barley and emmer wheat can be cultivated without the use of manure (Bertsch & Bertsch 1947).

The fruits and seeds of non-cultivated plants found in 1976–80 are also very rich, both quantitatively and qualitatively. About half a thousand carbonised seeds of mugwort (*Artemisia vulgaris*), for instance, have been registered. This is the earliest find of carbonized seeds of mugwort from the Funnel Beaker Culture area.

Cultivation of cereals in the Alvastra area during the MN A
As mentioned earlier, during harvests in MN A cereal pollen may have been released when the ears were cut (or broken) off. This implies that it should be possible to trace MN A corn fields which once bordered on very small basins, surrounded on all sides by light, lime-rich soils. Such a basin is found 3 km east of the megalithic tomb at the Isberga Nature Reserve or Norrö backar.

In the middle of the nature reserve is a small kettle hole filled with peat (fig. 5). Cores were tak-
en in this kettle hole and I pollen-analysed them. A charcoal particle found in the kettle hole at 97 cm below the surface was dated to $6435 \pm 165$ BP. The resulting pollen diagram thus starts during the Mesolithic (fig. 6). At 80 cm we find the elm decline which coincides with a steep fall of the lime curve, and at 70 cm we find the level which broadly corresponds to MN A. The Cerealia curve starts at the elm decline level and is unbroken through the whole of the Early and Middle Neolithic. The curves of various weeds reinforce this picture.

In the Isberga area cereals have been cultivated without interruption since the start of the Early Neolithic, through the Middle Neolithic and up to our time. Thus we can conclude that many fields of corn ought to have been found in the Alvastra-Tärkern area on suitable soils during the time when the megalithic tomb was built. The slope on which the tomb is situated (fig. 7) was likely used to grow cereals as were the light soils on the eastern side of Omberg Hill. Orma Kullar was also suitable, as were the light soils to the east of the Alvastra spring mire.

**Coppiced woodlands**

During MN A the light soils in the Alvastra area were covered with, above all, lime, oak and hazel. If a lime tree, an oak or a hazel is cut down in the autumn, winter or early spring the stump will sprout already in the following summer. The growing shoots will soon become fertile and spread pollen. Such shoots quickly grow up to “stump-sprout trees”. Many such trees will form a coppice (a coppiced woodland; fig. 8). Sometimes the term *coppice wood* has been used, not least by myself.

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Fig. 6. The pollen diagram from the kettle hole at Isberga. Note that grazing (reflected by *Plantago lanceolata*) and cultivation of cereals (sum Cerealia) have gone on without interruption in this steppe meadow area since the start of the Neolithic.

Fig. 7. Very likely cultivated fields and grazed areas were found in the coppiced woodland on the slope to the south of the Alvastra megalithic tomb. Probably more than one tomb was originally built at the southern end of Omberg Hill. At the same time the pile dwelling was in use. The arrow shows the excavated megalithic tomb. Photo: P-A. Carlsson.
Fig. 8. Alder coppice in late May 1997. When trees are cut down in the autumn or winter the stumps sprout in the following summer. These shoots will quickly grow into “stump-sprout trees”. Many such trees will form a coppice. Photo: author.

It should thus be difficult to observe clearings in forests of the above-mentioned trees, that is, the trees of the Middle Neolithic, by studying pollen diagrams from that epoch. We have to imagine – as a working hypothesis – a system of groves of different ages (coppices) on light soils. These groves were allowed to grow very dense so that the weeds were choked. Every year one grove was cut down, and twigs and thinner trunks were burnt. On the slightly burnt and cleared areas emmer wheat and naked four-row barley were sown, most likely in the spring. Larger trunks were probably used for fencing, fire wood or building timber (fig. 9). At harvest time the stumps had already sprouted. Next year another mature grove was cut down and cereals were sown in the soil. In this way the cultivated field wandered through the coppiced woodland. Such cultivated areas are termed “wandering arable”.

The cleared area was left alone for 10–30 years. This is only a guess. By taking harvests with such an interval on each small area, the light soils in the Alvastra area could have borne cereal cultivation – theoretically – over hundreds of years. It has been demonstrated that the piles in the pile dwelling were cut down in a coppice (Bartholin 1983). I had developed my “coppiced woodland model” before we received the dendrochronological results. I had to explain how cultivation of cereals could take place at the same time as the pollen from trees increased. One explanation was the wandering arable model. There is, however, another possible explanation: manured or non-manured permanent fields.

No regression in cultivation during MN A
As discussed above, pollen analysts can only expose MN A cereal cultivation if we take cores close to the former arable fields. The normal pollen picture from medium-sized or large basins of that era (from SB1 f-e and upwards) is that of regenerating forests (fig. 2). Such forest pollen spectra have fooled both pollen analysts and archaeologists into believing that agriculture ended at the beginning of MN A. People, it has been suggested, moved to the coasts and wild forests.
Fig. 9. Schematic drawing of coppices of different ages during an early part of the regeneration phase. 1) 25–40-year-old grove just before felling; there are no weeds in the dense grove. 2) The grove has been cut down and the ground cleared by burning. 3) One-year-old stump shoots and emmer wheat (in August) on the cleared area. Part of a fence, marked by trunks from the coppices, can be seen; not only fences but also pile dwellings could be built of such trunks. 4) A two-year old coppice on the previously cultivated surface. 5) A four-year-old coppice on the same surface. Soon the coppice will start producing pollen. Drawing: Göransson 1981, redrawn 1985.

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grew over former Neolithic settlement districts. What we see in the pollen diagrams from that epoch is, however, actually the opposite. The pollen spectra reflect continually used coppiced woodlands and grazed woodlands.

**Permanent fields during MNA?**

Were there permanent fields during MNA in the Alvastra area? Experiments in annual cropping of wheat and barley with and without manuring have been performed at Rothamsted and Woburn Experimental Stations (1970). These experiments demonstrate that harvests can be taken in the same area without manuring – on better soils in England – for more than a hundred years. Similar experimental cereal cultivation without manuring has also been tried on loess soil in Germany (Lüning & Meurers-Balke 1980).

Cereal cultivation without manuring on permanent fields on the light, calcareous soils at Alvastra – or in Falbygden in Västergötland – during MNA cannot be ruled out. Theoretically the Isberga area with its calcareous, well-drained soils could have been used in that way for centuries.

Jørgen Troels-Smith (1984) and his colleagues demonstrated that manure was taken from a Neolithic byre at Weier in Switzerland to a permanent arable field in the vicinity (Troels-Smith 1984). Thus permanent, manured arable fields may have existed in the vicinity of the winter byres which must have existed during MNA at many sites in Götaland.

**Grazing during MNA**

Already at the elm decline level, an unbroken *Plantago lanceolata* curve begins in the Isberga diagram, revealing grazing from the very first part of the Early Neolithic up to the present day (fig. 6). There was no break in the grazing during MNA. Also the grass curve (Poaceae < 37µm) is well developed during the Alvastra era (at 70 cm) and the Middle Neolithic throughout. As I have demonstrated in a series of papers, Middle Neolithic forests (outside the areas which were used for cultivation of cereals) were open, grazed forests from Alvastra in the north all across the investigated areas in southern Östergötland and north-eastermost Småland to southern Scania (figs 6, 12–13).
I have suggested that the large fens in the Alvastra area were grazed in early summer when the livestock was driven from the winter byres. Even today sedge communities are grazed in early summer in the Alvastra area (fig. 10). During middle summer the (coppiced) woodlands – outside the areas where cereals were cultivated – were grazed. Very likely Omberg Hill was grazed during the middle summer and early autumn – as was the Söderåsen ridge in Scania (Göransson 1999).

Winter-foddering of livestock?
During MN A winters, as far as can be judged, were at least as cold as today in the Alvastra area (Geoffrey Lempahl, pers. comm.). This means that the livestock had to be fed and watered during the long winter months. Most of the fodder used was likely leaves.

Many pollen diagrams from Neolithic occupation layers in Switzerland and southern Germany show sudden and extreme maxima for various trees and herbs (Rasmussen 1993, p. 497). These maxima reflect intentional collection of the species in question. Some deposits show unusually high percentages of Tilia, while in other deposits there are unusually high percentage values of Ulmus, Quercus, Corylus, Acer or Betula.

The pollen spectra from the occupation layer of the Alvastra pile dwelling (fig. 3) show abnormally high values for elm (Ulmus), lime (Tilia), other broad-leaved trees and mistletoe (Viscum). Goats and sheep love the twigs, bark and fruits of apple trees (Egon Axelsson, pers. comm.). Crooked twigs of crab apple trees were found on the floor of the pile dwelling (Bartholin 1983, p. 27). It may be suggested that goats and sheep were brought to the pile dwelling and fattened there with leaf-fodder before slaughtering. The leaf fodder may have been brought from a byre on higher ground.

Well-preserved goat droppings were found in the occupation layer in the eastern trench. The pollen spectrum from one of these droppings demonstrates that the goat had been fed with antherbearing twigs of hazel, elm and birch and probably blue anemone at the end of the winter (Göransson 1995, p. 82 f). This suggests that a sort of emergency foddering was practised at this time of the year – when the collected leaf-fodder had run out. Goats, sheep and cows survived with the aid of such emergency foddering (Göransson 1997; 2002).

Almost every sample from the occupation layer of the pile dwelling contains seeds of celery-leaved buttercup (Ranunculus sceleratus), a species which is highly favoured by liquid manure. Fat hen (Chenopodium album) – of which large amounts of seeds were found in the occupation layer – is also favoured by manure. Pupae of housefly (Musca domestica) have also been recorded (Lempahl 1995; 2012). Housefly larvae live in manure.

During wintertime the pile dwelling may thus have been used as a byre – at least for goats. This idea was, however, strongly opposed by the archaeologists on the Alvastra Project. Stig Wielander (1998) states that no real stables have been recorded from MN A. Many researchers have made the same observations (e.g. Årlin 1999).

The cultural landscape during the time of the megalithic tomb
From the above discussion we may summarise that the forests during MN A around the megalithic tomb and over much larger areas were cultural forests, that is, coppiced woodlands and grazed forests. On well-drained soils the coppiced woodlands were used for the cultivation of naked four-row barley and emmer wheat (“wandering arable”).

Pollen diagrams from medium-sized or large basis – such as the Dags mosse diagram – from the time when the tomb was built (around SB1 e) will give us a false picture of an abandoned cultural landscape overgrown with deciduous broadleaved trees. That is why archaeologists and pollen analysts to this day talk and write about a regression in cultivation during that epoch.

The megalithic tomb (or tombs?) at the southern end of Omberg Hill stood in a forested area, that is, in an area with coppices of different age. In such a landscape the tomb stood out. We who live today are used to timber forests of high trees and to large, open, artificially manured fields. This type of landscape is a product of the Laga skifte land enclosure reform and little more than a hundred years old. It is, however, evident that the landscape of today has a strong influence on our
Fig. 11. Pollen diagram from Kyrkviken Bay, Lake Ämbern, province of Östergötland. The grazing increases steadily during the Middle Neolithic, from index horizon SB1 f upwards. The radiocarbon dates are transferred from Dags Mosse and Mabo Mosse. After Göransson 1987.

minds. Fens characterised all of our provinces up to about 1900. They disappeared at about the same time as the coppiced woodlands.

Alvastra and Falbygden – a comparison
In the adjacent province of Västergötland, within a zone of about 40 by 25 km, almost 300 passage tombs are concentrated, only 70 km to the west-south-west of Alvastra. This tomb-rich area is named Falbygden. Most of the tombs were built between 4500 BP and 4200 BP (Persson & Sjögren 1996; Sjögren 2003), that is, during the regeneration phase.

Alvastra and Falbygden were especially favoured because of the presence of rich soils with a rich and varied vegetation. Calcareous steppe meadows (which were created by people and their livestock); calcareous glaciofluvial deposits with coppices of lime, oak and hazel; large, grazed fens (often rich fens) and hills with grazed forests of a range of broad-leaved trees were mixed in a way which favoured cultivation and thus a large human population.

Cultivation and grazing outside the megalithic areas in Götaland
Outside the rich areas described above, smaller areas with the same combination of different soils and varied vegetation were numerous, and most of Götaland was used by people during MN A. Götaland was characterised by coppiced woodland, wandering arable fields and probably also permanent fields, grazed forests and fens during this period. This is clearly seen in diagrams from outside the megalithic areas.

A diagram from Kyrkviken Bay in Lake Äm-
mern, 65 km south-east of Alvastra is presented in fig. 11. This diagram is both local and regional. The elm decline and the index horizons SB1 g, SB1 f and SB1 e are beautifully evident. We can observe a steady rise of the Juniperus curve from the beginning of the regeneration phase. Scattered Plantago lanceolata and Cerealia are found throughout the regeneration phase – during the whole of the Middle Neolithic. The steady rise of the Juniperus curve proves that the forests became more and more open. Juniper cannot grow in shade. Aspen (Populus) demands light. The forests were grazed during the whole of the Middle Neolithic, and wandering arable fields – and/or permanent fields – were found on light soils (the eskers).

The pollen diagram from the Mabo Mosse bog (fig. 12), which is currently in a marginal area, demonstrates that the forests of broad-leaved trees were grazed during MN A, during SB1 f and SB1 e. Plantago lanceolata is registered and it cannot grow in dense forest. This plant is typical of grazed areas but also grows on falls (Groenman-van Waeringe 1986, p. 200). Thus the landscape around Mabo Mosse in north-easternmost Småland was characterised by grazed forests, coppiced woodland and (wandering or permanent) arable.

The diagram from Lake Bjärssjöholmssjön in southernmost Scania (fig. 13) shows an unbroken curve for Plantago lanceolata during the whole of the Middle Neolithic. The Ageröds Mosse diagram from central Scania regularly records Plantago lanceolata during that epoch (Nilsson 1964). Grazed forests and coppiced woodlands with wandering arable fields and probably permanent fields have characterised this province from MN A up to recent centuries.
Acknowledgements

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References


Summary

A series of pollen diagrams from Alvastra in the north-east to Scania in the south are discussed in this article. The intention is to demonstrate that a megalithic tomb at Alvastra in Östergötland was built and used during a period when forests of broad-leaved trees began to regenerate after the elm decline – at the pollen index horizons SB1 f-SB1 e. It is suggested that the tomb was situated in a landscape of coppiced woodlands with clumps of different ages. In such a landscape the tomb was distinctly visible. On well-drained soils in the coppiced woodlands, four-row naked barley and emmer wheat were grown in wandering arable fields and probably also permanent fields. Certain very large open rich fens were of great importance – animals grazed there in early summer. Probably leaf-fodder was collected in the summer. Leafless, anther-bearing twigs were also collected in late winter when the leaf-fodder began to run out. It is not known where the leaf-fodder was stored or where the cows, sheep and goats were stabled in the wintertime.

To summarise, that high values for elm, ash, lime, oak and hazel in pollen diagrams from index horizon SB1 f and for several centuries ahead do not actually reflect any regression in cultivation. Instead, the high values for these tree species reflect coppiced woodland, a type of cultural forest, in which arable lands moved every year. However, permanent arable fields – both manured and non-manured – may have existed in the forests. It is difficult to compare the Alvastra area with the megalithic district to the west of Lake Vättern because of the old-fashioned pollen diagrams from that area.