13 Synthesis – A matter of life and death at Mienakker

J.P. Kleijne, S.M. Beckerman, D.C. Brinkhuizen, V. García-Díaz, L. Kubiak-Martens, G.R. Nobles, T.F.M. Oudemans, J.T. Zeiler, O. Brinkkemper, R.C.G.M. Lauwerier, B.I. Smit, E.M. Theunissen, A.L. van Gijn, J.H.M. Peeters & D.C.M. Raemaekers

13.1 Introduction

Much remains unclear about the settlement system of the Single Grave Culture (or Corded Ware phenomenon) in the Noord-Holland tidal area. It was therefore deemed useful to launch an Odyssey research project focusing on the analysis of the old excavations of the SGC sites at Keinsmerbrug, Mienakker and Zeewijk. Many finds from Mienakker had not been studied comprehensively and the totality of finds could not easily be related to the published features and the identified 'houses'.[483]

Mienakker so far

Mienakker was discovered during a borehole survey by RAAP archaeological consultancy in 1986 and excavated in 1990 by the State Service for Archaeological Investigations, now known as the Cultural Heritage Agency of the Netherlands. Since then, several interpretations of the archaeological remains have been proposed, mainly in preliminary form by the original researcher. Hogestijn attributed the Mienakker site to his group 2 classification, calling the site a temporary extraction camp.[484] He contrasted this group of sites with the larger, more permanent residential settlements in group 1. Hogestijn based his interpretations regarding Mienakker on the limited extent of the site (only approx. 500 m^2), the presence of a small structure (house plan), the absence of plough marks, the thickness of the cultural layer and find assemblages of bone (a high percentage of hunted wild animals), pottery (uniform and coarse wares) and bone and stone tools. This hypothesis was not however substantiated by a detailed and thorough examination of all cultural and ecological resources.

Drenth and others[485] reviewed the evidence for the Single Grave Culture in the Noord-Holland tidal area, and set the information available within a broader Dutch framework. They offered a critical evaluation of the proposed settlement system and site interpretations (group 1 versus group 2), based on the published archaeobotanical and archaeozoological evidence available at the time, looking for instance at the ratio of wild to domestic animals.

Research questions

This synthesis aims to combine the new analyses performed as part of the Odyssey project in order to provide an answer to the problems outlined above. The following research questions were raised at the start of the Odyssey project, and will be addressed in this chapter.

1. What is the spatial extent of settlement areas and how can any intra-site spatial differentiation be characterised?
2. What activities are represented in the artefact assemblages (ceramics, lithics, bone/antler tools, ornaments)?
3. What activities are represented in the characteristics of the archaeozoological and archaeobotanical remains?
4. What is the functional nature of structures and features?
5. What indicators exist for duration and seasonality of occupation?
6. What evidence exists for group composition?
7. What variability exists in the 'cultural biography' of objects?
8. What ecozones are represented in the archaeozoological and archaeobotanical assemblages?
9. What is the possible origin of inorganic resources?
10. How do the characteristics of the SGC settlements in Noord-Holland compare to SGC/Corded Ware phenomena in the wider geographical setting?

Some of these questions that refer to the site level can now be answered with reference to Mienakker. Since this is the second monograph to be published, reference will be made at the end of this chapter to the published results on Keinsmerbrug.[486] The more general questions will be answered after the material from the third (and, for this project, final) site at Zeewijk has been analysed.

13.2 Chronology

Relative chronology

Stratigraphical relationships exist between dark humic cultural layers, natural sandy clay deposits and several layers of consumed marine shells at

[483] Hogestijn 2001.
[484] Hogestijn 2001, 29; Hogestijn 2005.
[485] Drenth, Brinkkemper & Lauwerier 2008.
[486] Smit *et al.* 2012.

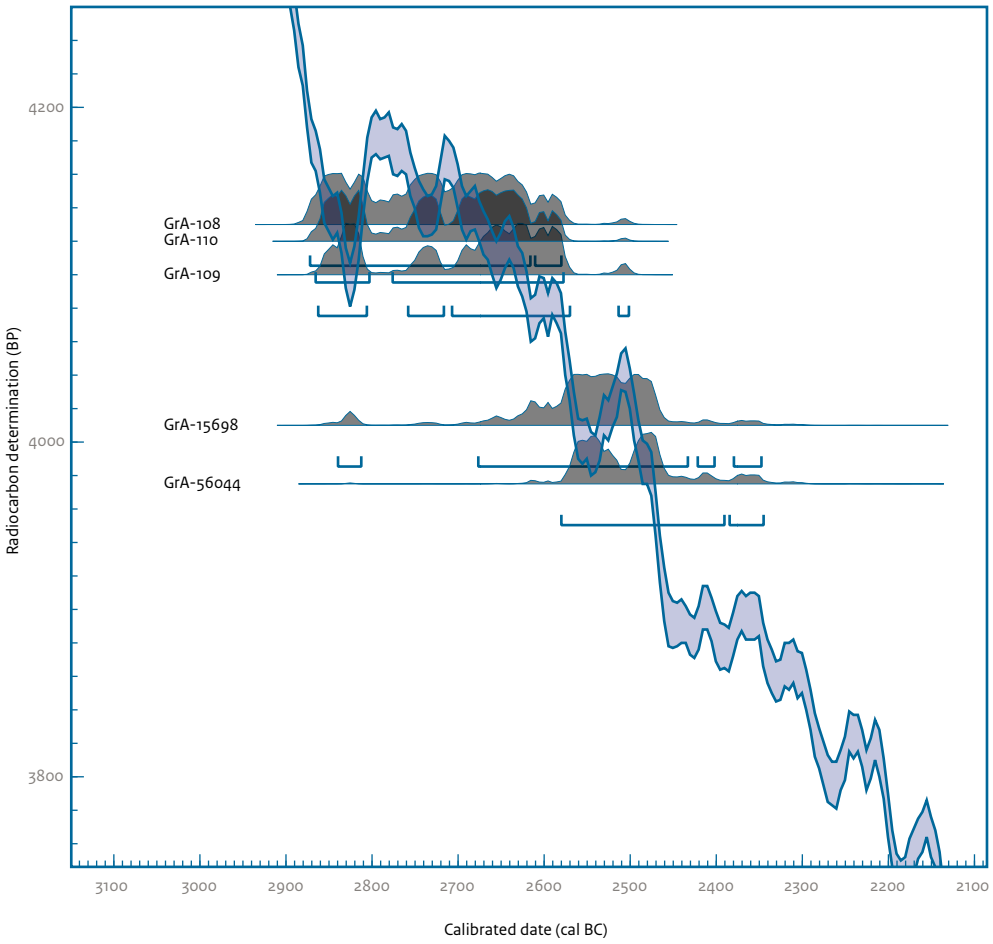

Figure 13.1 Plot of all ^{14}C results on the calibration curve.

the Mienakker site. Archaeological features at the site consist of postholes, hearths, pits and cattle hoof marks. One remarkable feature is a grave containing the remains of a male individual.

All these features are intertwined in the complex relative stratigraphy. Features are situated within the various cultural layers present at the site. However, in the process of this re-analysis it was not possible to retrieve all data concerning the layers and this complex stratigraphy. Furthermore, layer information was only recorded at the beginning of the excavation. As a consequence of this, many features were not attributable to a specific cultural layer and the cultural layers could not be isolated on the basis of spatial analysis.

By looking at superimposed features and overlapping and distorted find distributions using the results from spatial analysis, two distinct phases of occupation could eventually be discerned. The first phase of occupation is characterised by the presence of the oval/elongated structure Mienakker II (MKII house plan) associated with evidence of specific stone, flint and amber working. Food processing and butchering of animal remains took place to the north of the structure. Much of the settlement waste was deposited in this part of the settlement and in the creek to the south of the house. The settlement was later re-used, with the construction of a trapezoidal structure, partly on top of the silted-up creek. A burial was placed inside this structure, which has been designated MKI. The grave contained an adult male aged 26-35. After the construction of MKI and the burial, the settlement was abandoned and overgrown with peat. Later, in the Medieval period (12^{th}/13^{th} century), ditches were dug in order to reclaim the peatland for farming.

Table 13.1 Phasing of Mienakker, associated features, interpretation and absolute dating.

	Associated features	Interpretation	Dating
Phase 1	S120, northern refuse area, gully deposits, house MKII	house and domestic activities	before 2581 cal BC
Phase 2	Grave S54, top gully sediments, feature S120, structure MKI	ritual activities	after 2581 cal BC

Absolute chronology

Besides identifying stratigraphical relationships between features and cultural layers, ^{14}C dates were taken in order to gain an understanding of the chronology of the site. These dates, and the relative phasing described above, allow the site at Mienakker to be placed in an absolute timeframe (Fig. 13.1). Habitation took place somewhere between 2880 and 2480 BC. Traces and features like cattle hoof prints, fence lines, a storage pit (feature S120) and the postholes and hearth belonging to structure MKII can be positively attributed to this phase. A deposit of refuse north of the house and in the creek (probably still active at the time) constitute the material remnants of this phase of occupation at Mienakker.

Whether this is a single continuous phase of habitation is unclear. There might be more internal phasing of the site as a whole (as was also shown by the internal structure of the cultural layer in the micromorphological analysis and the many postholes which could not be related to probable structures), but this could not be discerned any further.

During or after this first phase, the creek silted up and the settlement was abandoned and no longer used for domestic habitation. In the second phase a substantial trapezoidal structure, MKI, was built. The structure was situated partly in the top of the creek sediments, perpendicular to its course. The remains of house MKII were also overbuilt and the prominent storage pit S120 was cut into. Structure MKI, a more ritual and ceremonial structure, enclosed the highly significant grave containing a human skeleton (Table 13.1).

Following this, the earliest possible point for the start of phase 2, the construction of MKI, is right after the deposition of charred grains in storage pit S120, no earlier than around 2581 cal BC. By then, the creek had silted up, and the human individual may already have died. Overall, we can conclude that a habitation phase and a funerary phase can be discerned at Mienakker.

13.3 Environment

The site at Mienakker is situated on a somewhat elevated area in a salt marsh environment. The site itself consists of a sandy levee next to an almost completely silted-up saltwater creek. This sandy sloping levee (Dutch: *kronkelrug*) overflowed several times prior to occupation. This creek had most probably not yet silted up when the first occupation phase started. The present analysis shows that a lot of material from the settlement ended up in this creek. The creek had definitely silted up during the second phase of use when a new structure, MKI, was built over it. The lower-lying parts of the landscape (the silted-up creek and the salt marshes) were overgrown with peat during and after the occupation at the site in the Late Neolithic. Both pollen analysis and macro-remains analysis at Mienakker and at the nearby site of Portelwoid[487] show that when people entered the region, they discovered a mosaic of vegetation on the nearby tidal flats and salt marshes. This mosaic tidal landscape was dominated by members of the goosefoot family (glasswort and various orache might have been particularly abundant), accompanied by sea-blite, sea aster, common sea-lavender, marshmallow and various grasses.

During the first phase of occupation, poplar trees (most probably aspen) grew near Mienakker in an open landscape with no dense tree coverage. The relative resistance of aspen to saline conditions accords well with the dominance of saltmarsh plants in the botanical macroremains. In the second phase, the

[487] Van Smeerdijk 2001.

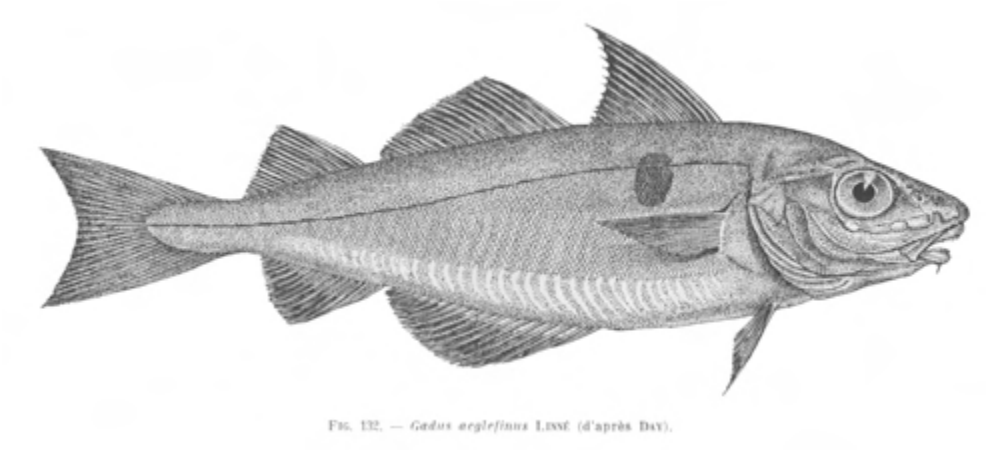

Figure 13.2 The haddock (from Poll 1947; source www.marinespecies.org) is rarely found in Neolithic sites and was caught in deep water by means of a boat.

landscape diversified, with birch occurring in the vicinity of the site. Oak was probably gathered from higher ground at some distance from the site (possibly the sandy outcrops at Wieringen).

The salt marshes must also have provided good opportunities for pasturing cattle as well as for fowling. The saltwater creeks themselves were present in the environment, as evidence of the fishing of cod and other saltwater species was found. The presence of many mature haddock remains, in particular, points to the proximity of cold, deep saltwater in the Noord-Holland tidal area. They might have been found in a deep primary tidal creek or at sea, near the coast.

Remains of catfish, pike and cyprinids also indicate the presence of freshwater resources near the site, most probably from local low-lying marshlands which had already lost their connection to the sea. In these freshwater environments, also located in the vicinity of the site, extensive reed swamps existed where willow and alder grew.

Trees (oak and hazel) were present on the higher ground surrounding the site, as indicated by pollen analysis. Where exactly these trees stood in the Westfrisian landscape is unclear.[488]

13.4 Exploitation of animal resources

The exploitation of animal resources at Mienakker was based on stock breeding, fowling, fishing and the collection of molluscs. Hunting played only a minor role in the subsistence pattern, probably as a source of hides and fur. This is indicated by the remains of specific seal bones, as well as some wild boar and several fur animals (polecat, stoat and pine or stone marten) and, in a single case, horse (probably wild).

Cattle, ducks, haddock, cod and flatfish were the most numerous animal species found at the settlement. Cattle were by far the most important food source in terms of meat supply. Age data suggest mostly adult and subadult animals were slaughtered. The abundance of cattle hoof prints, possibly surrounded by post-fences, at the settlement also shows the importance of keeping cattle close by. Sheep, goats and pigs were of minor importance. This pattern of cattle-dominated meat consumption is found at most sites in Noord-Holland during the Late Neolithic.[489] Molluscs were collected, probably along the tidal creek, most likely in trusses, and transported to the site. The abundance of shells at Mienakker does not provide conclusive evidence of the importance of shell gathering for subsistence, as the consumption of shellfish leaves large amounts of waste, for limited calorific gain.[490]

An important aspect of subsistence at Mienakker was fishing. Fishing was conducted at Mienakker mainly in the saltwater and brackish environment. Haddock, and to a lesser extent cod and plaice/flounder, were caught in the vicinity of the settlement. The high numbers of adult haddock is remarkable, as haddock is a species that thrives in cold waters (Fig. 13.2). It is

488 Van Smeerdijk 2001, 233.
489 Zeiler 1997.
490 Kuijper 2001.

therefore most likely that haddock were caught in the winter in a deep tidal creek or on the open sea.[491] One can envisage these particular fishing events taking place further away from the settlement, possibly lasting several days. Mienakker is the only prehistoric site in the Netherlands where evidence of haddock has been noted in such abundance. Interestingly, the Danish Corded Ware settlement at Kalvø also presents evidence of haddock fishing.[492] Whether this constitutes evidence of a practice more common in the Late Neolithic, or the remains at these two sites represent specific one-off episodes of deep-sea fishing is still unclear.

When it came to fowling, the catch consisted mainly of duck, mallard and teal or garganey. The quantity of ducks found at Mienakker is remarkable. From the distribution of skeletal parts within the assemblage it was concluded that most of the ducks and geese were consumed at the settlement. Traces of butchering were absent on the Mienakker bones, in contrast to the Keinsmerbrug material, where bird bones were still far more abundant. This distinction between Keinsmerbrug and Mienakker highlights the difference in the nature and function of the two sites within the settlement system of the Late Neolithic Single Grave culture in the Noord-Holland tidal area. Besides ducks and geese, small numbers of other species were also found. One interesting factor is the presence of fulmar, unique in a Dutch archaeozoological assemblage.

Animal use

Evidence for the use of animals in the production of wool, milk or cheese or other 'secondary products', is virtually absent. The hunting of small wild animals and seals could be related to the production of fur and hide for clothing.

Animal bones were used for the production of common utilitarian objects. Several bone 'ripples', made of ribs and vertebrae, were found.[493] Although the Mienakker ripples were not suitable for use-wear analysis, the results from Zeewijk point to the use for skin scraping.[494] Other bone tools, a piercer and chisel, were made of red deer metatarsal bones, and were probably brought to the settlement.[495]

Several configurations of straight and bent wooden branches were recovered from the creek in two separate clusters, presumably indicating the skeleton of a skin-lined boat. This interpretation is substantiated by several strands of indirect evidence. First of all, a significant quantity of very specific seal bones were found in the animal assemblage. The composition of the seal bone assemblage suggests that seal skins, with metacarpal and metatarsal bones attached, were brought to the settlement. Traces of cutting on the seal bones and wear traces on the flint artefacts indicate hide skinning took place at the settlement. These seal bones are interpreted as the refuse of hide working. Hide, and especially seal hide (which is naturally water resistant), could have easily been used to create the impermeable hull of a skin-lined boat. Secondly, fishing for haddock, probably in a deep gully or on the open sea, since this is a species that prefers cold waters, would have to have been done using a boat. All in all, both the wood remains in the creek and the seal bones point to the possibility that vessels were used and built at the settlement.

13.5 Crop cultivation and use of wild plant resources

Cereals have been found in great abundance at the settlement. Naked barley and emmer wheat were the principle crops produced. Flax was used for its oil-rich seeds and, possibly, also for its fibres. The production of two different cereals might suggest an attempt to spread risk. If a single crop failed due to weather conditions, the other crop type might be more resistant and produce enough yield for survival. It seems that complete ears and, possibly, entire plants of barley and emmer were brought into the settlement. There is good botanical evidence for the storage of cereals, contained within a single feature (S120). The barley crop was stored as semi-clean (possibly partly immature) ears, while emmer was stored as semi-clean spikelets. Botanical evidence also suggests that Mienakker was a small-scale producer settlement. The presence of quern fragments and use-wear traces related to the processing (grinding) of plant resources such as cereals at the settlement also suggests the on-site processing of cereals for consumption. Both the concentration of cereals and the stone quern fragments are spatially related to the domestic structure, MKII.

[491] See Pickard & Bonsall 2009 for a discussion based on evidence of deep-sea fishing in the European Mesolithic.
[492] Enghoff 2011, 283.
[493] Lauwerier 2001, 182.
[494] García-Díaz, in preparation.
[495] Not included in the present study. See Lauwerier 2001, 181-182, Fig. 42.

Cereals were probably grown in the vicinity of the settlement, on other areas of the higher sandy levee. Minor evidence of ard marks on the eastern part of the settlement, on the same levee, also points to the presence of arable fields nearby.

In addition to crop plants, hazelnuts, acorns and crab apples were gathered for food. They would all have been gathered in autumn and stored for winter use. They must all have been collected at some distance from the site. Some of these resources might have been also used to feed livestock. It is known, for example, that acorns are important fodder for pigs.[496] The fact that acorns were consistently found in charred remains, however, suggests some method of processing, most likely for human consumption. Other wild plants with edible leaves, stems and shoots such as sea aster, glasswort, annual sea-blite and various orache species might have been readily available on the salt marshes close to the settlement. The young plants of these species may have been eaten raw as green vegetables or cooked in combination with other foods such as meat, fish, cereals or roots. Various closely-related members of the goosefoot family (orache species in particular) may have been collected for their edible seeds.

Plants used as raw materials

Construction wood and firewood were probably gathered in the vicinity of the settlement and consisted of alder, birch and poplar, and (at a further distance) oak. Whereas reed, poplar, birch and oak were mainly used for firewood, oak was also used for construction. Willow twigs may have been used for wattle or for binding and tying, and for making fishing traps.

Various grasses, rushes and sedges may been used in many ways as building materials or to furnish the settlement. Reed, great sedge and sea club-rush may have been used for thatching roofs and making the walls of the houses. Cattail leaves and stems of club-rush may have been used to make sitting and sleeping mats, floor coverings, and to insulate the walls of the houses. Willow bark would have been an excellent material for making ropes. Dried stands of various plants such as reed, rushes, sedges, and even glasswort and sea aster may have been collected for fuel.

13.6 Food preparation and consumption

It was possible to observe food processing by looking at patterns in the zoological and botanical data and by chemically and botanically examining the residues in food crusts on pottery. Meat was probably roasted in the hearths, as indicated by burning on the mammal remains (cattle, sheep, pig and bird) and on the fish bones. Cereals and other types of plant food such as orache were also consumed at the settlement.

The skeleton of the buried man was ^{14}C dated and carbon and nitrogen isotopes were measured in the process, giving an indication as to his diet. The $\delta^{13}C$ and $\delta^{15}N$ values of the human bones indicate that aquatic food constituted a large proportion of his diet.

The combined chemical and botanical evidence showed relatively broad internal variation in the organic residues. Chemically, the food crusts contain both polysaccharides and proteins. The most important aspect of the preparation of food at Mienakker is the near-absence of fat or oil in the residues. Specific cooking practices in which both oil and fat played only a minor role should be envisaged. The absence of lipids from most residues suggests a plant origin in the form of protein- and carbohydrate-rich plants, such as orache and other closely related chenopods. An animal origin for the proteins is also possible, although only a few edible animal materials render an almost fatless protein (e.g. blood, egg whites, very lean meat or fish, some shellfish and whey). Interestingly, SEM examination showed the presence of fish scales in two residues, indicating that fish was cooked in a pot. The polysaccharides in the residues most likely originate from starch-rich plants that would have been available to people at Mienakker, including cereals, acorns and roots. Green vegetables such as fleshy stems, leaves and/or shoots were sometimes added to meals rich in protein and carbohydrates rather than themselves constituting the main component. There is evidence that cereals were cooked for food, albeit only in one residue.

[496] Ten Cate 1972.

All in all, food preparation in the Mienakker ceramics ranged from the cooking of emmer grain, and the cooking of food with the addition of green vegetables, to the cooking of fish and a mush of seeds, nuts and/or roots. The diversity of food sources exploited and meals produced is fairly large, and suggests that various cooking practices were involved in the preparation of food at Mienakker.

13.7 Production and use of ceramics

The ceramics at Mienakker are very uniform. There is a large class of thin-walled ware tempered with grog and containing sand. This ware is sometimes decorated with cord lines and, in a fewer instances, with zigzag patterns and horizontal rows of oblique spatula impressions in one or two directions. A smaller class of thick-walled ware contains grog and sand and sometimes organic matter (plant) and is undecorated. Just a small number of ceramics can be related to a specific phase. There are no striking differences between the vessels from the habitation phase and the phase related to the funerary structure, so no chronological development could be observed. Morphologically, the ceramics at Mienakker almost all represent beakers and S-shaped vessels. In terms of types, the beakers are possibly related to Van der Waals and Glasbergen types 2IIb or 1a, the zigzag type, 1e or 2IIc and 1d or 1b.[497] These types are not chronologically very different from the Keinsmerbrug ceramics.

The use of ceramics at Mienakker was investigated by means of residue analysis. Botanical and chemical analysis of the food crusts showed that the ceramics were used for cooking a multitude of different types of foods, as shown above. Even though only the thinner wares contained crust (cooking residues were not discovered on the thicker and rougher ceramics), the use of the vessels at Mienakker reflects a broad range of cooking practices. The residues themselves show much more variation than at Keinsmerbrug, prompting the idea that a broader range of foods were processed and a more varied diet existed at Mienakker.

13.8 Production and use of flint, hard stone and amber

Analysis of the raw materials suggests that stone, flint and amber were gathered locally at the beach and at the Pleistocene glacial erratic outcrops at Wieringen. Most flint derived from northern or southern rolled sources, ending up along the shore or in glacial till. Only a few pieces of true southern (specifically Grand-Pressigny) flint were found (and confirmed by thin-sectioning).[498] These fragments could be part of a single Grand Pressigny artefact (possibly a dagger?[499]) that was broken up, reused as a core and discarded at the settlement. The possibility that this tool was collected at some other (abandoned) settlement in the vicinity cannot be ruled out.

Stone artefact production at Mienakker was characterised by a specific choice of raw materials and specific functional aspects. Large hard stones were flaked in order to produce querns and grinding stones, while hammerstones were left unmodified and used on the spot for many unclear activities. The quern stones were used for the grinding of cereals and, in one instance, for hammering other plant remains.

Flint artefact production was based on flake technology, with a low percentage of retouched implements. Core reduction was executed using both *ad hoc* bipolar and unidirectional knapping (related to the physical characteristics of the parent material). Specific tools such as borers and scrapers were produced using both techniques. The presence of cores, waste and splinters is indicative of the production of flint tools at the settlement. Flint tools were used for the processing of vegetable tissues (hard and soft wood and non-siliceous plants), animal tissues and mineral materials. The use of flint tools for the processing of animal remains mainly relates to activities of hide working and skin scraping, though evidence of meat processing and bone working was also discovered. Several borers were used for the processing of mineral materials such as amber. These tools were mainly used in the production of amber beads. Perforations were probably made using the flint borers (as no other borers have been found), producing conical, bi-conical and cylindrical perforations.

497 Van der Waals & Glasbergen 1955.
498 Peeters 2001a, 531.
499 Peeters 2001a, 571.

The amber itself was flaked, cut and polished in order to obtain the required dimensions for beads. Most of the amber beads show traces of wear on the inside of the perforation, indicating use as pendants. Interestingly, a single pit outside the main area of the settlement (feature S138) contained a large amount of amber flakes and small splinters.

13.9 Spatial distribution of finds and features

13.9.1 Identification of activity areas

The spatial analysis of all finds (pottery, flint, stone, amber and zoological and macrobotanical remains) led to the identification of some particular activity areas. Several areas were discovered on the basis of a single find distribution, or combinations of multiple find distributions. These areas include the inside of structures MKI and MKII, where finds of flint and stone (and, in MKII, also amber) are associated with the hearths. The finds north of MKII, consisting of animal bone, flint and stone, are associated with cattle hoof prints and possible fence lines. This might indicate that this specific area was used for keeping cattle and dumping refuse during a particular period in the occupation of the settlement. Another concentration of finds is found around a storage pit (feature S120) in which a large quantity of cereal grains and cereal chaff was found. Finds spatially associated with this feature are mainly flint and stone artefacts. This feature is associated with the storage and processing of cereals during the habitation of the settlement.

A specific concentration of amber finds (mainly flakes and splinters) and flint artefacts comes from a feature outside the settlement area and could represent an amber working area. The containment of these flakes and splinters in a single pit outside the main settlement area could point to specialisation in amber bead production, or the structured (perhaps ritual) deposition of amber bead production waste.

13.9.2 Features and dwellings

The features at Mienakker consist of postholes, pits, two natural creeks, a grave, hearths, a hearth pit, a few ard marks and many cow hoof marks.

Two structures were reconstructed on the basis of the spatial analysis of finds and features (Fig. 13.3). MKII is an oval structure with double postholes around the centre and single postholes forming the rounded ends. MKII is 16.5 m in length and up to 4 m wide. The structure is built parallel to the southern creek. The contours of this house are also suggested by find distributions, especially of flint, stone and amber. Furthermore, a hearth was found within this structure, around which evidence for flint knapping and amber working could be reconstructed. The spatial distribution of daub just outside the MKII structure, might be indicative of a collapsed wall. The finds and features suggest that this structure was most likely a domestic residential structure: a house.

MKI was identified by Hogestijn as a small dwelling structure of c. 5-7 x 3 m.[500] Spatial analysis of the finds and features has shown it is much larger, however. It is probably a trapezoidal structure 22 m in length and 3-6 m wide. It is oriented on a SW-NE axis. This structure resembles the well-known large Zeewijk structure, in both length and post configuration on both short sides. However, the posts on the long sides of MKI are not regularly placed as is the case with the Zeewijk structure. MKI crosses the creek, and must therefore be later than this feature and thus could only have been constructed after the creek had silted up. Similarly, a wall post cuts through feature S120, a storage pit, and must thus be later than this feature. Finds and features associated with the MKI structure are a hearth pit and, more significantly, the burial pit containing the grave of an adult male. This has prompted the idea that this was most probably a mortuary structure.

[500] Hogestijn 2001.

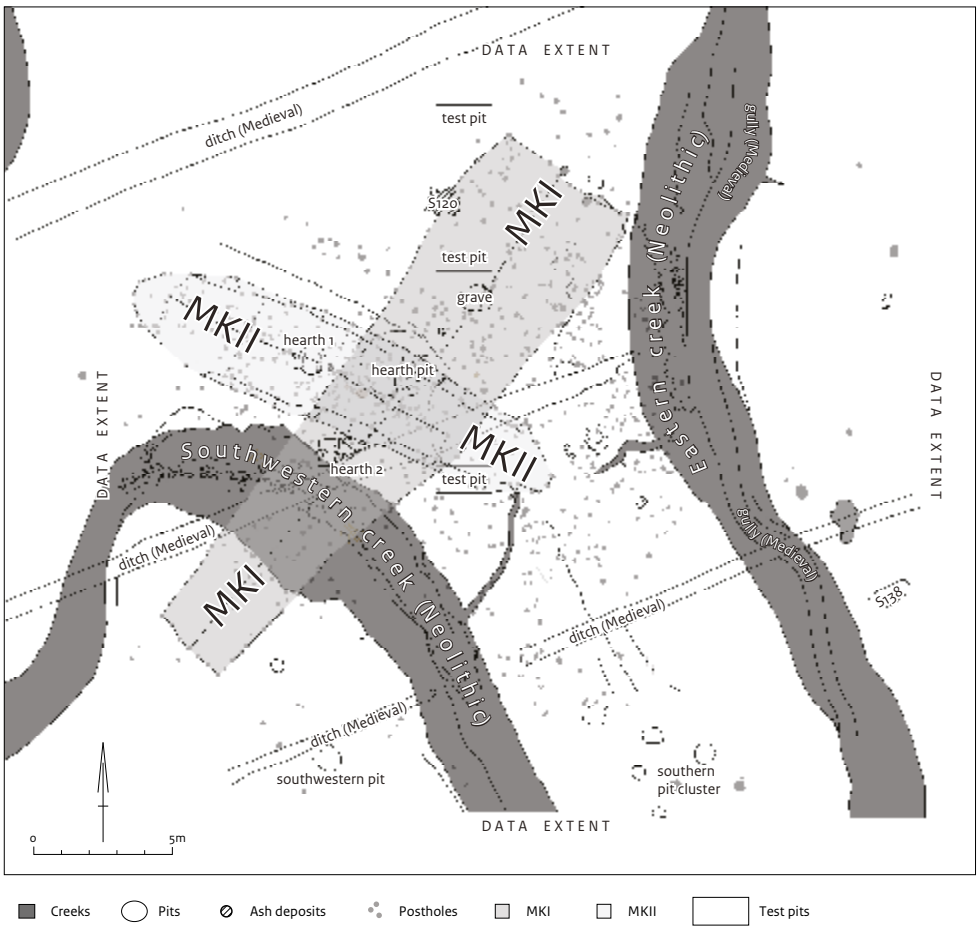

Figure 13.3 Mienakker features and the interpretation of structures.

13.10 Seasonality at Mienakker

The archaeozoological information points to year-round activities at the settlement. Mallard and teal/garganey were most probably caught in late summer, during the moulting period. Flounder, stingray, grey mullet and bass are indicative of fishing in summer. On the other hand, the presence of mature specimens of haddock points to fishing in deep waters, most probably during winter.

In addition, several interesting patterns related to seasonality emerge from the practice of cereal cultivation (emmer wheat and naked barley) in the vicinity of Mienakker. The cereals would have to be sown in spring in order to avoid flooding with saltwater during autumn and winter. Then end of summer would have been the season for cereal harvesting. Evidence of large grain concentrations in two specific features on-site along with considerable quantities of threshing by-products from the early stage of crop processing indicates that Mienakker was a settlement where people stored and processed their crop yields in late summer/autumn, and possibly from which they sowed and tended the fields as well. Wild plant food resources such as acorns, crab apples and hazelnuts would have been gathered at the end of summer and in early autumn, after which these resources could be stored for use during winter. Green vegetables would have to be collected in spring to early summer as most of the leaves, stems and shoots are available in a palatable and digestible form only when young.

Combining the season-specific information (Table 13.2) we would conclude that Mienakker was probably inhabited throughout the year. Different subsistence activities – fishing,

Table 13.2 Seasonality at Mienakker.

Seasonal activities	Spring	Summer	Autumn	Winter
Fowling: mallard and teal/garganey		■		
Fishing: flounder/stingray/grey mullet		■		
Fishing: haddock				■
Gathering: acorn/hazelnuts/crab apples		■	■	
Use of plants: agriculture	■	■		
Use of plants: gathering green vegetables	■			

gathering and farming – were carried out in specific seasonal episodes during the year.

13.11 Concluding Mienakker

We can conclude from the above that Mienakker was a small domestic settlement situated in the Late Neolithic dynamic tidal landscape of Noord-Holland, and occupied all year round. Many different activities were performed at the settlement in different parts of the year and in many places in the wider landscape. Mienakker was a central location in a broad spectrum of activities related to subsistence; farming (processing, storage and consumption), foraging, fishing and fowling took place in the wider region. Traces and remains of all these activities were deposited at the Mienakker settlement. Products or results of these activities ended up in the food consumed by the Single Grave communities at Mienakker. Multiple strands of evidence produce a picture of a diet which was varied and rich, containing cereals, fish, birds, cattle and wild plants. This contrasts significantly with the Keinsmerbrug results, where a less varied spectrum of activities was recorded and a less diverse range of food was prepared and consumed.[501]

The higher levees next to the creeks at Mienakker were the stable landforms in the dynamic tidal wetland landscape. Many traces of domestic activities at the site relate to the stability and permanence of a Late Neolithic settlement. Compared to the structures identified at Keinsmerbrug, a firm and sturdy house was constructed at Mienakker, various hearths (containing multiple traces of use) were built, cattle were kept in a specific area of the settlement and refuse was dumped outside the house structure to keep the living floor clean.

Materially, this stability is observed in the tools and equipment used in everyday life. Pottery was produced in a uniform fashion into thin- and thick-walled wares, indicating production within a single framework of knowledge and tradition, with decoration being the main exponent of creativity. Only thin-walled vessels were decorated and used for cooking. Cooking and eating, being social activities, made the decoration on these vessels purposeful in communicating aspects of Corded Ware society within and beyond the local group.[502] This also relates to the importance of thick-walled vessels for other less social purposes, most likely storage. This observed pattern is different from Keinsmerbrug, where the variation in production technology was large, and all vessels were used for cooking. There we interpreted this as the gathering of different groups of Corded Ware households who brought their own pottery, and used both decorated and undecorated thin- and thick-walled vessels for the cooking of a single specific type of meal.[503]

At Mienakker specific flint artefacts were produced for labour-intensive activities carried out at the settlement, such as scrapers for hide scraping and borers for amber bead production. Hard stone tools, querns, hammerstones and a grinding stone also relate to regular subsistence activities carried out at a Late Neolithic settlement such as the processing of cereals and animals and even possible use in pottery production. The production of amber is another specific activity which took place at Mienakker, both in the domestic house as well as at the edge of the settlement, possibly of a more

501 Smit *et al.* 2012.
502 See also David, Sterner & Gavua 1988; Dietler & Herbich 1989; Gosselain 2000; Kleijne 2010.
503 Smit *et al.* 2012.

ritualistic nature. All the stages in the production process are represented at the settlement, as well as several final products and tools used in the production process, indicating the local, intensive and specialist nature of the craft at this settlement.

The landscape changed towards the end of Late Neolithic occupation at Mienakker. The creeks close to the settlement had silted up, the large tidal inlet near the coast had changed its course, turning the surroundings of Mienakker into a backswamp area, with the levees and refuse areas as higher relics in a landscape drowning as the water table rose. A new distinct structure was constructed on the remains of the Mienakker settlement, probably during the latest stages of occupation. This trapezoidal wooden structure was deliberately built over and perpendicular to the older remains of the domestic settlement and landscape topography, and postholes were dug into the culture layer and older features. A hearth pit was constructed and used for many short intervals, linked to the new way of using the settlement. This could be interpreted as a break in tradition or a deliberately chosen way of ending the occupation. The most emotional event linked to this phase was the death of a male individual, possibly an inhabitant of the settlement at Mienakker. His remains were deposited in the centre of the trapezoidal structure, invoking a link between the structure and the grave as a final act of human presence in a once settled landscape.