Times fade away. The neolithization of the southern Netherlands

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2 Merselo-Haag, a Late Mesolithic site with Early Mesolithic traces in the core region Venray.

2.1 Introduction

The Mesolithic settlements in the south of the Netherlands have yielded only few organic remains. Usually these are carbonized hazelnut shells and in one instance burned remnants of bones[1]. In addition, a number of single bone and antler finds provide an indication which animals were hunted by Mesolithic man. Due to these meagre remains it is not possible to create a picture of the behaviour and economy of Late Mesolithic communities in the south of the Netherlands. Despite several attempts this investigation, too, did not manage to find sites containing organic remains. The number of sites with favourable conservation conditions has decreased dramatically over the last decades. These have been lost as a result of land consolidation, agricultural activities, large infrastructural projects and house building. Judging by the location of the nearest Mesolithic sites containing organic material[2], there appear to be possibilities in the deeper parts of the river valleys. This, however, would require vast amounts of time and money.

We therefore need other sources to allow a reconstruction of behaviour and economy. For the reconstruction of the economy we have to restrict ourselves to the information provided by the thousands of surface finds containing flint only.

By analysing the artefact composition of a site, studying the site in relation to its position in the terrain and by investigating the settlement pattern, economic information may be obtained, under certain assumptions[3]. The insight obtained in this way may then lead to further investigations on site level.

This chapter provides an example of this procedure. With the aid of the available data a picture is created of the behaviour and economy of Late Mesolithic hunter-gatherer communities and this is subsequently tested on two levels. First it is compared to the different types of settlement and the settlement pattern in the core region Venray. Then the results obtained are tested on the levels of microregion and site. To this end we excavated a Late Mesolithic hunting camp at Merselo-Haag in 1989. By correlating all data obtained, a synthesis is attempted of behaviour and economy of hunter-gatherers in the Late Mesolithic.

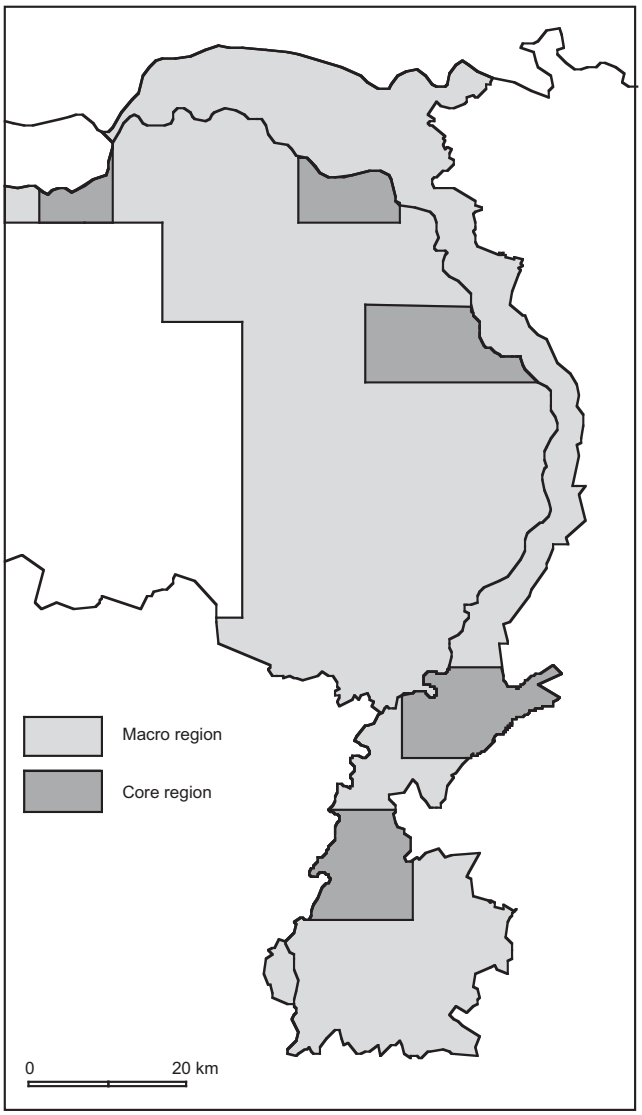

Fig. 2.1 The southern Netherlands with the location of the macroregion, with its core regions. From north to south these are: 's-Hertogenbosch, Grave-Cuyk, Venray (black outline), Roerstreek and Graetheide.

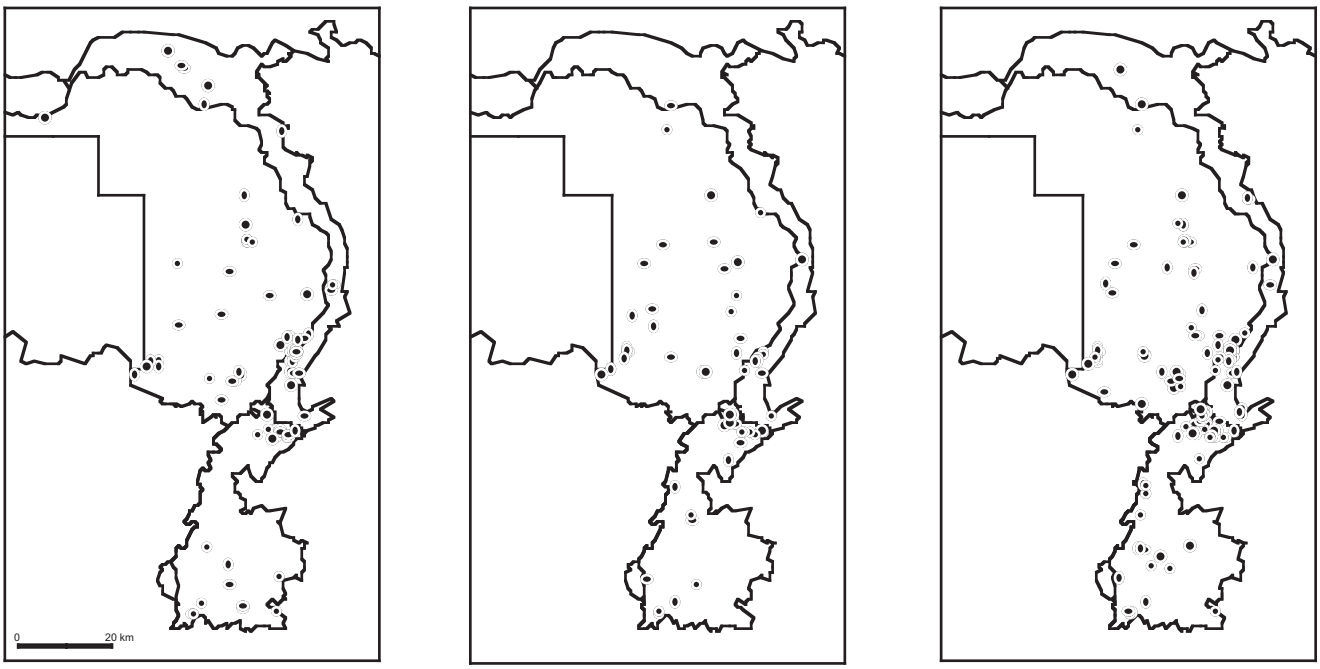

Fig. 2.2 Distribution of all Early- (a), Middle- (b) and Late Mesolithic (c) sites over the macroregion.

2.2 The Late Mesolithic in the south of the Netherlands

Knowledge of the Late Mesolithic in the south of the Netherlands is sketchy and full of gaps. Sources are several general survey publications[4] and numerous smaller publications, like find reports and excavation accounts. These provide a framework that may be supplemented with the data of a relatively small number of excavated settlements in the Netherlands and Belgium, as well as data from neighbouring countries.

The general idea is that in the Late Mesolithic small groups of hunter-fisher-gatherers migrated in a yearly cycle along places where, among other things, they could find food or meet in larger groups for social contacts, in order to exchange information, barter raw materials and find a mate. These activities are reflected as a pattern of sites with flint artefacts. Depending on the nature of the activities and the size of the group, various types of settlement should be discernible, such as aggregation camps, base camps, hunting camps and special activity camps. Residential structures have not been found in the south of the Netherlands. The size of the annual territory is hard to specify, but there is a trend towards smaller territories and possibly concomitant lowered mobility over the Late Mesolithic in northwestern Europe[5].

Due to the absence of bones and carbonized botanical macroremains from that period, it is difficult to reconstruct the food economy. Extrapolation from food data from neighbouring countries, in particular Denmark and Germany, makes it likely big game (aurochs, elk, red deer, bear, boar) was hunted, as well as small game (roe deer, wild cat, fox, beaver, otter), birds and fish. We assume the share of marine food resources will have been great along the seashore, but it is questionable whether the seashore was within the annual territory of Late Mesolithic Limburg hunter-gatherers. Besides hunting and fishing the gathering of vegetable material like nuts, berries, fruits, roots and greens will have contributed significantly to the diet.

Hunting, fishing and gathering occurred with a wide range of tools. These often multi-component tools consisted of mainly organic material and have generally decomposed. The imperishable parts — stone and flint — are found in large numbers. The tool most characteristic for this period is the trapeze projectile point.

2.3 The macroregion

The distribution of all Mesolithic sites, irrespective of period, in the macroregion displays a pattern of empty zones and clusterings that is mainly the result of investigative factors, viz. amateur activities (fig. 2.2). There are only few

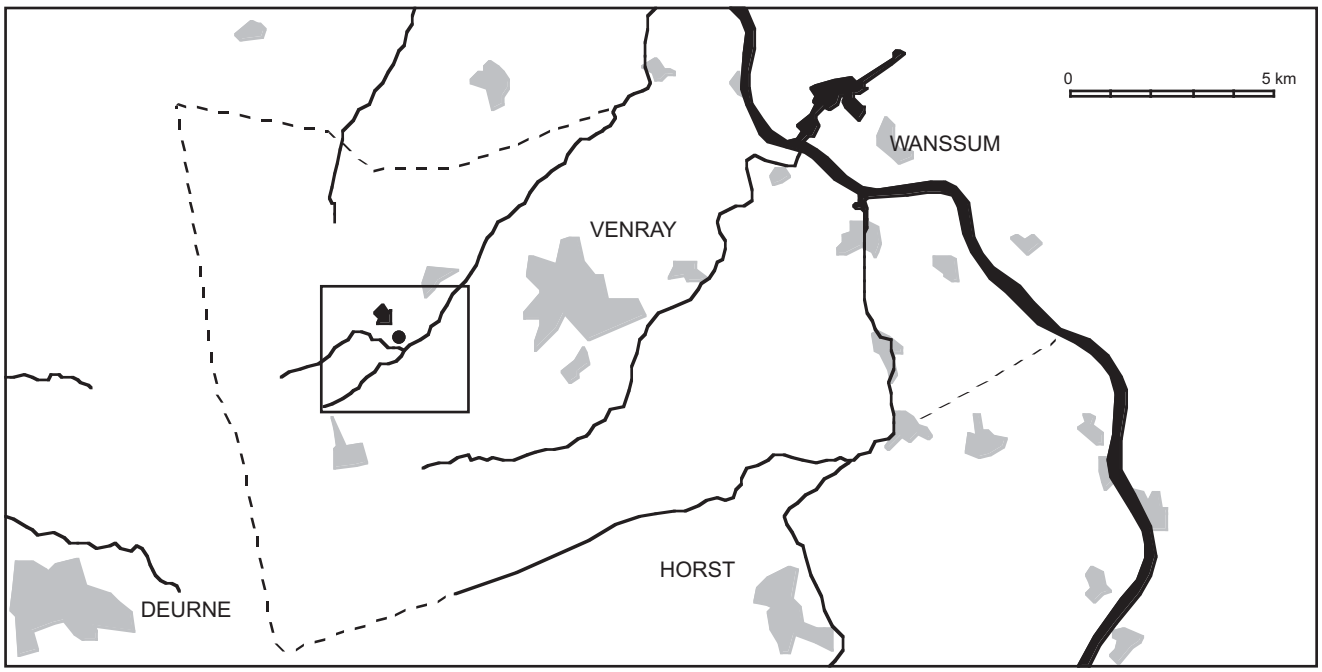

Fig. 2.3 The core region Venray with the microregion Loobeekdal and the excavation site Merselo-Haag. Towns and villages are indicated in grey.

guide artefacts for the Early, Middle and Late Mesolithic. For the Early Mesolithic, the A-point is the most suitable chronological indicator. The distribution of A-points displays a pattern almost identical to that of all sites. Investigative factors play a part here as well. The Middle Mesolithic is characterized by the use of points with surface retouch. The distribution of Middle Mesolithic sites, as compared to the Early Mesolithic ones, shows only minor differences. For the Late Mesolithic the most striking artefact is the trapeze point. Remarkably, there are hardly any differences between the three distribution patterns: Early, Middle and Late Mesolithic.

The distribution patterns of Mesolithic sites in the macroregion strongly match those of later periods. So they are more likely to reflect the investigation than document the spatial behaviour of hunter-gatherer communities. Without additional analysis therefore, hardly any conclusion can be drawn from these patterns.

2.4 The core region Venray

The core region Venray (fig. 2.3) covers the territory of the town of Venray and parts of the towns of Meerlo-Wanssum and Vierlingsbeek. To the west, it is bounded by the boundary between the provinces of Noord-Brabant and Limburg, to the north by the provincial boundary and the northwest part of the Loobeek, to the east by the Meuse and in the south by the Lollebeek. The surface of the area under investigation is approx. 125 km^2.

2.4.1 GEOLOGY (fig. 2.4)

The starting point for the description of the geological development of the area is the Veghel Formation[6]. This assemblage consists of coarse-grained Meuse sediments, alternating with clay and loam layers and dates from the beginning of the Middle Pleistocene. In the Saalien strong tectonic activity occurred, as a result of which the Centrale Slenk and the Venlo Slenk dropped in respect to the Peelhorst[7]. The Meuse subsequently shifted its bed towards the Venlo Slenk. On top of the Veghel Formation fluvio-periglacial deposits, Brabant loam and aeolic coversands were successively deposited during the Saalien. Total thickness of these layers is approx. 10 m.

Improving climatologic conditions in the Eemien stopped the sand drifts and allowed formation of humic and peaty clastic sediments. The thickness of this Asten Formation varies from several centimetres to 2 m. At the end of the Eemien, during the transition to the Weichselien, the climate sharply deteriorated and intensive erosion occurred. At the same time the Meuse cut a deeper bed, as a result of which the mostly east-west flowing Limburg brooks cut in deeper as well. The Loobeek, dating from the Early Weichselien, is a good instance of this.

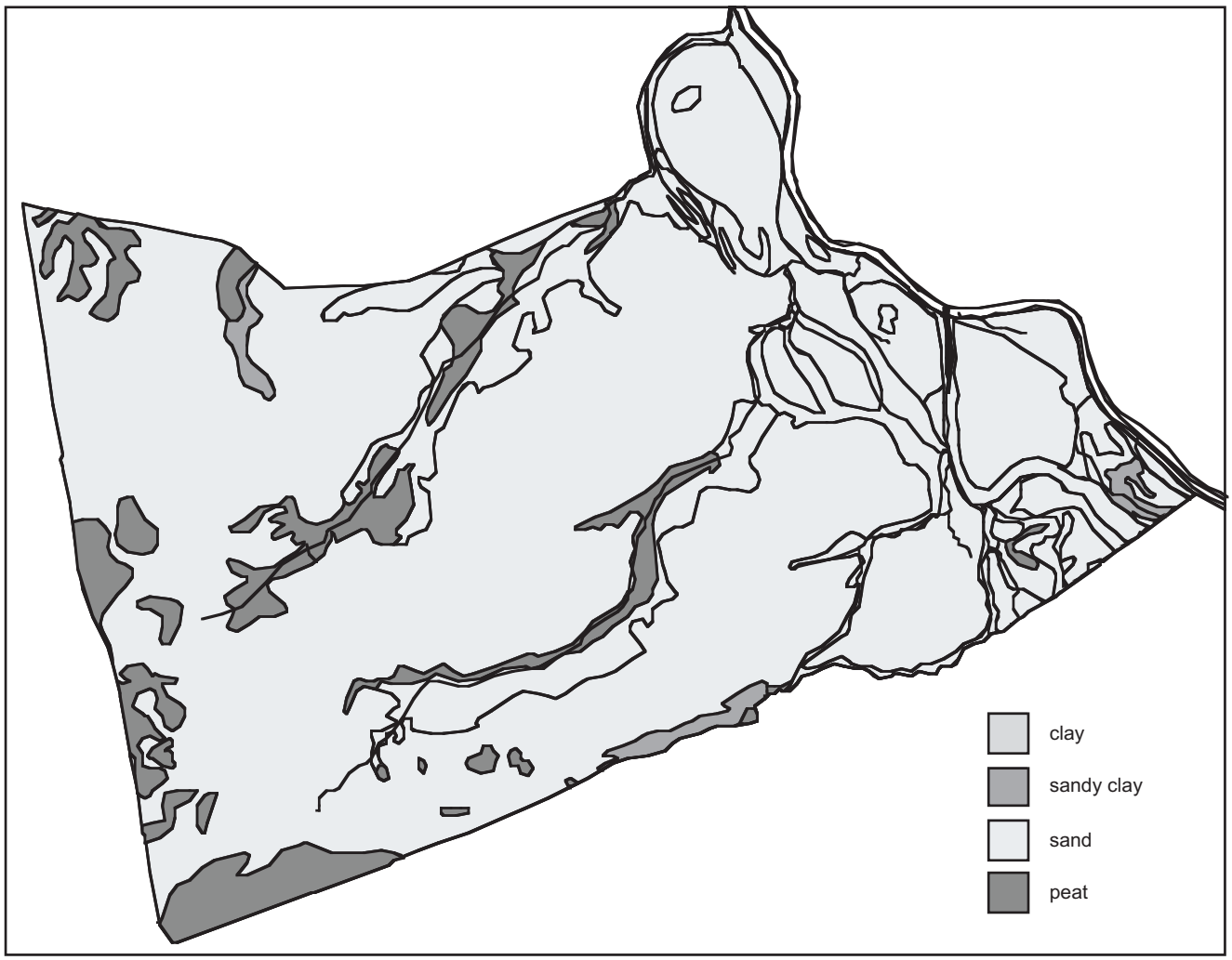

Fig. 2.4 Core region Venray. Symplified geological outline map.

During the Weichselien the vegetation degraded and sand drifts re-occurred, resulting in thick layers of coversands. These coversands, known as Twente Formation or Young Coversand I and II, dominate the surface of the terrain. In the east the Meuse deposited the Kreftenheye Formation, consisting of gravelly, very coarse sand.
Thanks to an improving climate during the Bølling and Allerød, at the end of the Late Glacial, the area was revegetated. In the east the Meuse cut in deeper with the result that the brooks cut deeper as well and extended themselves by cutting into the recently vacated Meuse bed. Meanwhile in the Allerød peat bogs had started to form in the badly drained low-lying areas to the west of the research area, followed in the Praeboreal by ever increasing high moor peat. This high moor, the Peel, attained its strongest growth in the Atlantic and Subatlantic. In brook valleys clastic sediments formed, consisting of fine loamy sands, loam layers with plant and wood remains and peat. The formation of peat ended as early as the end of the Boreal in areas where the growth of high moor peat was impossible[8]. The latest geological developments have been highly influenced by human activity: the strong reliefs of medieval and post-medieval drifting sands.

2.4.2 TERRAIN

The Venray region may be characterized as a mainly gently sloping coversand area, slanting from the west to the east (fig. 2.5). The Peel area to the west, mostly dug by now, has an altitude of approx. +30 m NAP, with peaks like the Weverslose Berg, over +35 m NAP. To the east is the

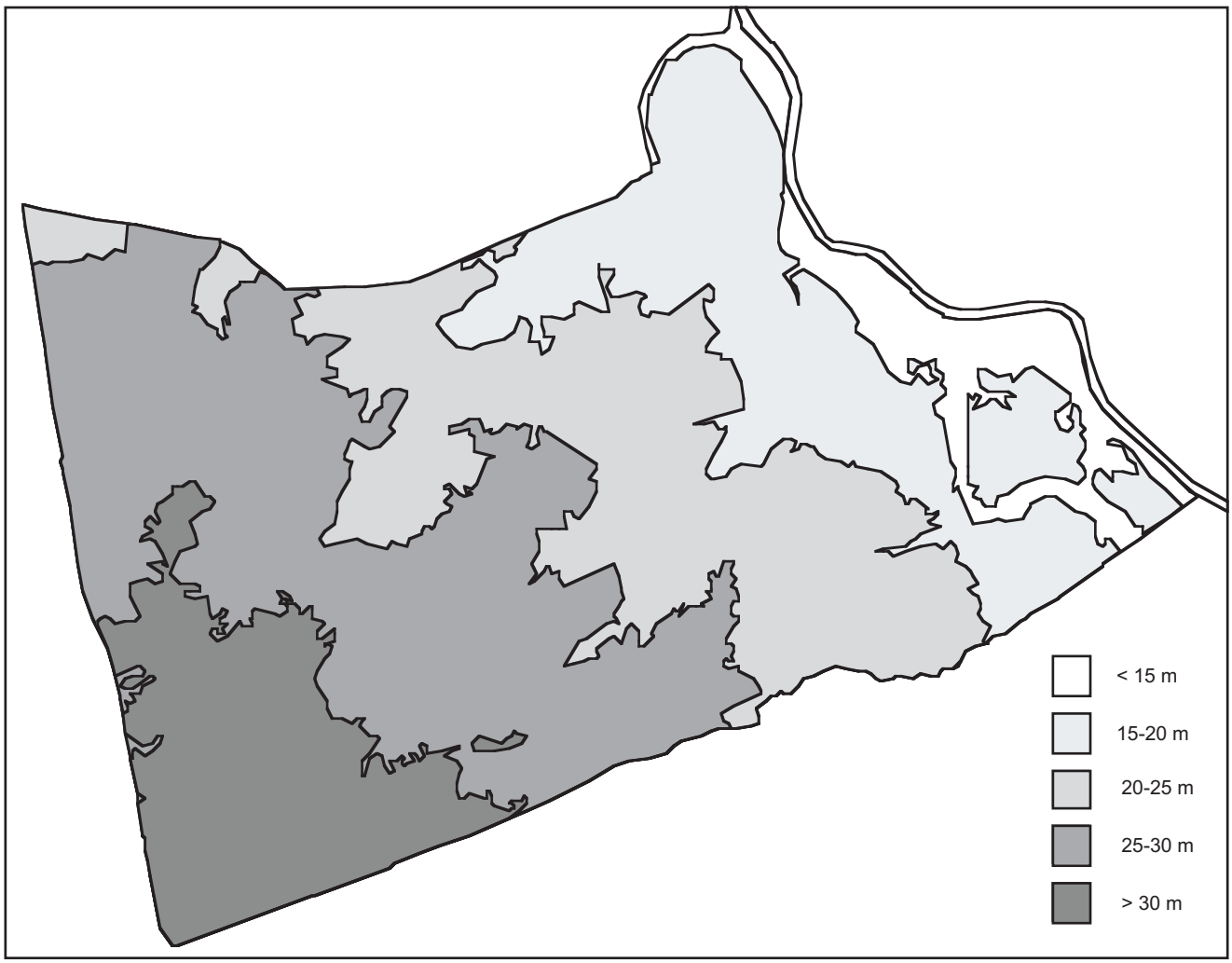

Fig. 2.5 Core region Venray. Contour lines.

Meuse valley, at an altitude of approx. 13 m + NAP. The area is drained by a brook system running from the east to the west (fig. 2.3). The major brooks are the Loobeek, Oostrumse beek and Lollebeek, all of which run into the Meuse.
The terrain in the core region can be divided into three large areas (fig. 2.7). From the west these are the high peat moors, the coversands and the Meuse valley. The original high moors, 'the waste lands', were characterized by alternating gently sloping heath, sand drifts, pools and marshes. This terrain had formed during the Allerød. From hollows filled with bog the high moor could rapidly increase during the Holocene. At the height of peat formation the high moors stretched as far east as the line Overloon-Merselo-Veulen-America. From there it reached out even further to the east by way of the by then infilled brook beds. The entire high moor area has now been cut and transformed into gently sloping arable land.
The most striking feature in the research area is the coversand, which covers approx. 70 % of the entire area. This is an aeolic deposit from the Early and Late Dryas and consists of a substrate of weakly loamy sands with occasional high amounts of loam. At present this terrain is mainly used for mixed farming, with the emphasis on pig and chicken farming.
To the east of the core region lies the Meuse valley, running north-south. It has a relatively high relief with river dunes, infilled gulleys, terraces and backlands. The result is a highly varied landscape rich in small geographical features.

Fig. 2.6 The gently sloping coversand under a thin rest peat layer in the Loobeek area.

2.4.3 HUMAN INFLUENCE

We do not intend to extensively discuss human influence on the terrain from the dawn of time to the present. The emphasis is on influences in the field that might have played a major part in the realization of the various archaeological distribution maps.

There have been hardly any large-scale interventions until the middle of the 19th century. On the edge of the high moor, on the coversand, the hamlets of the small farming communities were situated, surrounded by their tiny pastures, kitchen gardens and fields. The 'waste lands' to the west were used to graze sheep and cut peat for fuel for private use. Large-scale peat digging started after 1850 when private enterprises could obtain government licenses[9]. By the end of the last century mechanical peat digging had started, resulting in the complete disappearance of all peat from the research area.

The coversand area displays two important phenomena that are the result of human intervention. First of all large areas of drifting sands have come into existence due to too much logging, burning of the heath, cutting turf and overexploitation of the farm land in the Middle Ages. Another human influence is the formation of plaggensoil. These arable lands form as the result of centuries of fertilizing the fields with manure from deep litter houses and are mainly located near the old habitation centres in the high land between the brook valleys. Their thickness is 1 m at the most. To the east, in the transition zone of the coversand to the Meuse valley, they become more numerous but decrease in size.

The main part of the coversand area has always been waste

Fig. 2.7 Core region Venray, divided into large geographical units.

land: terrain dominated by heath, marshes and pools. As the waste land was inextricably linked to mixed farming, possibly as early as the Iron Age[10], this area was not developed until late. Waste lands provided the litter for the sheds that was spread over the fields together with the manure. Only after the arrival of alternative fertilizers, guano and saltpetre in the period 1885-1895[11] and chemical fertilizer after 1895, could these lands be developed.
In the Meuse valley human influence is less visible and often much more small-scale. The sole, albeit limited, disturbance is peat cutting in infilled channels of the Meuse. Over the entire area the subsoil has been disturbed to a great extent by agrarian activities and building of towns and villages. In order to improve agricultural opportunities, a number of land consolidation projects have occurred in the research area, most recently in 1989. In land consolidations the soil is sometimes turned over to a great depth, as much as one metre or more, and the ground is extensively levelled. This means that in many parts of the research area artefacts come to light, but it is almost impossible to find sites in undisturbed soil. In agriculturally improved areas it is even impossible to find any artefact in its original context.

2.4.4 ARCHAEOLOGY OF THE CORE REGION

In the core region Venray there have been remarkably few professional archaeological investigations. There have been only a small number of excavations, mostly on younger prehistoric sites[12]. These concentrate on the transition between coversand and Meuse valley: agriculturally most fertile and also the area that appears to have been inhabited

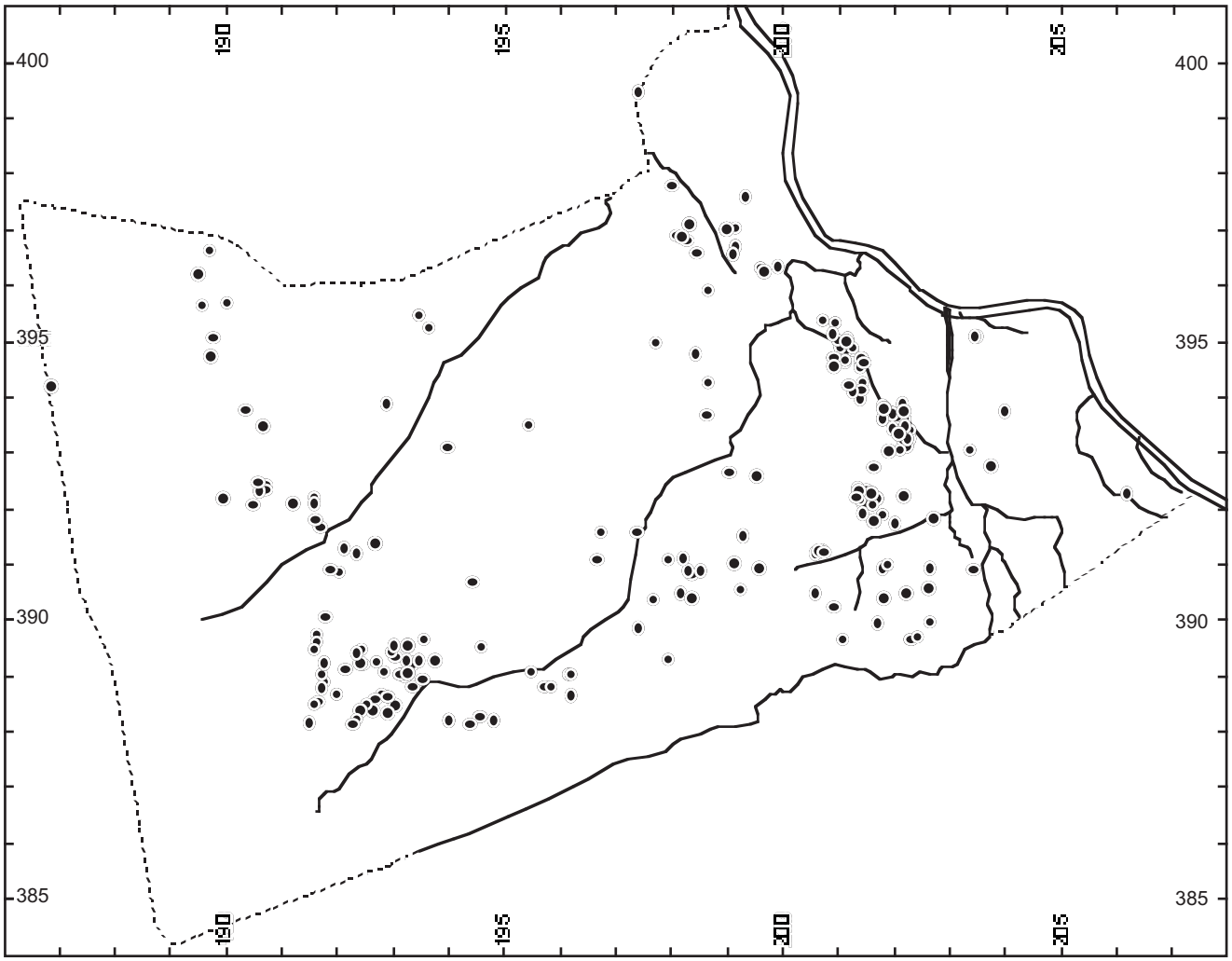

Fig. 2.8 Core region Venray. Distribution of all Stone Age sites.

for the longest period. There is a marked contrast between the few efforts of research institutes and the amount of work done by amateur archaeologists.

2.4.4.1 Amateur activities

There were some rare archaeological investigations in the area around Venray in the late 19th and early 20th centuries. Well-known in this respect are the names of the Roermond notary G.Ch.H. Guillon and the Venlo collector L.D. Keus. In the late fifties and early sixties the well-known amateur archaeologist J.E. Driessens began to explore large parts of North Limburg and East Brabant in a search for archaeological sites. He was a passionate amateur archaeologist and convinced that in his lifetime many, if not all, archaeological sites would disappear as a result of large-scale developments in agriculture and the growth of villages and towns. To document these as best as possible, speed was of the essence. Before his working day started, he would leave in the dark on his moped in order to start his search at the first light of dawn. At eight o'clock he would go to work and, after the day's work, he would continue his searches, weather permitting. In the mid-seventies his range increased tremendously by the purchase of a car. The result of almost thirty years of activities is an enormous collection of artefacts from hundreds of sites. Apart from the size of the collection, the degree of documentation is impressive as well. There has been a highly professional registration of all relevant data, the finds have been numbered and position and size of the sites accurately mapped.

In the sixties Driessens still lived in Venray and conducted his explorations in the neighbourhood in the company of

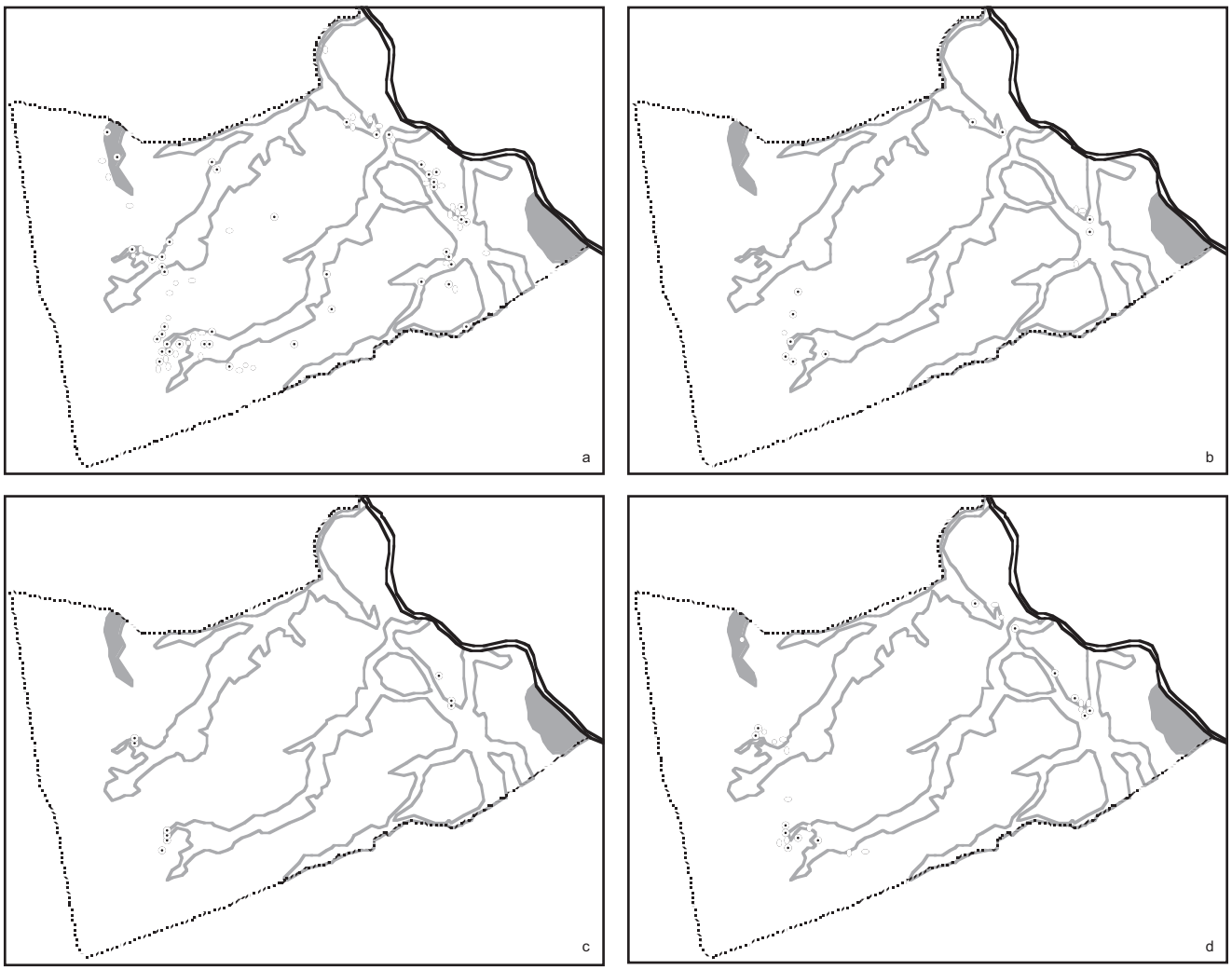

Fig. 2.9 Core region Venray. Distribution of all Mesolithic sites and by period: Mesolithic (a), Early Mesolithic (b), Middle Mesolithic (c) and Late Mesolithic (d).

W.G.M. van Ass, B.A.M. Kruysen and J.W.H.M. Storms. On one of their trips they discovered some flint on a sandy path through a small nature reserve near Merselo-Haag. The site was on the north slope of the brook valley, at the exact transition from coversand to brook plain. The transition was clearly visible as a small cliff. They regularly returned to this spot and after some years they were able to ascertain this was not a single site, but actually two. Approximately 25 years later these would again contribute to research into the Mesolithic in the south of the Netherlands.

2.4.4.2 Inventory and composition of distribution maps

In 1987 and 1988 all finds from the core region Venray in museums, from archaeological working groups and individual amateurs have been described, in the context of this investigation (fig. 2.8). On the basis of guide artefacts these sites may be dated and distribution maps drawn up by phase. In this study the emphasis is on the analysis of Mesolithic site distribution patterns.

The Mesolithic displays a, albeit thin, scattering over the entire area, with a concentration in the west, where the brooks rise, and a concentration in the transition from coversand to Meuse valley (fig. 2.9). Despite the small number, it is clear the intervening coversand area was used as well. The majority of the sites is located along the brooks.

From the Early Mesolithic onwards a division in choice of site can be distinguished (fig. 2.9), that was already visible

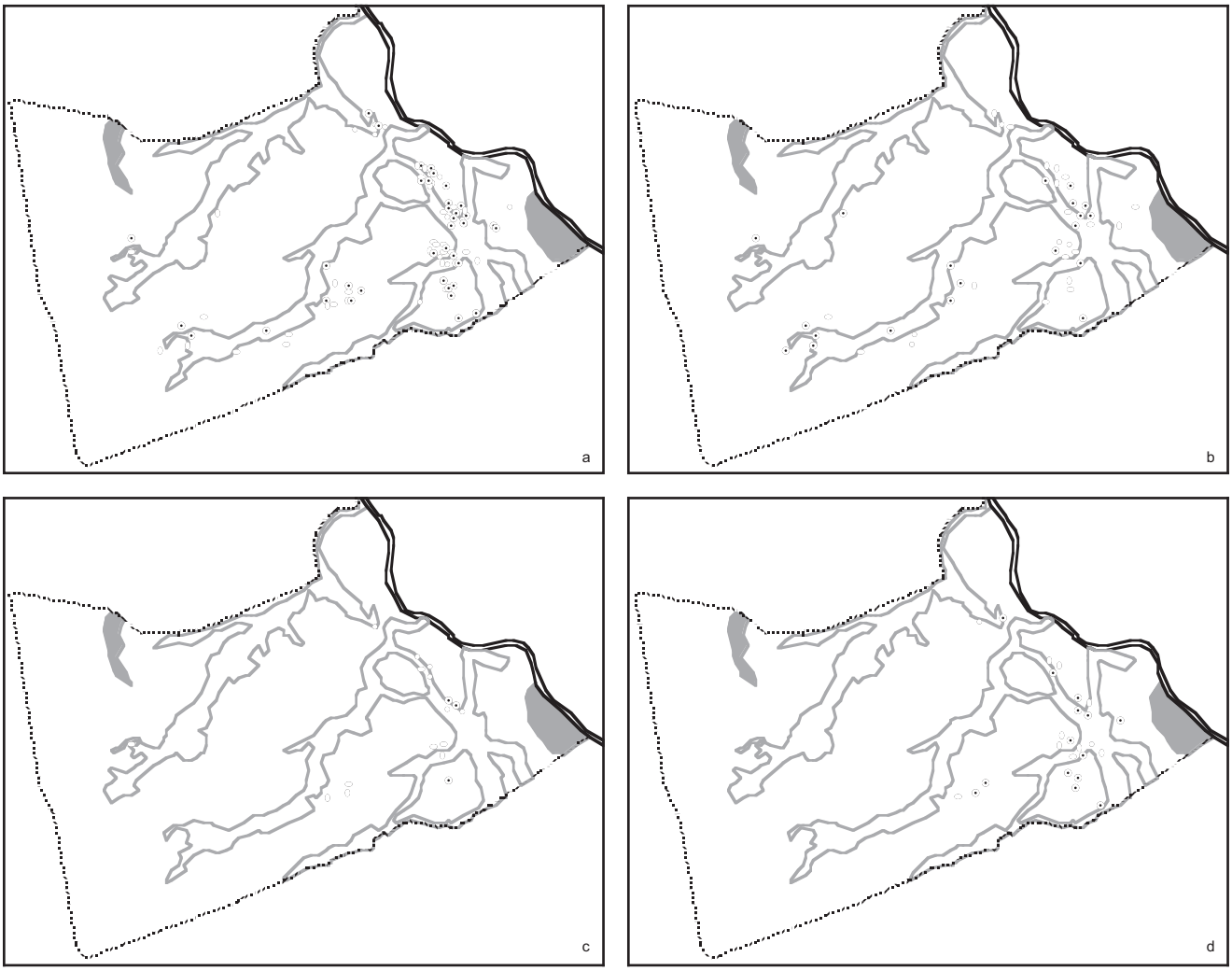

Fig. 2.10 Core region Venray. Distribution of Neolithic sites by period: Neolithic-indeterminate (a), Michelsberg (b), Wartberg-Stein-Vlaardingen (c) and beaker (d).

in the distribution map of all Mesolithic sites. There is a cluster in the east of the core region, on the transition from coversand to Meuse valley and in the west a condensing of sites at the beginning of the Oostrumse Beek, on the transition from coversand to peat lands. Despite the small number of sites the distribution pattern in the Middle Mesolithic (fig. 2.9c) is almost identical. In the Late Mesolithic the division is clearer again (fig. 2.9d). The number of sites has increased and the beginning of the Loobeek valley is again part of the exploitation area.
In the Neolithic a gradual shift of the sites towards the Meuse becomes apparent, coupled with changes in the choice of location. From the Middle to Late Neolithic flat, slightly damp geographical terrain with easily tilled soils is preferred[13].
With the exception of a single LBK point, the Michelsberg culture is the first representative of the Neolithic in the area[14]. The choice of location is still strongly reminiscent of the Late Mesolithic. The sites lie along the brooks and show strong clustering in the transition zone from coversand to Meuse valley (fig. 2.10b). This clustering is even more evident in the WSV-phase (fig. 2.10c), particularly as the western part of the core region is barely used. In the beaker period there are more sites in the transition zone, as well as a small cluster on the coversand between Oostromse Beek and Lollebeek, a short distance from the cluster in the Boddenbroek (fig. 2.10d).

Fig. 2.11 Microregion Loobeekdal. The Pleistocene valley (grey) with all Stone Age sites. Numbers refer to sites discussed in the text.

2.5 The microregion Loobeek

The absence of older (Palaeolithic, Early and Middle Mesolithic) and younger (Neolithic) sites suggests the area near the Loobeek was exploited solely in the Late Mesolithic. This in time clearly demarcated pattern of sites makes this an ideal location for the reconstruction of the Late Mesolithic hunter-gatherer economy, in the period before a transition to a Neolithic way of life was to occur. On the basis of the experiences during the preliminary investigation, the prospects for success appeared greatest on the sites in the small nature reserve near Haag. Most Stone Age sites in coversand areas have been severely affected and have usually even disappeared as a result of agrarian activities.

Initially this seemed less so here, so a research area was marked out around the site Haag: the microregion Loobeek. This microregion (fig. 2.11) lies to the west of Venray and covers an area of 3,5x3 km. In the research area two hamlets are located: Haag and Weverslo.

2.5.1 GEOLOGY

The geological image is based on a study of the literature and physical geographical investigations by H. van der Beek and R. Isarin[15].

The beginning of the Loobeek valley complex is palmate and consists of the Loobeek valley itself and two valleys meeting to the southeast of the Weverlose Berg: the Weverslose Beek and the Nachtegaalse Beek.
The Loobeek valley dates from the Early Weichselien. The various river valleys to the east of the Peel fault block were originally transport channels for meltwater and occasional drainage gulleys for large amounts of precipitation[16]. At the time the subsoil was frozen and impermeable, so all water transport had to occur on the surface, which is why all brook valleys begin at the highest Peel fault block. The beginning of the valleys is wide, often palmate, and they become progressively narrower downstream, as clearly demonstrated by the Loobeek.
In Early and Late Dryas the younger coversands -known as the Twente Formation- were deposited. During this process coversand ridges are formed that could close off the west-east running brook valleys, as appears to have happened with the Loobeek. The Weverslose Berg and the coversand area near Haag are the remnants of a single continuous ridge. Due to the presence of this ridge a pool could come into existence to the west of it. This damp hollow, which existed as late as 1850, was called the Vennepoel, Veenepas or Vennepas.
At the end of the Glacial — the Bølling and Allerød- the climate improved causing the Meuse to cut deeper into its bed. The tributaries followed this example, but not for the beginning of the valleys, formed in the Early Weichselien.
In this Holocene valley of the Loobeek peat bog started to grow as early as the Praeboreal. Peat formation continues until the Boreal, when it is interrupted[17]. The strongest peat growth occurs in the second half of the Atlantic[18]. In the Loobeek valley the peat reaches a maximum depth of 230 cm in the lowest areas. Clay layers and high moor peat do not occur in the profiles.
Events are somewhat different in the Vennepoel: possibly in the Late Glacial[19] peat bog starts to grow, but on top of this high moor peat is formed, fed by nutrient-poor rainwater[20]. The peat formed here was cut in its entirety and a sand layer was deposited on the remainder, with the exception of two narrow, elongated peat bands, a little to the southwest of Haag. This peat is however strongly mouldered[21].
The latest geological developments have been strongly influenced by man. In the north of the microregion lies an area of drifting sands caused by overgrazing by sheep and in the south, on the island of the Weverslose Berg there is approx. 120 cm of plaggensoil. In the west the fluvio-periglacial deposits (Asten Formation) and the Dryas cover-sands have come to the surface, due to the cutting of peat.

2.5.2 TERRAIN

In the modern terrain around Merselo-Haag hardly any traces from the past are visible. The vast peat moors characteristic of this area have mostly been cut and transformed into fields and pasture. The large-scale land improvement schemes after the second World War have obliterated the numerous differences in relief. Land consolidation in the eighties has divided the area into large, rectangular blocks, drained by a system of straight ditches. Improved drainage caused much of the original pastures to be transformed into fields as well, dominated at present by the cultivation of maize. To reconstruct the terrain around the excavation we therefore have to rely on old maps and physical-geographical investigations.
The site is on the coversand, on the edge of the Loobeek valley. The location is at present remarkable by its cliff, approx. 1 m high. This cliff is only partly a remnant of an old bank of the Loobeek or the older Vennepoel, also called Weversloose Ven, but it is mainly the result of recent levelling activities, as can be inferred from the north-south running main profile of the excavation Merselo-Haag and the profiles of several test pits in the low north bank. The low-lying pasture has been levelled in the past. The soil dug up has in part been shoved onto the lower part of the terrain, in part deposited in the woodland. Both lowering and heightening have therefore contributed to a highly remarkable cliff. This was the original north bank of the Loobeek and the Vennepoel, a bank characterized inland by a relatively flat location and with a modern height of approx. +27.50 m NAP.

2.5.2.1 Historical developments

The geographical development and the land use may be inferred from a series of topographical maps (fig. 2.12). The oldest detailed map of the area was composed by French topographers under the engineer Jean Tranchot in the years 1802-1804. In 1816-1820 this was updated by general-major Freiherr von Müffling. It is evident from that map that the area around Haag is for the most part not yet under cultivation. The area to the west of Merselo is part of a vast heathland, with occasional sheep pens and cut by an extensive network of sandy tracks running west to east. These tracks led to small-scale, private-use peat cuts. The terrain was gently sloping with small sand dunes, drifts, marshes and pools. The coversand area of Haag is heath as well, but still borders a marshy pool by the name of Weversloose Ven. This part was not reclaimed, as seepage from the higher areas of the Peel surfaced here. This was to be a long-term feature.
Reclamation of the western part of the microregion must have occurred late, as the 1891 topographical map still shows waste lands, whereas on the 1918 map the area is under cultivation. The waste lands were transformed into fields and to a lesser degree pasture. The first map to show the reclamation of the Vennepas dates from 1891. On the

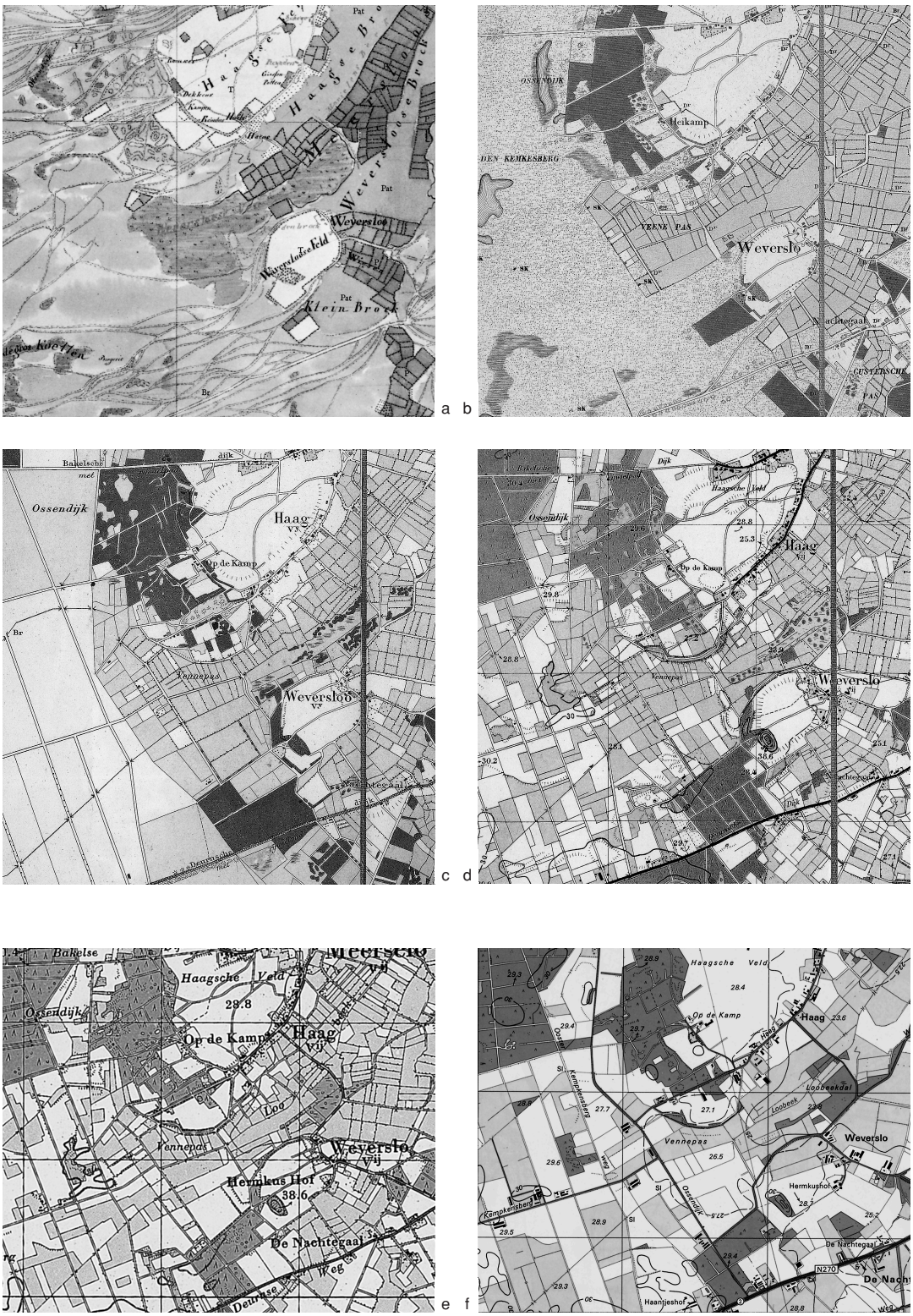

Fig. 2.12 Microregion Loobeekdal. Topographical maps with geographical changes over time, 1803-1827 (a), 1891 (b), 1918 (c), 1934 (d), 1955 (e) and 1978 (f), respectively.

1850 map it is still described as marsh, so reclamation must have occurred between 1850 and 1891. The area was mainly used for pasture, agriculture is a recent feature. The higher coversand area on the transition between marsh and high ground was spared all these reclamation efforts. Here, a sandy track was surrounded by shrubs and small trees, fell into disuse due to the infrastructural developments early in this century and allowed the development of a small nature reserve. Haag was never ploughed and the track was almost the sole disturbing factor.

2.5.2.2 Mesolithic terrain and vegetation

It is not easy to reconstruct the Mesolithic terrain. Essential sources are wholly or partly absent. Whereas the western part of the Peel is relatively well-known from the investigations by a.o. Van Leeuwaarden[22], the eastern part has drawn the attentions of geologists and palynologists to a lesser extent. In part this is due to the fact that many sample points do not exhibit continuous sequences, as evidenced by the sample points in the Groote Peel[23], in the vicinity of the research area. Many of the diagrams from this area demonstrate the infamous Boreal/Atlantic gap. The nearest diagram with a complete sequence east of the Peel comes from the Kleefsche Beek, near Heijen south of Nijmegen[24]. In order to fill this gap we attempted to find a suitable sample point in the microregion, as close as possible to the location Merselo-Haag. In the Weversbroek, 600 m away as the crow flies, a 230 cm-thick layer of peat was found. In this spot groundwater is up to surface level and visual inspection of the profile gave no signs of disturbance or gaps. Preliminary investigation of the diagram showed the bottom to be dominated by Late Glacial pollen, whereas at the top pollen occurred, indicative of a more recent age (Sub-Boreal/Sub-Atlantic)[25]. Prof. dr. C.C. Bakels took a second sample in 1989, of which a preliminary diagram was made. This proved that the basis of the 2-metre profile was characterized by lacustrine deposits, probably dating from the Late Glacial, with infiltration of younger pollen types. The transition from Late Glacial to Preaboreal lies at a depth of 1.50 metres below the surface. Here peat has grown which is strongly disturbed or demonstrates a large gap from 1 metre upwards. An important indication for this is the presence of *Fagus* in this layer, which only becomes common in the Sub-Atlantic. The presence of rye pollen indicates this as well. The profile has probably been disturbed by a combination of strong dehydration of the peat and erosion.

Due to the negative results of our own palynological investigation and the limited data from the area to the east of the Peel, we are forced to use data from the area to the west. The large similarities in height, relief, substrate and drainage between this area and the core region Venray justify the assumption that developments in the west were comparable to those in the east. On the whole, the reconstruction based on the investigation of the western part of the Peel is valid here as well.

First of all, the study by Van Leeuwaarden demonstrates that the various pollen zones in the diagrams, displaying similar changes, need not necessarily be of similar age. It appears that the types indicative of attribution to a particular pollen zone, often were established in the valleys 500-600 years before they occurred elsewhere.

In the Allerød peat started to form in depressions and low-lying areas in the valleys. The dominant feature was birch, both in the valleys and on the higher coversands. After a short fall in temperatures, which caused the disappearance of many trees, from the Younger Dryas (11.500 BP) onwards open birch forests with *Artemisia* undergrowth developed again on the coversand between the brooks. In the valleys there was a predominance of birch, poplar and pine. After 11.000 BP pine settled in the higher lands as well and the amount of birch increased, but the forest remained relatively open. From the Praeboreal (10.200 BP) onwards pine strongly spread in the valleys, whereas the forest outside barely changed.

From the start of the Boreal (between 9600 and 9000 BP) hazel and to a lesser extent oak gained ground in the valleys and displaced birch. Afterwards, after 8800 BP, elm began to grow in the valleys and a hazel-oak-elm forest with some birch and pine came into existence. In the high grounds hazel and oak began to invade as well, at the expense of birch. Around 8000 BP lime trees and ash were present in the valley. The lime replaced part of the hazel, which in turn colonized the coversand. Between 7600 and 7300 BP, the start of the Atlantic, alder entered the valleys and displaced pine. Outside the valleys a relatively dense forest of hazel and occasional oak and elm had grown. Around 7300 BP lime and ash simultaneously settled in the valley and the higher grounds. In the Atlantic, until 5000 BP, dense forests composed of lime, ash, oak, elm, birch and pine dominated the higher sandy areas[26].

Van Leeuwaarden's investigation ends at the start of the Atlantic. As stated before, data on the Atlantic are extremely rare, but they do show a continuance of the trend. So until the Subboreal dense forests of lime, ash, oak, birch and pine remain predominant in the higher sandy areas[27].

On the basis of these data a rough outline of the Mesolithic terrain can be drawn (fig. 2.13). In the high sandy areas there will have been dense forests. The few open spaces in the forest will be along the west to east running brooks and the Meuse. An open zone may be assumed as well in the transition zone between the damp Peel to the west and the coversand.

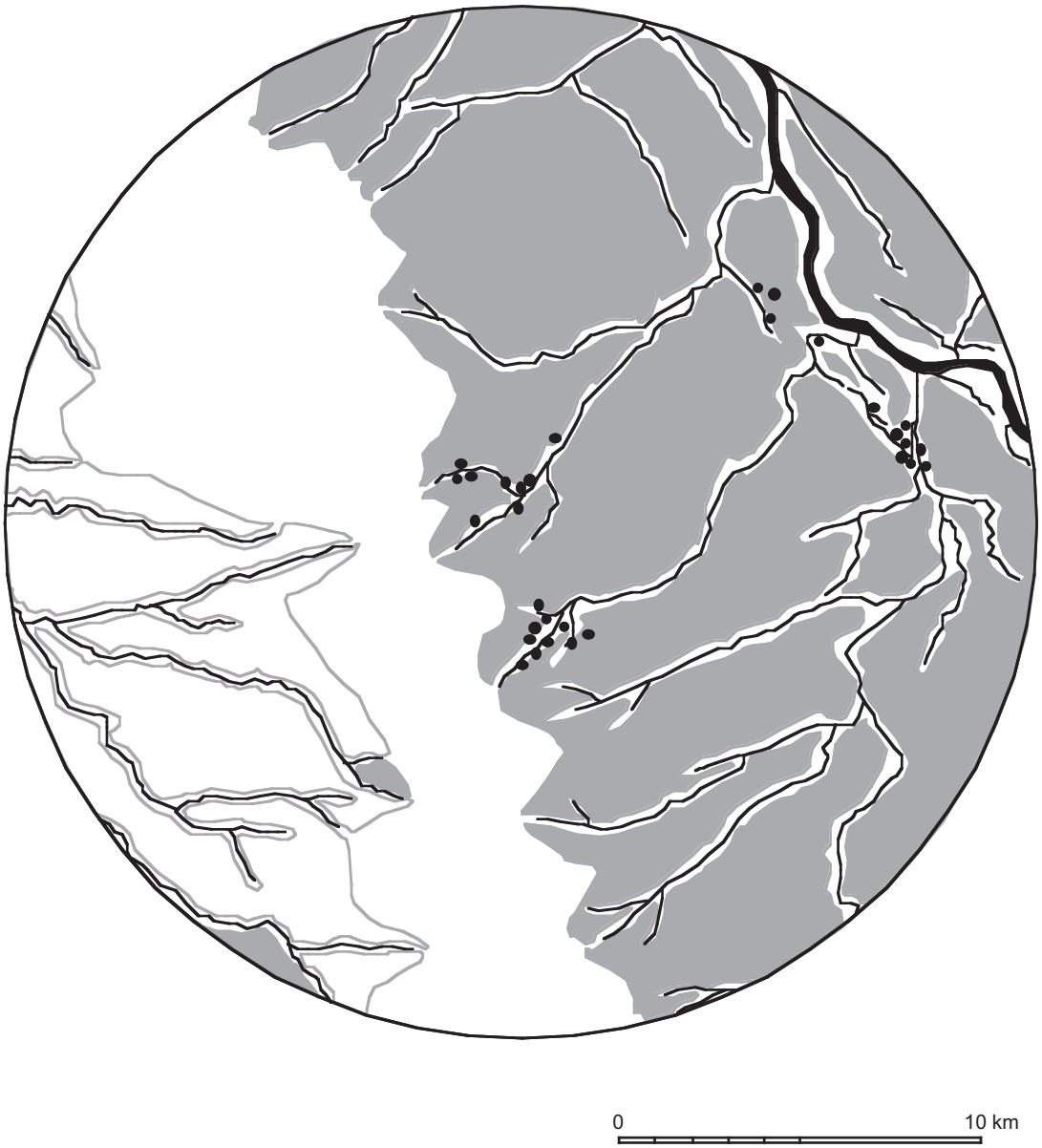

Fig. 2.13 Simplified reconstruction of the terrain in the Late Mesolithic with the location of the sites known to date. White: peat and open areas along brooks and rivers; grey: forest.

2.6 Pilot study

Preparatory to an excavation, the first stage of a detailed pilot study of the western part of the Loobeek valley was started in the summer of 1987. This pilot study had several objectives. The first was to determine to what degree the sites near Haag and its vicinity were undisturbed and what the size of the find distribution was. The second was to find out whether it was possible to find organic material in the area. And thirdly, increase the number of sites by surveying the fields.

2.6.1 EXPLORATIONS

The explorations were composed of two different sorts of activity. On the known sites one or more test pits were dug to determine the quality of the site and gain some insight into its size. In addition fields, ploughed pastures and areas of recent soil improvements were systematically surveyed. These explorations were executed in a number of campaigns in 1987-1988 and covered an area of 3x2 km. These activities were recorded by site, meaning plot, on a

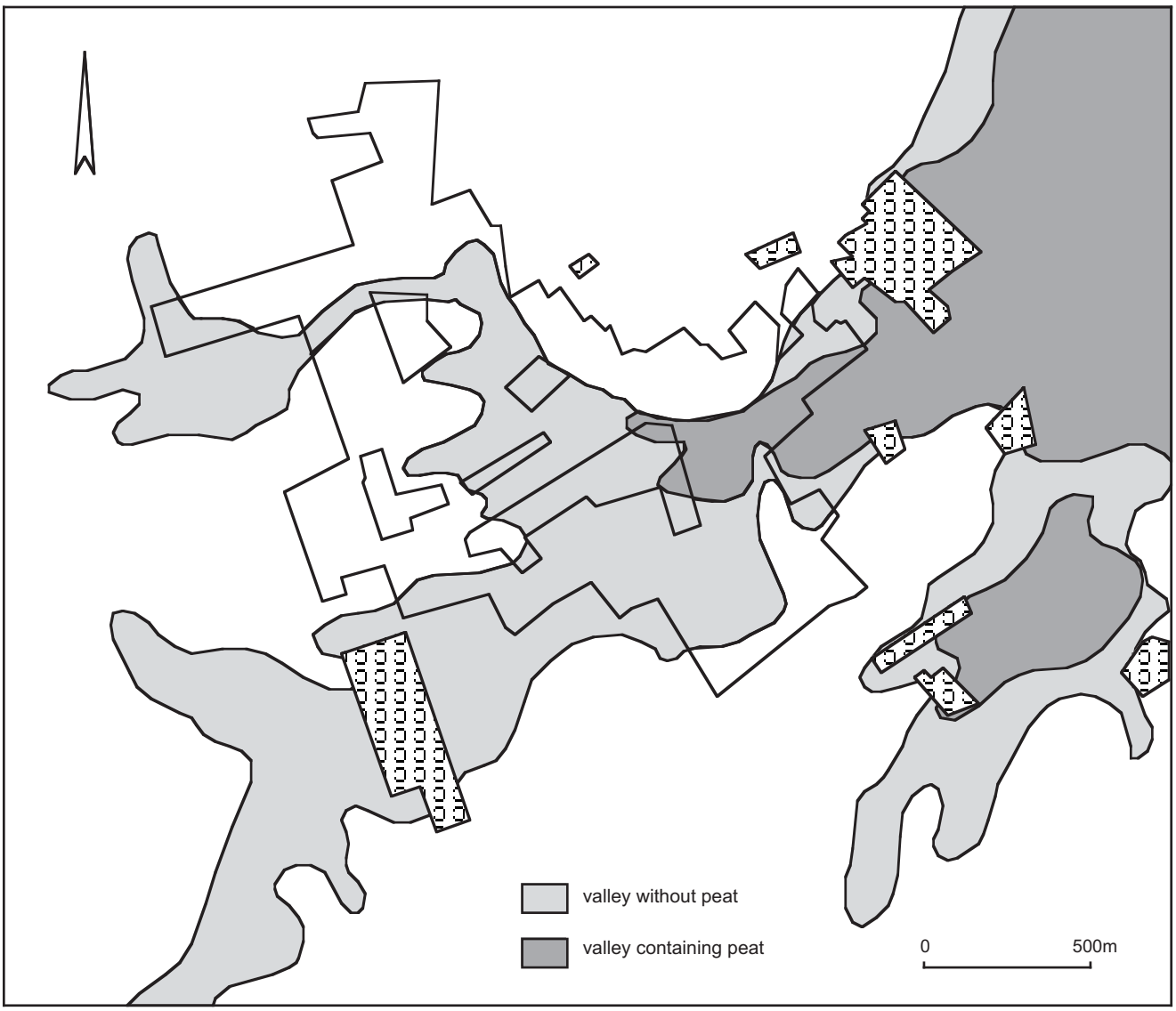

Fig. 2.14 Microregion Loobeekdal. Summary of surveys in research area. The Pleistocene valley of the Loobeek is indicated in grey; hatched: areas surveyed.

map and described in plot lists. In the study area 80 plots were visited (fig. 2.14). Unsuitable areas (covered with forest or grass, built on, covered by sand drifts or plaggensoil) were not investigated because of the suspected lack of finds. Both in the sand drift and plaggensoil areas small lots were surveyed to verify this assumption.
This exploration brought the total number of sites to 43 (fig. 2.15a). Although 23 of these sites (fig. 2.15b) date from the Stone Age, they can not be dated with greater accuracy due to the small amount of finds and the absence of chronologically significant artefacts (table 2.2).

2.6.2 PLOT DESCRIPTIONS

The numbers used here consist of a topographic map number followed by a site number. Between parentheses is the plot number used during the exploration.

52B-177 (Plot 6)
This site is located in the southeastern part of the study area along the road from Venray to Deurne. This is where mr. Driessens found flint dating from the Mesolithic and Neolithic in the transition from coversand to the valley of the Nachtegaalse Beek. The Mesolithic material can be dated Late Mesolithic thanks to the presence of 1 trapeze, 1 C-point and Wommersom quartzite. Among the material

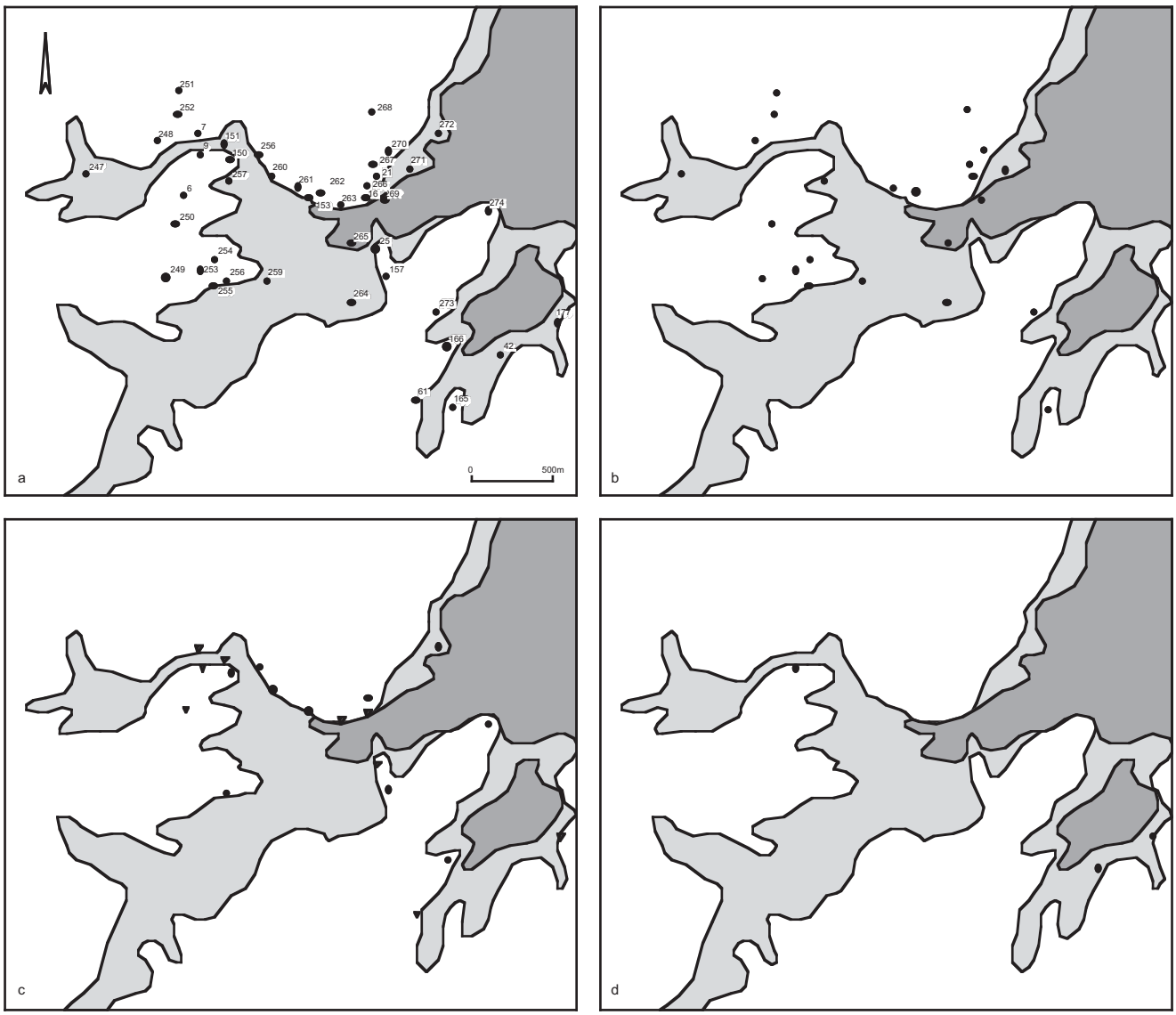

Fig. 2.15 Microregion Loobeekdal. Distribution of the sites after surveying the plots: all sites (a), indeterminate Stone Age (b), Mesolithic (c) and Neolithic (d). Triangles: sites known before the start of the survey; dots: sites discovered as a result of the survey.

collected on the surface are also two Neolithic axe fragments, other significant Mesolithic artefacts are absent.
On the plot three test pits have been dug, a 1-metre wide and 16-metres long trench from the high coversand area down to the bed of the brook and two smaller ones of 1x2 metres on the coversand. The trench was meant to follow a waste layer, if present, to the bed and to see if any archaeological, in particular organic, material, could be found. The results were highly disappointing. The relief differences found in the terrain turned out to be the result of relatively recent small-scale levelling activities. The peaty deposits must have been excavated from the bed and had been replaced by sand from higher up. Neither in the trench nor in the pits were any artefacts found.

Additional drilling in a somewhat larger area did yield some peat, but as this was highly mouldered, the chances of finding organic artefacts were nil. Another result of this drilling was the discovery that the Nachtegaalse beek was actually a man-made 'brook' and that the site Nachtegaal must have been on the bank of a pool.

52B-25 (Plot 7)
On a neck of land opposite the site Haag is site nr. 52B-25 situated. Here Mr. Driessens had collected Mesolithic surface material. The presence of Wommersom quartzite and trapezes suggest a Late Mesolithic age. The presence of a B-point is an indication of possible admixture of older material. On the basis of the relief map

and indications for peat nearby on the soil map, this appeared to be a suitable site to investigate. In the field however, the site turned out to be remarkably flat and profiles of two test pits showed the entire plot to have been levelled quite recently, as part of the land consolidation project Overloon-Merselo. No finds were recovered.

52B-274 (Plot 13)
During the drilling a sandy rise was discovered to the northeast of Weverslo, which turned out to be part of the Weverslose Berg. On top of a humic clay layer a 5 cm-thick charcoal layer was found, which could be followed over a large distance. As the plot had always been used for pasture, no finds had been recorded. On the strength of the charcoal presence some eight test pits were dug: an array of six from the high coversand area down to the depression and two test pits to study the lateral distribution of the charcoal in the deepest part.
The base of the deepest profile consists of a layer of medium fine-grained sand with remains of roots. On top of this is a thin layer of humic clay containing occasional pieces of charcoal. This layer is covered by a 30 cm-thick layer of peat containing tree-trunks, with a sandy, 30 cm-thick plough soil on top. Towards the higher coversand the peat layer slowly wedges out and the layer of humic clay becomes black, due to increasing amounts of charcoal. This layer wedges out as well, as the profile contains mere plough soil with a C-level underneath in the highest part. The highest part of the sandy rise therefore appears to have been levelled.
No finds were recorded. The amounts of charcoal and the many locations where it was found give the impression that this charcoal is the remnant of a natural fire and has no relation to human activities.

52B-166 (Plot 20)
In the mid-sixties mr. Driessens found some flint on pasture that had been ploughed once. No guide artefacts were present. The sole indication of their age is a piece of Wommersom quartzite, so a Mesolithic date is most likely.
Preparatory to a large-scale levelling project, where the subsoil is dug to a great depth, two test pits were dug. No finds were recovered, but it could be ascertained that the plot had been levelled before in the highest area, precisely where the flint had been found in the past.

52B-173 (Plot 14)
In the course of the pilot study, the southern part of the plaggensoil of the Weverlose Berg was levelled as part of the land consolidation project Overloon-Merselo. A small drilling study was conducted before this and the presence of charcoal was ascertained once again in a geological setting comparable to the one on site 52B-274. This was confirmed by two pits yielding no finds. The large-scale levelling provided an opportunity to investigate below the plaggensoil over a relatively large area. Except for a single flake of Wommersom quartzite no traces of human activity were found.

52B-16/21/153/263 (Plots 9, 15, 17, 19)
The greatest activities were displayed on the two sites mr. Driessens had discovered on the Haag track, one to the west and the other to the east. In order to determine quality and size of these sites, test pits were dug on the transition from coversand to valley. In general these were 25 metres apart and covered a length of 700 metres. The majority of the pits was 2x2 m, some were 1x2 m. Both the plough soil and the undisturbed layers underneath were shovelled with spades until a depth of 70 cm below the bottom of the plough soil. The finds recovered in and below the plough soil were collected by square metre, but tools below the plough soil were individually measured and numbered.
In the western part, plot 17 (52B-153), mr. Driessens had found four pieces of flint, including a trapeze. Although the data are few, a Late Mesolithic age is likely. During the exploration five pits have been dug. The three to the west displayed a soil profile that was completely or partly levelled and no finds were recovered here. The two remaining pits displayed characteristic field podzol profiles, consisting of a 20 cm-thick top layer of partly applied leached sand, with underneath a light grey to white washed out level ranging in thickness from 8-20 cm and a dark grey, irregular washed in level of approx. 20 cm, changing into a sand layer that is reddish brown on top — the matrix — with iron fibres, but gradually changes to yellow with increasing depth. In pit 3 a flake was found in the undisturbed leached sand. The other finds were made in the disturbed top layer.
From the middle of the area, plot 19 (52B-263), no surface finds had been recovered so far. Three pits were dug here, all displaying a highly disturbed soil profile, to a depth of approx. 70 cm. In the best case a brown discoloration and iron fibres were found at the top of the matrix. During excavation 9 pieces of flint were recovered from the disturbed top layer, including a trapeze. The material is therefore thought to date from the Late Mesolithic.
In the eastern part, plot 9 (52B-16/21), Mr. Driessens had collected most material. Twelve test pits were dug, two of which in the adjoining pasture to the south (plot 15). The pits were on the south verge of the road, to determine the spread in the east-west direction. On the location where most finds had been recovered, four pits were dug to determine the spread to the north and south.
The soil consists of a podzol profile almost similar in composition to the western part, but far less disturbed than the middle and western parts. In pit 6 part of the washed out level is absent, whereas pit 7 was disturbed and only the matrix remains. It is remarkable how divergent the thickness of the various levels is over relatively short distances; the washed out level is 10-15 cm in pit 1, but 75 cm in pit 2, 25 metres away.
Driessens' surface finds, including trapezes and Wommersom quartzite, indicated a Late Mesolithic age. During the exploration finds were recovered from the disturbed top layer in every pit. Only pits 3, 5 and 10 yielded large amounts of artefacts below the plough soil. These finds confirm the age of this terrain to be Late Mesolithic[28].
In the eastern pits 1, 11 and 12 finds were recovered from below the plough soil as well. These included a feuille de gui, a type of artefact considered older than the trapezes. We should therefore in this case consider the possibility of a Middle Mesolithic site.
The southern pits -8 and 9- in the pasture yielded no finds. The soil profile turns out to have been levelled here. Below 25 cm of plough soil a yellowish grey layer of sand is found with roots and some iron fibres.
In addition to these test pits we also executed a drilling study in order to ascertain the presence in the valley of sediments that might

contain archaeological organic material. On the basis of the 1968 soil map this seemed a reasonable assumption. However, fieldwork for the execution of this map had been done in 1960-1963, a time when intensive farming had only just begun and there had been only limited land consolidations. The situation was quite different in 1987. The peat mentioned on the map had disappeared due to digging, levelling, drainage and ploughing. Only in the deeper areas some, strongly mouldered peat had been preserved and covered with a layer of sand.

type	52B-177	52B-25	52B-166	52B-153	52B-263
points	2	3	–	1	1
scrapers	2	7	–		
retouched blades/flakes	12	10	1	–	–
microburins	1	3	1	–	–
cores	7	14	3	–	–
debris	229	269	22	7	8
Total	253	306	27	8	9
hammer stone	1	–	–	–	–
Neolithic axe	2	–	–	–	–

Table 2.1 Microregion Loobeek valley, summary of finds by site explored.

2.6.3 RESULTS

The pilot study demonstrates that many sites have been disturbed to a large degree or have disappeared completely, with the exception of the nature reserve Haag. In the eastern part of the coversand edge the original soil profile has mostly been preserved and it contains large amounts of finds. The areas in the middle and the west have been disturbed severely to completely.

On the distribution map of all sites in relation to the Pleistocene and Holocene valley system the prominent location of the sites is remarkable. This pattern is discernible in the distribution of the 19 Mesolithic sites as well (fig. 2.15c). The sites are on the edge of the Pleistocene/Holocene valley of the Loobeek, on the transition to the higher coversand. Three sites (fig. 2.15d) have yielded polished flint axes and may therefore be considered Neolithic.

What could be the explanation for this remarkable distribution? Initially, it seemed the area might have been highly suitable for hunting during the Mesolithic. Due to the lack of palynological data for the research area, it is not possible to make a detailed palaeogeographical reconstruction for the Late Mesolithic (Atlantic). Extrapolating Van Leeuwaarden's data and correlating these with the general picture of vegetation in this period, however, yields a picture of a terrain where the higher areas — the coversand — have been covered with a relatively dense mixed deciduous forest,

Site nr.	indet.	Mesolithic	Neolithic	remarks
52B-6		x		
52B-7		x		
52B-9	x		x	
52B-16	x			excavation '89
52B-21	x			
52B-25		x		
52B-42			x	
52B-150		x		
52B-151		x		
52B-153		x		
52B-157		x		
52B-161			x	
52B-165	x			
52B-166		x		
52B-177		x	x	
52B-247	x			
52B-248	x			
52B-249	x			
52B-250	x			
52B-251	x			
52B-252	x			
52B-253	x			
52B-254	x			
52B-255	x			
52B-256		x		
52B-257	x			
52B-258		x		
52B-259	x			
52B-260		x		
52B-261	x			
52B-262	x			
52B-263		x		
52B-264	x			
52B-265	x			
52B-266		x		
52B-267	x			
52B-268	x			
52B-269	x			
52B-270	x			
52B-271	x			
52B-272		x		
52B-273	x			
52B-274		x		

Table 2.2 Microregion Loobeek valley. Dating of the sites.

composed of lime, ash, oak, birch and some pine. That type of forest would be easily accessible to man, thanks to the lack of undergrowth, but would not be very rich in food resources, with the exception of boar, edible roots, fruits and leafy vegetables[29].

In the brook valley a more open, marshy forest would occur, mainly composed of willow and alder. This area would have

more gradients and favour the development of a varied flora and fauna. This type of terrain provides much more vegetable resources and game would gather there as well. This 'open' zone stretched from the source of the brooks to where they flowed into the Meuse. The palmate shape near the source of the brook covers a considerable area, whereas the open zone is much narrower downstream. Where it flows into the Meuse the zone is wider again.
It is remarkable that precisely in the area with the largest open vegetation — the source of the brook — a clustering of sites is in evidence. It remains to be seen whether the surface finds from settlements in this area also provide indications for the exploitation of this particular area.

2.6.4 FUNCTIONAL INTERPRETATION

In order to get an idea of the function of the various surface finds, it should be possible to correlate enough finds and artefacts with activities. For this purpose sites containing over 100 artefacts have been selected. These are 6 in all (table 2.3).

type	52B-7		52B-9		52B-25	
	n	%	n	%	n	%
points	23	1.5	6	1.5	3	1.0
scrapers	29	1.9	7	1.8	7	2.3
retouched flakes/blades	51	3.3	6	1.5	10	3.3
microburins	15	1.0	2	0.5	3	1.0
cores	76	5.0	17	4.3	14	4.6
debris	1342	87.4	357	90.3	269	87.9
Total	1536	100.1	395	99.9	306	100.1

type	52B-151		52B-161		52B-177	
	n	%	n	%	n	%
points	2	1.7	1	0.8	1	0.4
scrapers	–	–	2	1.6	2	0.8
retouched blades/flakes..	3	2.6	3	2.4	12	4.7
microburins	–	–	–	–	1	0.4
cores	12	10.3	5	3.9	7	2.8
debris	99	85.3	116	91.3	230	90.9
Total	116	99.9	127	100.0	253	100.0

Table 2.3 Microregion Loobeek valley. Tool composition by site (>100 artefacts).

In their composition the sites are quite similar, with the exception of site 52B-151. Points, scrapers, retouched artefacts, cores and debris all occur (table 2.3). Site 52B-151 is remarkable by the absence of scrapers, to which the small number of finds may have contributed.

The tool composition of the surface sites does not suggest any particular activity that might have been executed in this area. There are no sites with a high percentage of tools from a single category, therefore an explanation as base camps is likely.
These data may be compared with the sites along the Meuse. As most find groups have been contaminated and mixed, this procedure is quite difficult. There are only 2 sites that have not been mixed (table 2.4).

type	52E-57		52E-67	
	n	%	n	%
points	1	0.8	1	0.1
scrapers	2	1.6	15	1.7
retouch.	5	4.1	24	2.8
microburins	4	3.3	7	0.8
cores	9	7.3	35	4.1
debris	102	82.9	779	90.4
Total	123	100.0	862	99.9

Table 2.4 Sites in the Meuse valley. Tool composition by site.

Both display no large differences with the sites from the Loobeek valley. So there appears to be no distinct functional difference between the sites along the Meuse and those from the valley of the Loobeek. In the settlements almost all types of tools are present, with possible differences in emphasis by site. Instances of hunting camps with arrowheads only, as known from the Early Mesolithic[30], are absent.
These conclusions are in keeping with a preliminary statistical analysis of the relatively small number of clean sites[31]. This shows that the number of finds may vary quite a lot by site, but when the sites are ranked, few functional differences are apparent. The majority display a range of tools indicative of domestic activities, with a hunting component as well. A similar general function for the sites is therefore likely, possibly with differences in length of use and/or the number of moments of use.

2.6.5 CONCLUSIONS

The surface finds do not indicate that the sites in the source area of the Loobeek may be considered special activity sites. A range of activities appears to have been deployed and almost all sites give the impression — based on the artefact composition — to have been functionally comparable. There are differences in the number of artefacts, but these are more likely the result of the manner and intensity of collection.
In the Late Mesolithic, in the core region Venray, small migrating groups of hunter-gatherers were active who deployed a number of more or less identical activities on

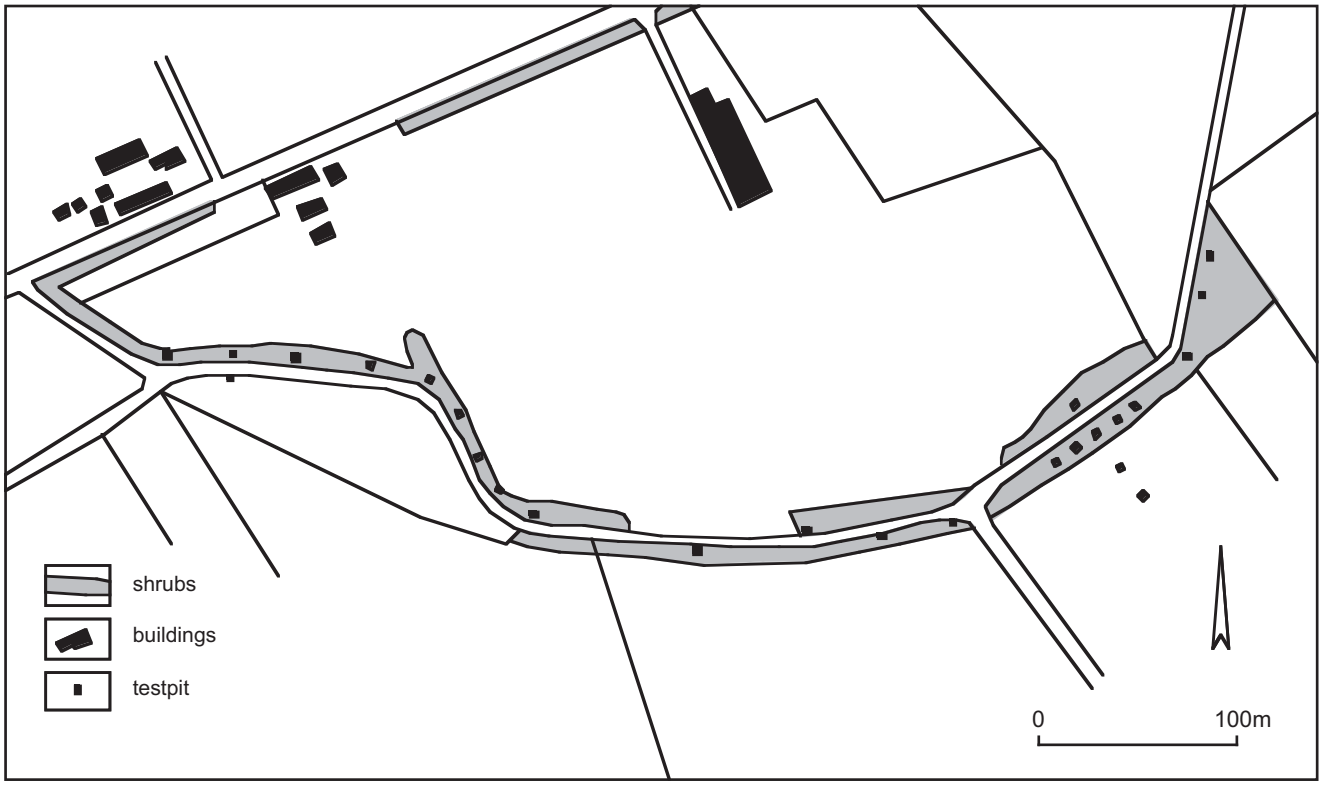

Fig. 2.16 Merselo-Haag. Location of the test pits.

each site. On the basis of the relatively large number of points per site, hunting will have been emphasized. In order to substantiate this hypothesis and get a better picture of the size and length of use of such camps, a location near Merselo-Haag was selected for excavation. This excavation was realized in the spring of 1988.

2.7 Excavation Merselo-Haag

The surface finds on the edge of the coversand near Merselo-Haag give the impression that this zone was mainly visited during the Late Mesolithic. The finds probably come from a large number of connected and overlapping encampments and activity areas. These camps and activity areas probably overlap. Most finds turned out to be still in situ, in the undisturbed part of the soil profile.
An additional argument for an excavation was provided by the immediate threat to the site. During the pilot study it had become evident that almost all sites in the research area were seriously threatened by an imminent land consolidation project. The nature reserves, including the coversand edge Haag, appeared to be preserved, but the track there would be ploughed to a great depth and planted with trees. This would result in the complete destruction of the sites present there. Consultation with the Land Planning Department of the Ministry of Agriculture and Fisheries allowed a one-year postponement of these activities, so an archaeological investigation of the most important sites could be conducted in the summer of 1988[32].
The excavation occurred between 13 April and 2 June 1988 and 409 m^2 of the part most under threat was documented. Although the surface finds seemed to suggest the area had only been used in the Late Mesolithic, the excavation demonstrated among other things human activities in this area in the Early Mesolithic as well. However, in the working up of the excavation data the emphasis was on the Late Mesolithic finds.

2.7.1 EXCAVATION METHODOLOGY

One of the most important methodological problems facing the excavation was how to search as large an area as possible in the limited time available.
Traditionally Palaeolithic and Mesolithic sites are excavated by shovelling or scraping the soil away. The finds encountered in this process are individually measured, in three dimensions. The excavated soil is often sieved afterwards. This is an extremely time-consuming way to

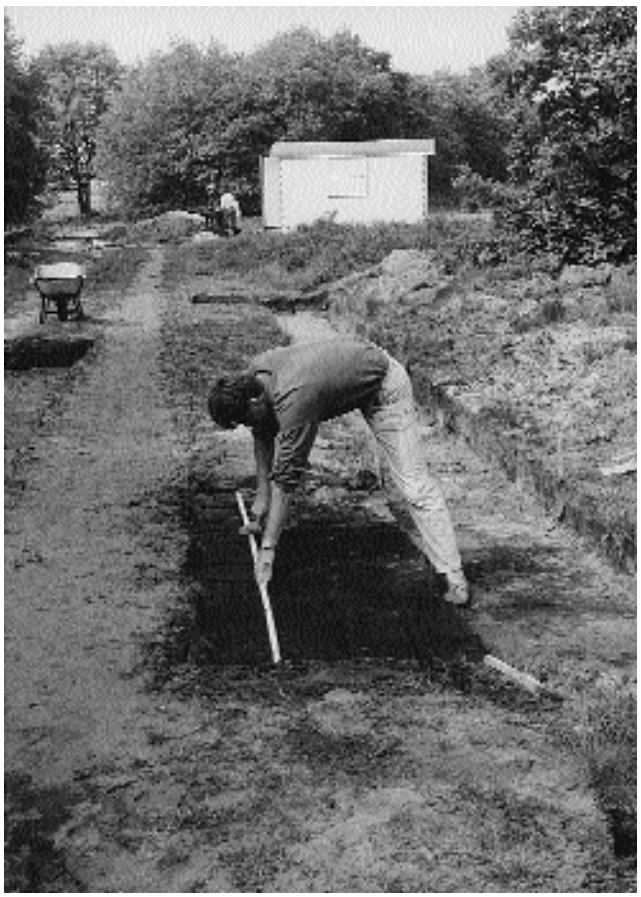

Fig. 2.17 Merselo-Haag. Marking off the 25 cm-squares, after the plough soil has been shovelled off.

excavate, which may be quite useful for situations where sites have been covered rapidly and without depositional and post-depositional disturbance. Impressive results have been achieved with this detailed method, as witnessed by the research of e.g. Pincevent, Etiolles and Gönnersdorf.
Truth to tell, such sites are rare. Usually there is some or even severe disturbance. Even in caves, where post-depositional processes at first sight would appear to have played a minor part, the artefact displacements may be considerable[33]. In the coversands of the south of the Netherlands, deeply riddled with roots and burrowed by animals, an excavation where finds are measured in three dimensions is therefore not a very good idea[34]. It is unlikely that artefacts are still in the exact same position in which they were left. Research in various Mesolithic settlements in coversand areas has demonstrated that vertical transport in the soil may be as much as approx. 30 cm[35]. The horizontal displacement of finds will have been subject to a similar degree of disturbance. However, the effects on the analysis of the spatial distribution of artefacts are smaller than in a stratigraphic approach. After all, in the case of a site with several moments of use that might be discerned in a 30 cm-thick soil profile, the displacement of an artefact over 20 cm in that soil profile would be disastrous. In the horizontal plane such a displacement presents less problems in a spatial analysis.
We have searched for another excavation technique that would save time but also safeguard a lot of detail. The underlying decision was to omit the shovelling, scraping and three-dimensional measurements and concentrate on sieving only. The question was in which units the soil should be collected in order to preserve a maximum of detail with a minimum of excavation effort. In the seventies this problem had already been investigated in Denmark[36]. In addition to that, some three-dimensional excavation ground plans of Palaeolithic and Mesolithic sites were analyzed using various grid sizes and staggered grid cells. The final result was that for the horizontal find spread a grid size of 25 by 25 cm yielded a good distribution pattern. Moreover, this is a practicable size when digging with spades. The decision was also taken to work in 15 cm-thick layers. When a transition to another soil level occurred within these 15 cm, a division would be made in accordance with the thickness of each level. It might after all be possible that there was a relation between soil levels and vertical distribution of the finds.

2.7.1.1 Soil constitution

The soil profile displayed the following structure: at the top was a disturbed layer, the A- level (fig. 2.19-20). This was denser and often thicker as well in the part where the road was, in comparison to the part with shrubs. Below this A-level a (levelled) humusiron-ironpodzol (hairy podzol) had developed with a washed out level on top, the E-level, with a highly variable thickness over short distances. In some places this layer would be absent or merely a few cm thick; several metres further on it would have a thickness of over 1 m. The washed out level was particularly prominent in the eastern part of the excavation. The numerous white to grey sandy spots in the A-level suggest that part of the E-level has been included in the disturbed topsoil. In the northwest, in particular in the section over the 330 metre line, the E-level was almost completely absent and appeared to have been included in the A-level. Beneath the E-level, or lacking this, beneath the A-level, a washed in layer (B-level) was found, with the starting material underneath (C-level): the coversand. Here iron fibres and locally weakly-developed bog ore banks had developed.

2.7.1.2 Method

At the start of the investigation we began by way of experiment a manual excavation, to a depth of 60 cm below

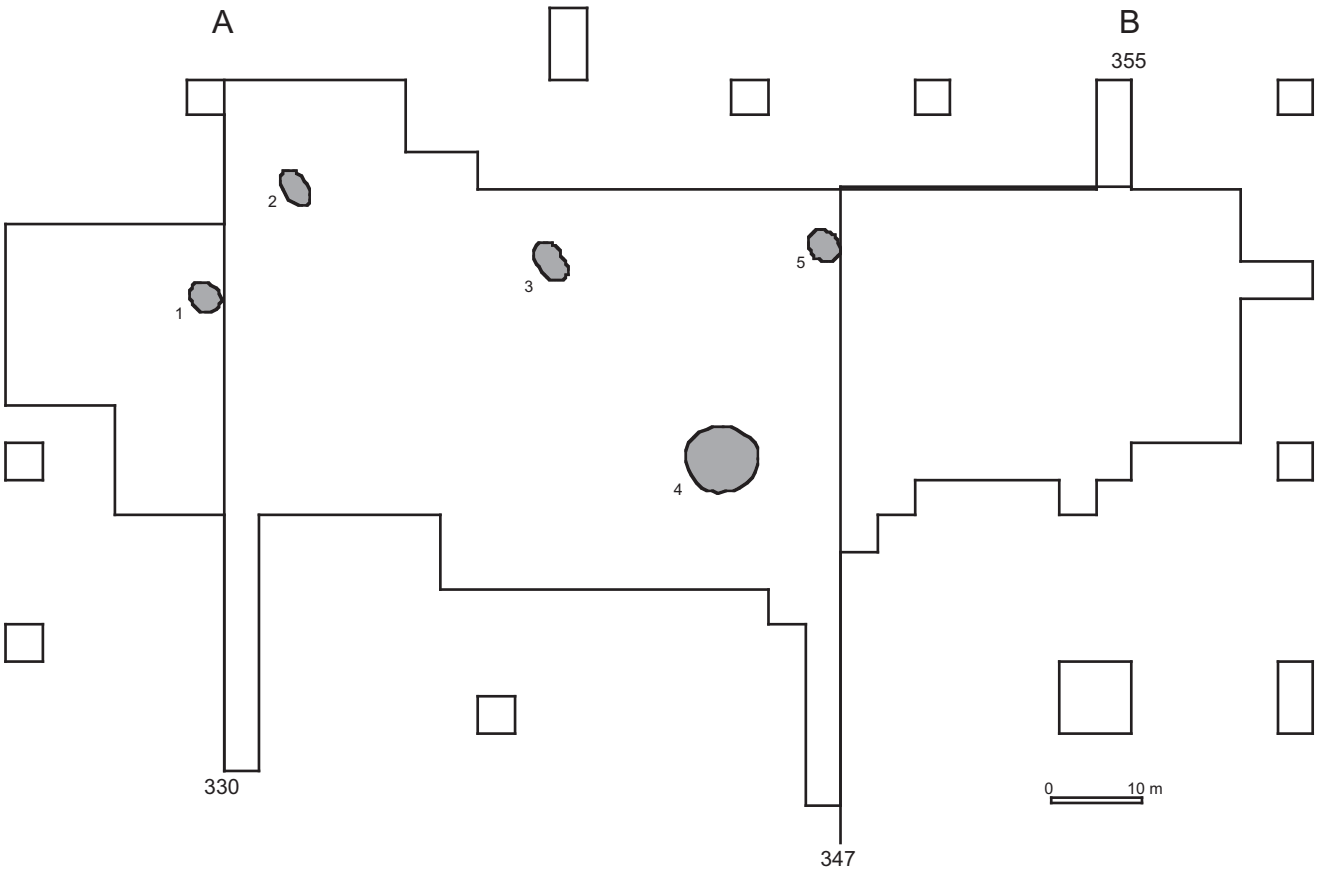

Fig. 2.18 Merselo-Haag. Location of sections pictured below.

the plough soil, of ten square metres, scattered over the entire area. It soon become evident that this method would allow the investigation of not more than 50 m^2 in the time available. The lower layers, 30-60 cm below the A-level, turned out to yield 14% of the finds. So the majority of the finds originate in the upper part of the soil profile, 30 cm below the A-level. Therefore, by only excavating 30 cm, 86% of the finds would be secured. In order to collect the remaining 14% of finds, over twice as much effort would have to be exerted, with the consequence that only a small part of the area could be searched. We therefore decided not to excavate the lowermost level of the find layer. In order to increase the speed of the investigation, it was also decided to excavate the A-level in a different way. This A-level turned out to be hard to sieve, due to the density of the soil and its loamy nature. Analysis of the ten square metres that had been excavated made it clear that in particular the relatively large finds occurred in the A-level. In order to gain time here as well, it was decided to shovel and not sieve this layer. An additional consideration was that the find distribution pattern had been subjected most to disturbances in this part of the soil profile. The artefacts were expected to be to a lesser degree in the vicinity of their original position. This would imply that these finds would also be useless for the spatial analysis of the original find spread. Although a small part of the material will have been lost, most of the larger items and tools will have been collected.

Using the method outlined above, the remainder of the terrain was excavated, resulting in the investigation of an area of 409 m^2. When the top layers had been shovelled and sieved, the level would be shovelled flat, photographed and drawn. Ground traces were drawn, cut and photographed — verifying whether artefacts or charcoal were present in the filling — and finally sampled.

2.7.2 DEFINITION OF CHRONOLOGICAL SPATIAL UNITS

Even at first glance, it is evident that various Mesolithic periods are present in the find material. Among the characteristic arrowheads A-points, a feuille de gui and

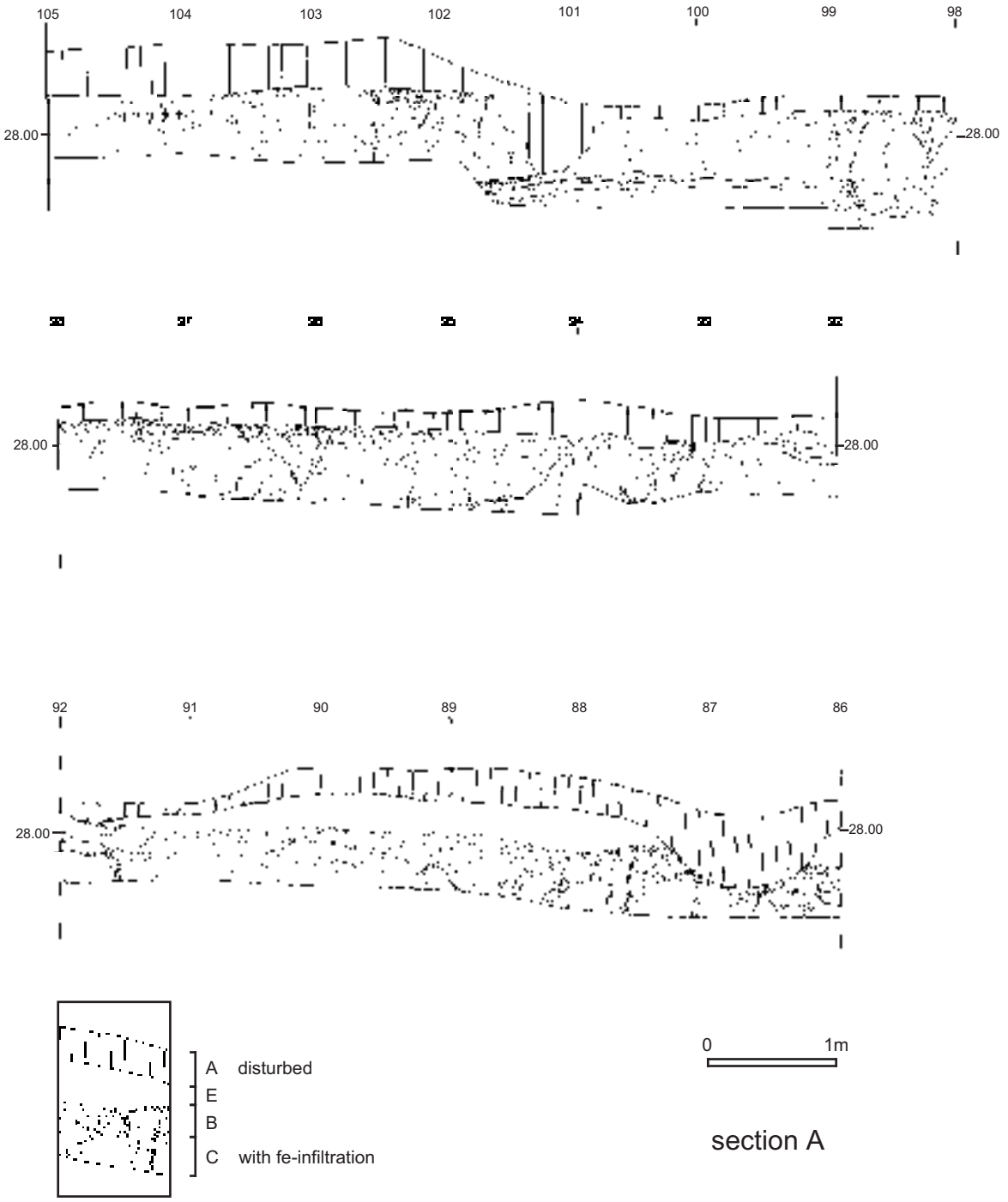

Fig. 2.19 Merselo-Haag. North-south section over 330 m-line.

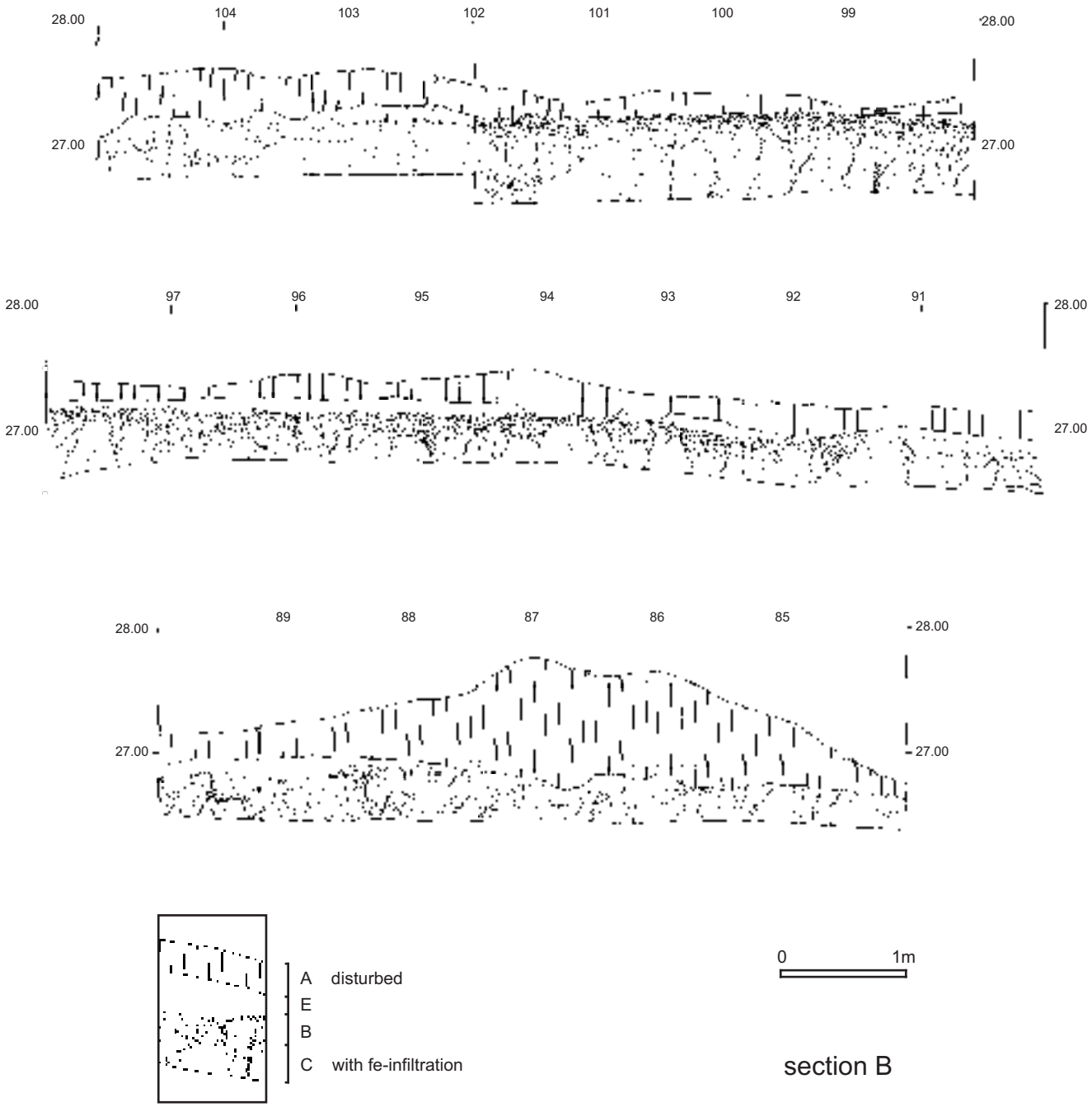

Fig. 2.20 Merselo-Haag. North-south section over 347/355 m-line.

Fig. 2.21 Merselo-Haag. Excavation in progress.

trapezes can be distinguished (fig. 2.53, 2.54, 2.56, 2.71). This means that the area under investigation was visited on at least three occasions, far apart in time, roughly speaking in the Early Mesolithic, Middle Mesolithic and Late Mesolithic.
Middle Mesolithic activities have only been ascertained in a single test pit in the eastern part of the nature reserve Merselo-Haag and may therefore be largely left out of consideration in this context. The Early and Late Mesolithic activities occurred in the central, continuous part of the nature reserve, the excavated area.
There is a thin scattering of finds over the entire excavated area (fig. 2.24-25). There are no large zones without finds, but several obvious flint clusters can be distinguished. In order to answer the question how this distribution pattern came to be, what the relationship among the clusters is and what the implications for interpretation are, it is necessary to first clearly define the Early and Late Mesolithic areas.
In order to obtain a sound separation, we decided on the following procedure:

1 Investigate the distribution of stylistically prominent points
2 Investigate the distribution of various raw flint and stone materials
3 Perform a refitting study

For an accurate analysis of spatial distribution only the finds from undisturbed layers have been used. This means that 21.2% of the find material, originating in the A-level (table 2.5) has been left out of consideration, even though the disturbance by the road may be considered slight. This is apparent from the large similarities between the distribution patterns of the A-level and the underlying, undisturbed levels (fig. 2.24, 2.25).

Fig. 2.22 Merselo-Haag. Sieving the soil.

Soil level	n	%
A	970	21.2
E	2205	48.3
B	765	16.8
C	618	13.5
indet.	7	0.2
Total	4565	100.0

Table 2.5 Distribution of (flint)stone finds over the various soil levels

Arrowheads indicative of the Early Mesolithic are A-, B-, and D-points, whereas in the Late Mesolithic trapezes are common[37]. The Early Mesolithic points occur mainly in the western part of the excavated area, but also thinly scattered over the rest of the excavation (fig. 2.76). The distribution of Late Mesolithic points — trapezes and LBK-like points — is concentrated in the eastern part of the excavation, with a small number of points in the west (fig. 2.66). So the various chronological activities occur in spatially distinct clusters within the excavation area, but there is a certain overlap. Various groups of flint and individual nodules can be distinguished in the flint that was recovered[38], displaying a consistent pattern in distribution. For example, several types of flint (codes: 24, 42, 50, 65, 90) turn out not to be evenly spread over the entire area, but display a clustering in the east or west (fig. 2.37, 2.36a, 2.35a, 2.39b).
The results of the refitting study correspond to this as well. In particular in the eastern cluster a concentration of refitting lines may be discerned, in accordance with the location of trapezes and some flint types in this area (fig. 2.42). The refit results show a lesser degree of condensing in the western area. The entire find spread can therefore be divided into two zones. To the west a zone dating from the Early Mesolithic,

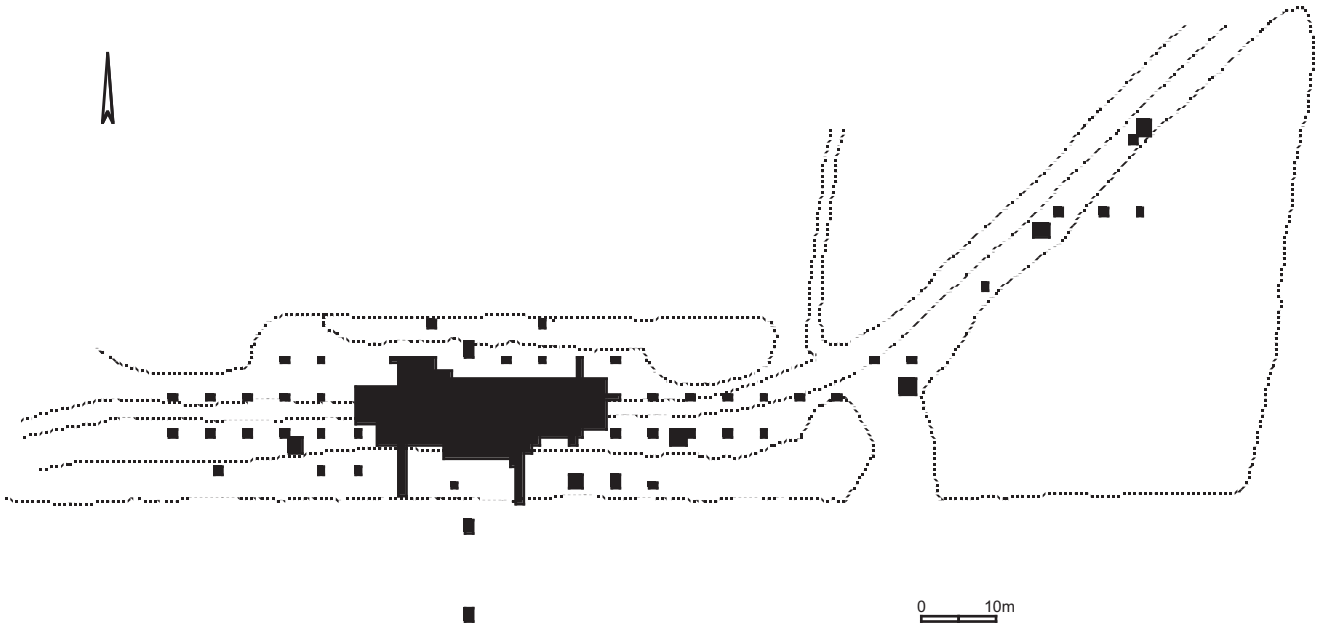

Fig. 2.23 Merselo-Haag. Summary of local topography and location of excavation and test pits.

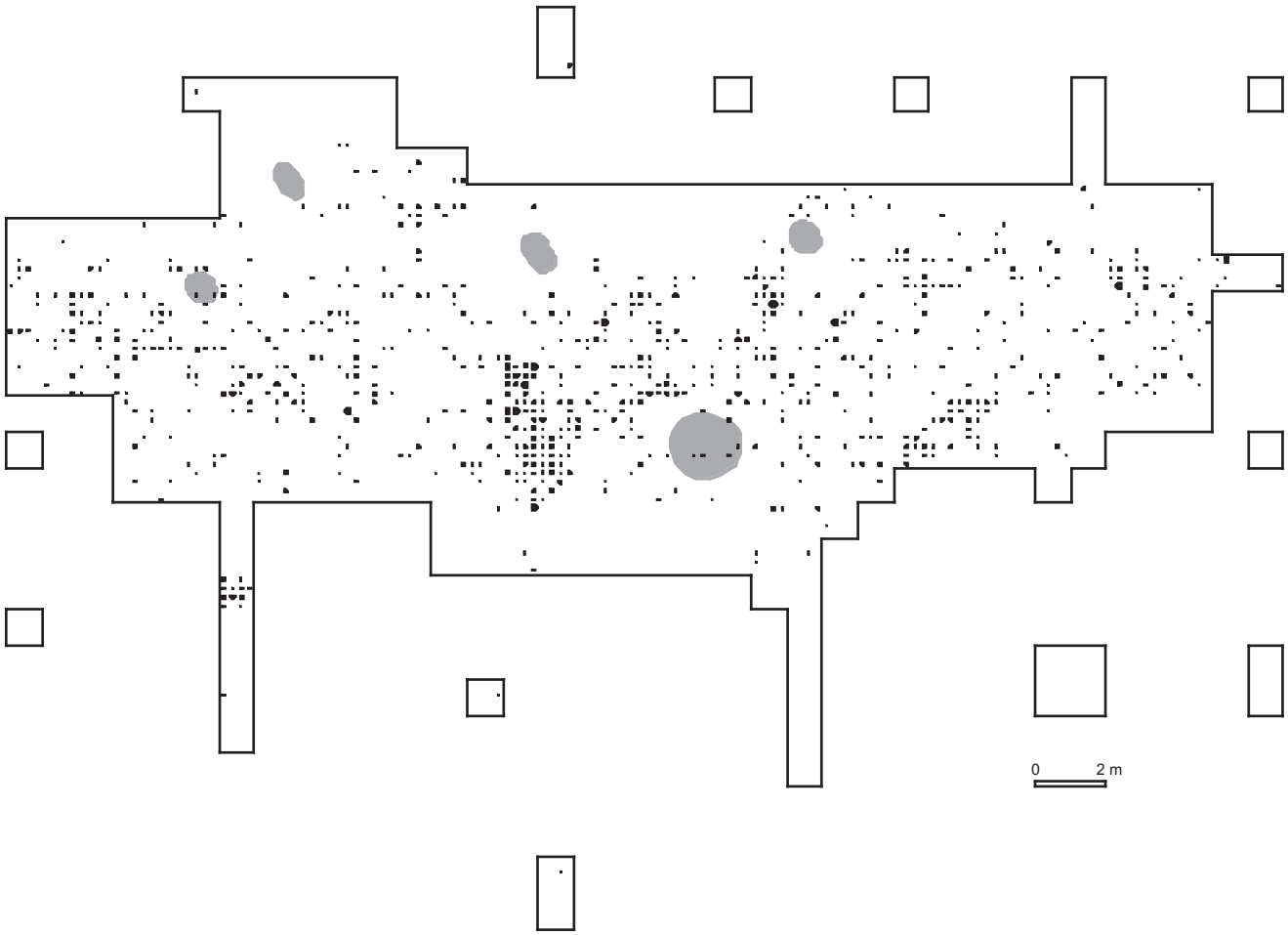

Fig. 2.24 Merselo-Haag. Relative distribution of flint finds in the A-level. Maximum number of finds per 25 cm-square is 5.

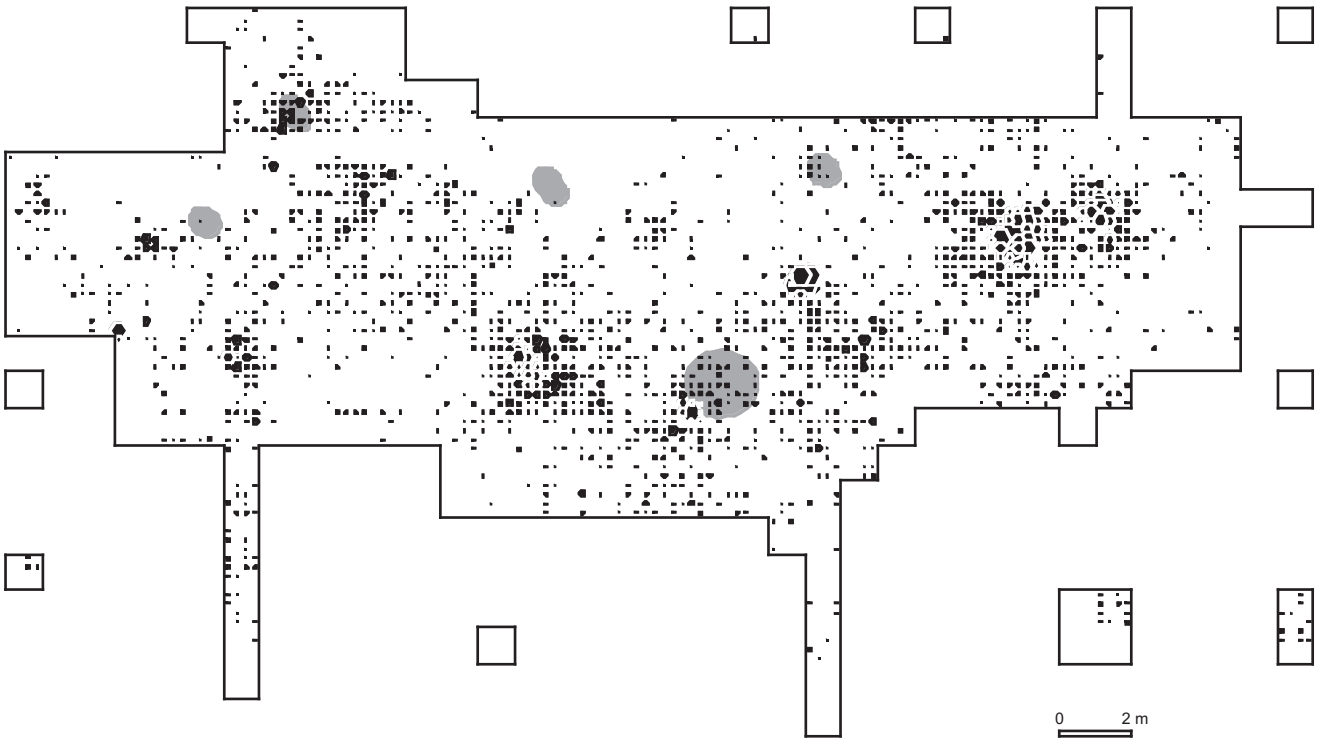

Fig. 2.25 Merselo-Haag. Relative distribution of all flint in undisturbed subsoil. Maximum number of finds per 25 cm-square is 32.

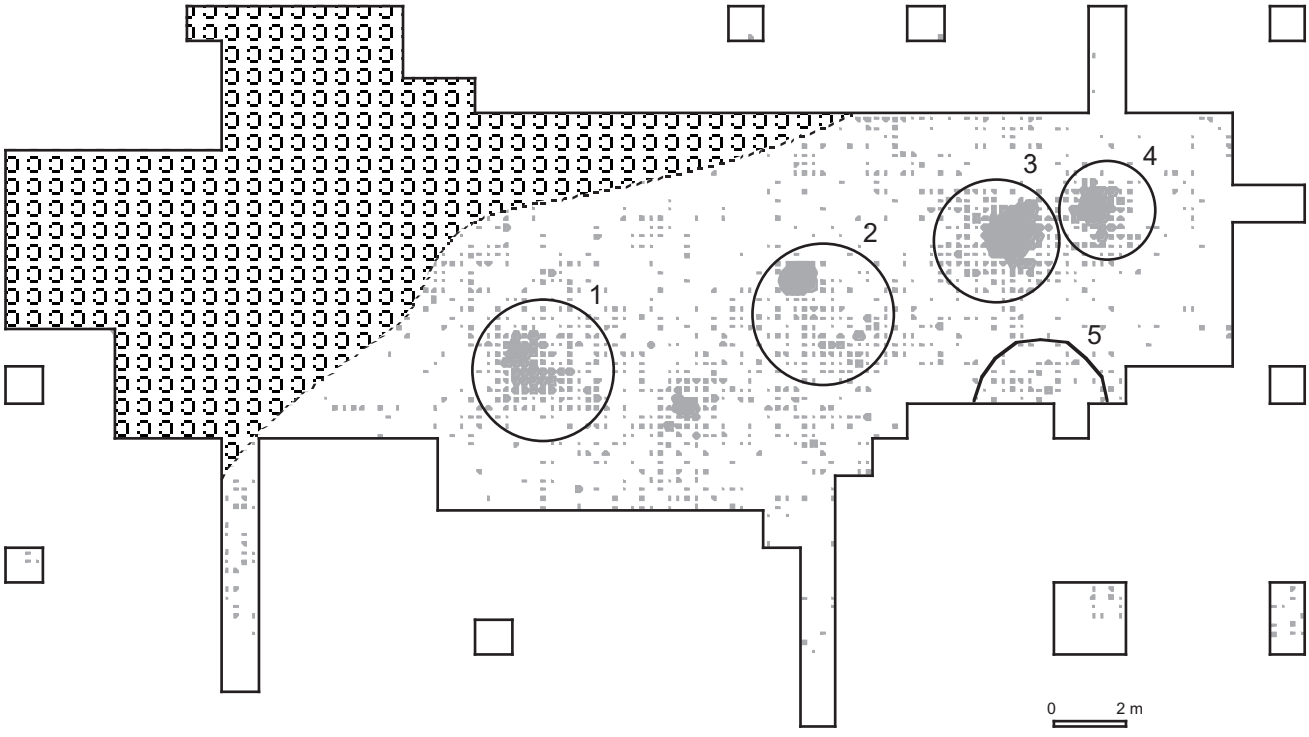

Fig. 2.26 Merselo-Haag. Division into chronological zones, Early (hatched) and Late Mesolithic, and clusters distinguished in the Late Mesolithic zone.

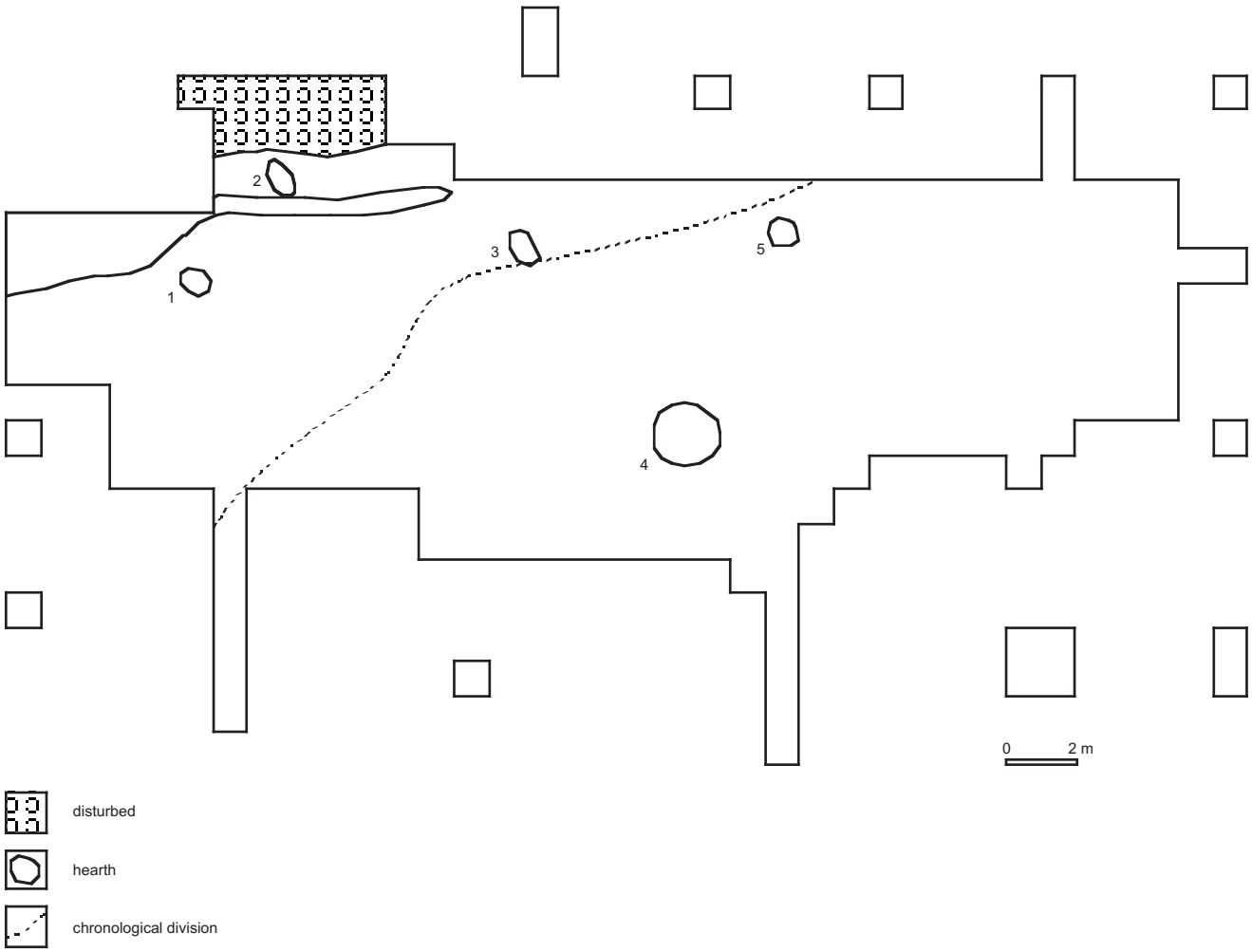

Fig. 2.27 Merselo-Haag. Summary of soil traces and disturbances. The hearths have been numbered 1 through 5.

with a lower degree of condensing in find material, and to the east a Late Mesolithic zone consisting of a series of sharply distinct clusters.
The question remains whether these zones may be defined and to what degree they overlap. In the Late Mesolithic zone there is a thin scattering of Early Mesolithic points: a single A-point and a small number of fragments that can not be attributed to any one type. This last group consists mainly of unilaterally retouched fragments. A large number of these can also be found in the Early Mesolithic zone. On the basis of technical, typological and spatial similarities these fragments may be attributed to the Early Mesolithic.
The Late Mesolithic trapezes and LBK-like points are concentrated in the eastern cluster. The thin scattering reaches as far west as the clustering of Early Mesolithic points. So trapezes do not occur inside the Early Mesolithic cluster.
Both C-points can be dated Late Mesolithic. The main considerations in this are the location of the one in the eastern, Late Mesolithic area and the fact that the other one, from the Early Mesolithic zone, is made of Wommersom quartzite. Although this point is located in the Early Mesolithic zone, we opt for a Late Mesolithic date as Wommersom quartzite is a type of stone used in particular in the Late Mesolithic at this site.
In summary, the following choices have been made. For future analysis of the excavation results the size of the Late Mesolithic area of activity may be defined by the maximum spread of the trapezes. The trapezes and LBK-like points display the clearest distribution pattern. This is also true for the distribution of various types of flint and the refitting results. The presence of a C-point in the western, Early Mesolithic zone makes it clear there were activities outside the zone as well, but these are considered to be limited in size and will

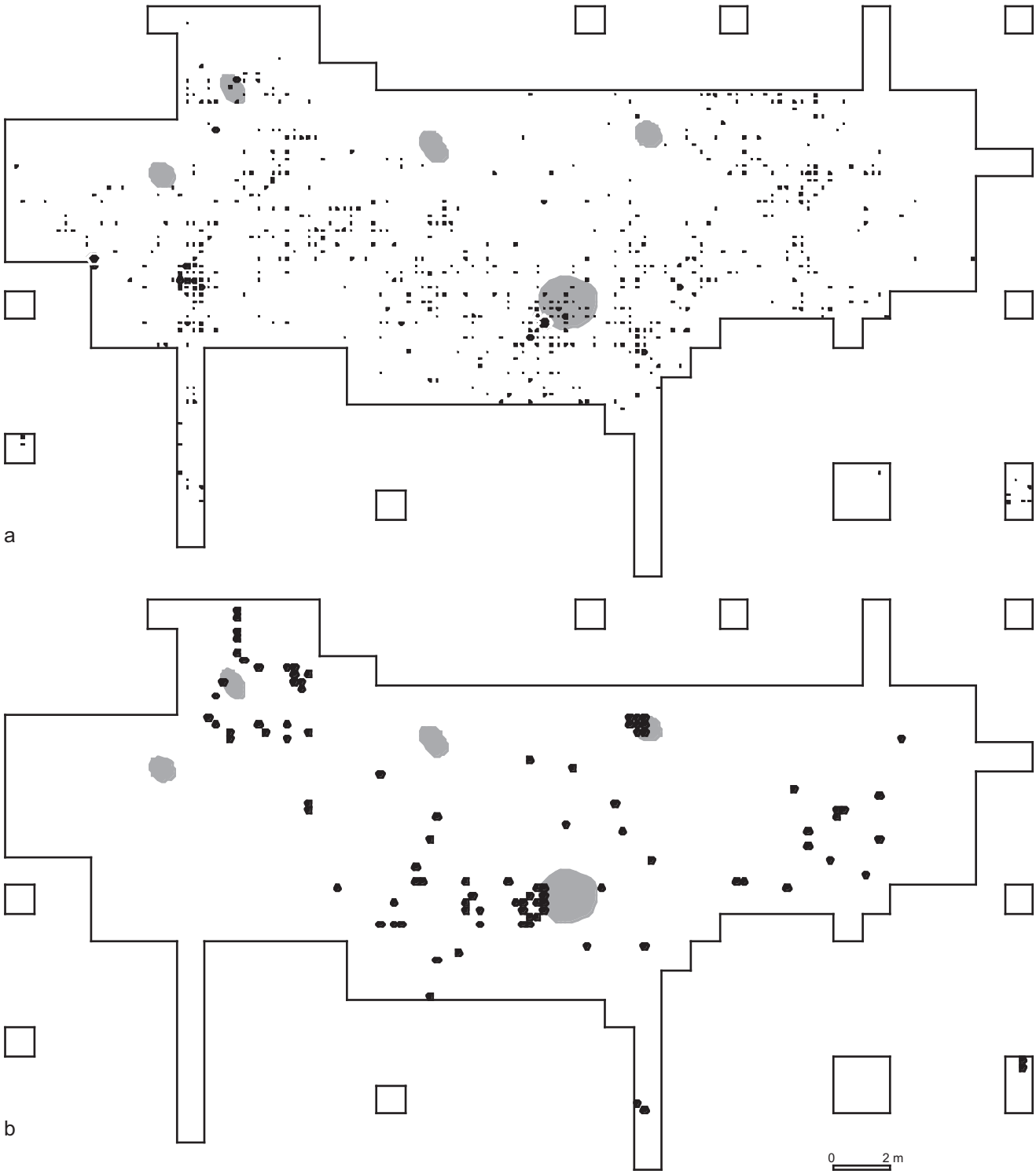

Fig. 2.28 Merselo-Haag. Relative distribution of burned flint in undisturbed subsoil. Maximum number of finds per 25 cm-square is 10. (a). Occurrence of pieces of charcoal per m^2 in absolute numbers (b).

not fundamentally affect the results of further analysis.
The Early Mesolithic zone can not be defined as easily. The clustering of points is outside the maximum spread of the trapezes. The western part of the excavated area may therefore be considered a primarily Early Mesolithic area of activity. In addition there is a certain overlap as demonstrated by the presence of Early Mesolithic points in the eastern part of the excavation area. Although this concerns more artefacts, this overlap appears to be limited in size.
An Early Mesolithic and a Late Mesolithic zone may therefore be distinguished, where the maximum spread of trapezes is taken as the dividing line. It should however be emphasized once again that in the zones demarcated in this way activities will have been carried out in earlier or later periods that were limited in size and will not fundamentally affect the results of each period's analysis.

2.7.3 SOIL TRACES

Like almost all Mesolithic sites, Merselo-Haag is remarkable for the highly limited number of soil traces. These traces have been blurred to a high degree by a strong, subrecent disturbance. Holes and post traces have not been observed; the only remains are some faint charcoal concentrations interpreted as hearths. In addition several smaller, often clearly demarcated areas with a little charcoal were visible. These are most probably recent charcoal remains, such as carbonized roots and material displaced by animals.
In the excavated area five hearths have been discovered that must have been dug, otherwise they would not have been preserved. The ruinous activities of animals and plants in the soil are clearly visible in the hearths, as numerous discolorations due to animal burrows and root growth can be discerned, resulting in a faint trace only. This is obviously characteristic for the hearths in the southern sandy soils[39]. In sandy soils in the north of the Netherlands several well-preserved and deeply dug hearths have been recovered. Because they were dug deeply and later sedimentation provided animals and plants with less opportunity to deploy their disastrous activities, the undersides have been preserved quite well. This is however not true for Merselo-Haag. This implies that great caution should be used in the interpretation of C14-datings.

2.7.3.1 Description of the hearths

Hearth 1: Oval, darkish-grey ashen discoloration with occasional pieces and particles of charcoal and a concentration in the northern part of the hearth. Diameter 75 cm, depth below shovelled level 10 cm.
Hearth 2: Elongated, greenish-grey ashen discoloration with occasional charcoal particles. Cut off in the northern part by recent disturbance. Length 80 cm, width 40 cm, depth below shovelled level 12 cm.
Hearth 3: Elongated oval, ashen, yellowish-brown discoloration with occasional pieces and particles of charcoal. Length 90 cm, width 50 cm, depth below shovelled level 34 cm.
Hearth 4: Concentration of pieces and particles of charcoal scattered over an area of 4 m^2. Near the coordinates of 94/343 a clustering can be discerned. Diameter approx. 200 cm, depth below shovelled level 0 cm.
Hearth 5: Round, ashen, greenish-grey discoloration with occasional pieces and particles of charcoal. Diameter approx. 75 cm, depth below shovelled level 11 cm.

The hearths are scattered evenly over the terrain, with no obvious clustering. It is remarkable that the hearths do not overlap or show a relationship with the flint concentrations. Hearths 1-3 are in the zone defined as Early Mesolithic; hearths 4 and 5 are located in the zone defined Late Mesolithic. The spatial distribution of the charcoal remnants found in the sieve residu makes it clear that around hearths 2, 4 and 5 many small pieces of charcoal were recovered as well, less so with hearths 1 and 3. The distribution of the burned flint in relation to the hearths displays quite a number of differences. In hearths 2 and 4 there is quite a lot of burned flint as well, less so in the other hearths. In the southwestern corner a considerable amount of burned flint was recovered as well. Traces of a hearth have not been found here, nor any separate pieces of charcoal.
So the location of a hearth is not unequivocally revealed by the distribution of pieces of charcoal or burned flint.

2.7.3.2 Sampling of the hearths

A soil sample, with a volume of approx. 5 litres, was taken of each hearth and sieved through a 1-mm sieve. The aim was to trace carbonized macroremains of vegetable or animal food. Such remains were however not obtained.
Only two hearths (nrs. 2 and 4) provided enough material for a conventional C14-dating. The filling of hearth 2 allowed the collection of small to intermediate pieces of charcoal. As hearth 4 had not been dug deeply, the charcoal had to be collected from the level.
Although in the filling of the dug hearths no burned flint has been recovered, several small pieces of unburned flint have been found. These probably landed in the filling as the result of animal burrowing and root growth, or during degradation of a hearth.

2.7.3.3 Wood analysis and dating

The wood composition of both hearths sampled for C14-dating has been investigated[40]. Hearth 4 was nearest to the Late Mesolithic cluster and therefore an association was assumed. The firewood consisted exclusively of evenly grown Pinus; branches were absent. Part of the charcoal had been strongly sintered, indicating a high temperature of the fire. The wood composition indicates a Boreal age, older therefore than the Late Mesolithic (Atlantic) age expected. The result of the C14-dating was 8225 ± 50 BP (GrN-17406).

Hearth 2 was located in the Early Mesolithic concentration. The charcoal proved to come from Pinus with some Quercus mixed in. The Pinus had grown evenly and few branches had been used. The presence of Quercus is indicative of a younger age than the expected Praeboreal/Boreal age. The C14-sample yielded an age of 5120 ± 60 BP (GrN-17407).

2.7.3.4 Conclusions

In no way are the dug hearths associated with the flint concentrations, on the contrary they are located outside those concentrations. Although charcoal is present in the sieved grids on top of the dug hearths, there is hardly any overlap between hearths and burned flint (fig. 2.28). In addition there are also areas where no hearth is obvious in the shovelled level, but burned flint and/or charcoal have been found nevertheless. In some places only charcoal occurs. This leads us to conclude that there were two types of hearths on this site. First the originally deeply-dug hearths whose underside, although strongly affected by animal burrows and roots, can still be discerned on the level. The filling contains relatively large amounts of charcoal, predominantly pine, and no burned flint or botanic macro-remains. There is no direct spatial relationship between the hearths and the various flint concentrations, it is even more likely that the hearths have been constructed relatively far from these concentrations.
The second type was not dug, but was instead on the surface[41]. The original position may be determined by the pattern of scattered pieces of charcoal and the distribution of the burned flint. We should however bear in mind that such patterns may also be the result of the clearing out of deeply-dug hearths. Of the 5 hearths only number 4 shows any connection with the find concentrations. In the area defined as Late Mesolithic, the hearth overlaps the southernmost concentration. Remarkably, hearths are absent from the areas with most tools. In the Early Mesolithic area there is also hardly any overlap visible between possible hearths and the flint concentration. On the southern edge there is a large amount of burned flint, without any charcoal association. The deeply-dug hearth pits appear to have been used mainly for storing fire and possibly for food preparation[42]. This is not in accordance with the standard image of hunters resting by a fire. The hearth that was dug provided not enough radiant heat and its location outside the flint concentrations speaks against such an image as well. On the other hand, the hearths that have been on the surface, do fit the image outlined above.

2.7.4 RAW MATERIALS

Determination of the provenance of the flint has been based on macroscopic comparison with the Leiden flint type collection[43]. Recognition is complicated by the often wide range of colours within flint from the same source. In Merselo-Haag the colour of the flint is mainly determined by the soil level where it is found. Flint from the A-level is usually relatively dark and displays a strong wind(?) patina. Artefacts from the B-level have been coloured brown under the influence of iron, whereas artefacts from the E-level are usually lighter in colour.

2.7.4.1 Description

For the description the flint has been classified into main groups (Raw Material Units [RMU]), within which individual nodules have been identified as much as possible. The main groups have been classified according to texture from vitreous via fine-grained to coarse-grained flint (fig. 2.29). This is the range covered by numbers 1 to 50. In a main group all flint has been included that shares the general characteristics of the group, but can not be distinguished as a separate nodule. Overall, 13 main groups have been distinguished. The groups numbered 60 and higher are smaller in size and in one instance consist of a single artefact only. These groups are considered to be individual nodules.
To these descriptions the stone types quartzite, Wommersom quartzite and Ottignies Phtanite have been added. The remainder consists of the burned pieces and artefacts that could not be attributed to one of the preceding groups.

RMU 01: vitreous flint
Cortex: rolled surface, pebble patina. In cavities the rough surface has been preserved. Thickness 1 mm.
Texture: vitreous, with translucent edges.
Inclusions: small, dark vitreous spots, small and intermediate white inclusions and some rather coarse-grained inclusions. Transitions from inclusion to matrix are sometimes diffuse.
Colour: light brown, brown, light grey, bluish grey, dark grey.
Source: mostly river deposits, the darker material is likely to come from the Meuse. The lighter material appears to come from the north, although typical northern flint with bryozoa is absent. An origin north of the Rhine is most likely, with erratic material the most plausible source.

Nodule 02:
Cortex: rolled surface, pebble patina. In cavities the rough surface has been preserved. Large parts show wind gloss. Thickness of the cortex ranges from 1 to 6 mm.
Texture: vitreous, with translucent edges.
Inclusions: small and large dark vitreous spots, small and intermediate white inclusions and some rather coarse-grained inclusions. Transitions are sometimes diffuse. Bryozoa visible in some pieces.
Colour: light grey, bluish grey, dark grey.

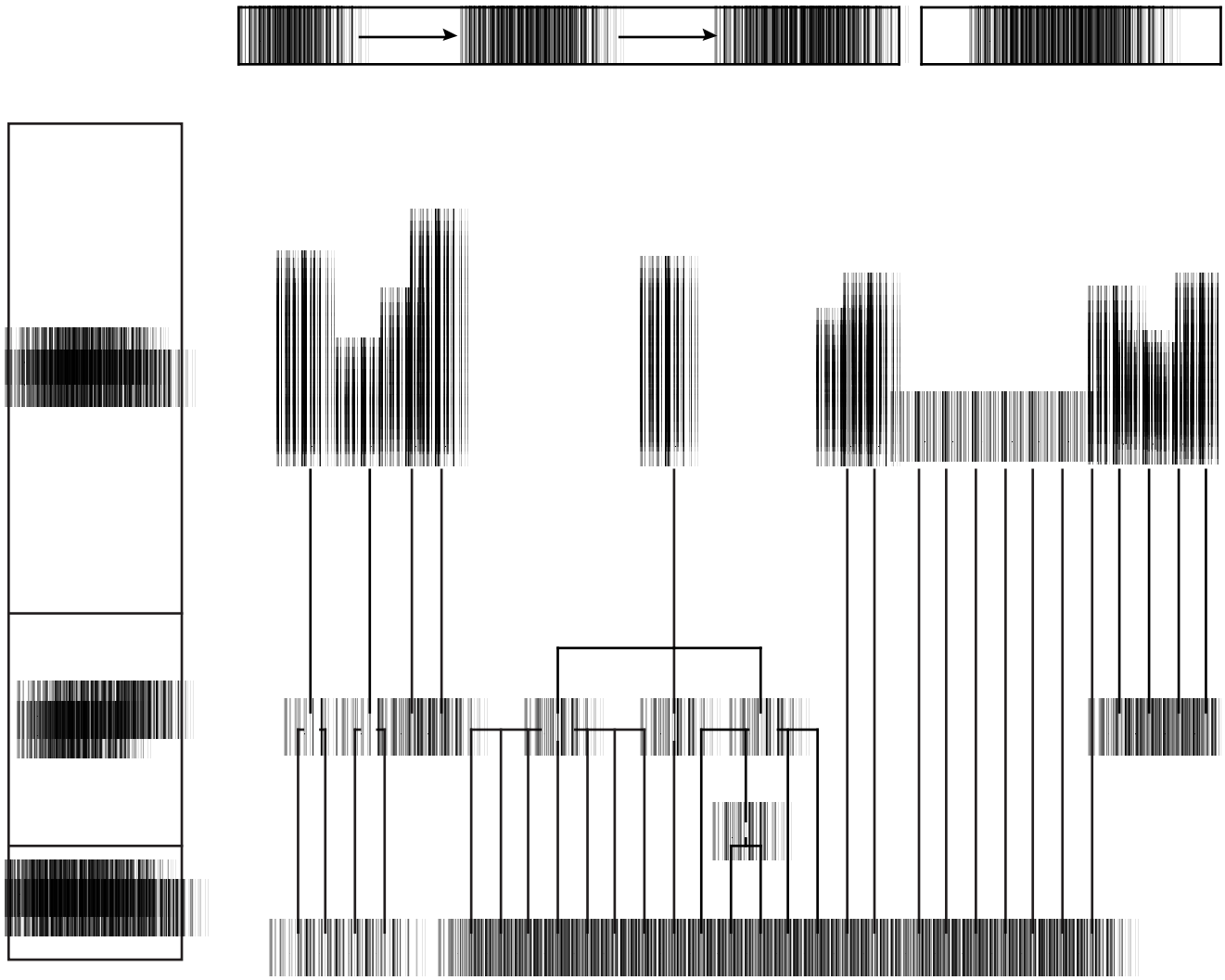

Fig. 2.29 Merselo-Haag. Summary of classification of all flint into main groups, raw material units (RMU) and individual groups and nodules.

Source: the presence of bryozoa is indicative of a northern origin. The wind gloss on some pieces is suggestive of a moraine deposit origin. Source most likely north of the Rhine.

Nodule 03:
Cortex: rolled surface, pebble patina. Cortex consists of two layers. Inner layer is brown, outer layer greyish brown. Thickness in all 2 mm.
Texture: vitreous.
Inclusions: some small grey spots and translucent grey inclusions. Sharp transitions visible between inclusions and matrix.
Colour: greyish brown.
Source: river deposits. The pieces are quite small, but the surface is highly reminiscent of Meuse eggs. Likely source Meuse deposits.

RMU 05: vitreous to fine-grained flint with tiny speckles
Cortex: rolled surface, pebble patina. In cortex sometimes deep, irregularly shaped depressions. Thickness 2 mm.
Texture: vitreous, translucent on the edges, with tiny speckles. Where speckles dominate, impression of a fine-grained flint arises.
Inclusions: small, round to irregular. Part is sharply defined, but diffuse transitions occur as well.
Colour: grey to brownish grey.
Source: Meuse deposits. Original area of provenance possibly Zevenwegen.

Nodule 06:
Cortex: rolled surface, pebble patina. Thickness 1 mm.
Texture: fine-grained.

Inclusions: none.
Colour: light grey with brown band under cortex.
Source: Meuse deposits.

Nodule 07:
Cortex: rolled eluvial cortex with calcareous remnants in cavities. Thickness 1 mm.
Texture: vitreous.
Inclusions: tiny speckles, small white spots, large irregular inclusions and coarse-grained inclusions.
Colour: light grey.
Source: unknown.

RMU 10: vitreous flint of Haspengouw-type
Cortex: rolled cortex with some calcareous remnants in deeper cavities, pebble patina. Thickness 1 mm.
Texture: vitreous.
Inclusions: small vitreous speckles, somewhat bigger speckles and irregularly shaped inclusions, partly sharply defined. Also inclusions with diffuse edges.
Colour: light grey, dark grey, brownish yellow.
Remarks: heterogeneous, highly divergent group.
Source: Flint with pebble patina from Meuse deposits. Flint with rolled cortex is eluvial from Haspengouw, Belgium.

RMU 15: vitreous with speckles and greasy appearance
Cortex: rolled cortex, pebble patina. Thickness 1 mm.
Texture: vitreous.
Inclusions: small white speckles.
Colour: grey, dark grey, brownish grey.
Remarks: heterogeneous, highly divergent group.
Source: Flint of the Lixhe-type. Flint with pebble patina from Meuse deposits; with rolled cortex is eluvial from Zuid-Limburg.

RMU 20: flint of the Rijckholt/Rullen-type
Cortex: rolled cortex, pebble patina. Thickness 1 mm.
Texture: fine-grained.
Inclusions: many small white speckles with very few irregular inclusions.
Colour: grey, brownish grey.
Source: The flint is an intermediate group with characteristics of the Rijckholt- and Rullen-types. Flint with pebble patina from Meuse deposits; flint with rolled cortex is eluvial from Zuid-Limburg/northeast Belgium.

Nodule 21:
Cortex: pebble patina. Thickness 1 mm.
Texture: fine-grained.
Inclusions: tiny speckles and somewhat larger spots.
Colour: brownish grey, with thin reddish brown lines
Source: Meuse deposits.

Nodule 22:
Cortex: small part pebble patina, mostly lightly rolled cortex with calcareous remnants in deeper cavities. Thickness 2 mm.
Texture: fine-grained.
Inclusions: many tiny speckles and small white spots, often irregular in shape.
Colour: light to dark grey.
Remarks: surface quite shiny.
Source: Flint with pebble patina from Meuse deposits; with rolled cortex eluvial from Zuid-Limburg/northeast Belgium.

Nodule 23:
Cortex: lightly rolled cortex with calcareous remnants in deeper cavities. Thickness 1 mm.
Texture: fine-grained.
Inclusions: many tiny speckles and small to large white spots, often irregular in shape.
Colour: light to dark grey with a light brown area below the cortex.
Source: Flint from eluvium in Zuid-Limburg/northeast Belgium.

Nodule 24:
Cortex: rolled cortex, pebble patina with rough cortex in deeper parts. Thickness 1-3 mm.
Texture: fine- to coarse-grained.
Inclusions: tiny speckles and coarse-grained irregular inclusions.
Colour: light to dark grey. Below the cortex a light brown band is visible.
Source: Meuse deposits.

Nodule 25:
Cortex: pebble patina. Thickness 1 mm.
Texture: fine-grained.
Inclusions: tiny speckles with irregular small, light grey spots.
Colour: light to dark grey. Below the cortex a light brown band is visible.
Remarks: might belong to nodule 24.
Source: Meuse deposits.

Nodule 26:
Cortex: pebble patina with fresh cortex in deeper cavities, but no calcareous remnants. Thickness 1-2 mm.
Texture: fine-grained.
Inclusions: tiny speckles with irregular, small, light grey spots with diffuse edges.
Colour: brown with reddish-brown band below the cortex.
Source: Meuse deposits.

Nodule 27:
Cortex: rolled cortex in deeper parts, pebble patina. Thickness up to 6 mm.
Texture: fine-grained.
Inclusions: tiny speckles and small white spots.
Colour: dark grey.
Source: Meuse deposits.

RMU 30: flint of the Rullen-type
Cortex: part of the cortex with pebble patina. Other part fresh cortex without calcareous remnants. Thickness 1-2 mm.

Texture: vitreous to fine-grained.
Inclusions: abundant speckles with small diffuse spots, often regular in shape.
Colour: light to dark grey.
Source: Flint with pebble patina from Meuse deposits; flint with fresh cortex from vicinity of Rullen, Belgium.

Nodule 31:
Cortex: rolled cortex and pebble patina. Fresh cortex may possibly have been preserved in deeper parts. Small remnants of this present on occasional artefact. Thickness 1 mm.
Texture: fine-grained.
Inclusions: tiny speckles, some white spots and areas with a finer, vitreous texture.
Colour: grey.
Source: Meuse deposits.

RMU 40: flint of the Rijckholt-type
Cortex: pebble patina and rolled cortex (eluvial?). Thickness 1-3 mm.
Texture: mostly fine-grained with incidental more coarse-grained areas.
Inclusions: small posts with vitreous or coarse-grained texture and irregularly shaped spots.
Colour: light grey, dark grey, brownish grey.
Source: rolled material from Meuse deposits, flint with rolled cortex eluvial from Zuid-Limburg, possibly in the vicinity of Rijckholt.

Nodule 41:
Cortex: pebble patina. Thickness 1-2 mm.
Texture: fine-grained.
Inclusions: small white spots, irregular small and large vitreous spots
Colour: grey.
Source: Meuse deposits.

Nodule 42:
Cortex: rolled cortex. Thickness 1-6 mm.
Texture: fine-grained.
Inclusions: small vitreous inclusions with irregular shape.
Colour: light grey.
Source: eluvial from Zuid-Limburg, possibly in the vicinity of Rijckholt.

Nodule 43:
Cortex: pebble patina, rolled cortex in deeper parts. Thickness 1-2 mm.
Texture: fine-grained.
Inclusions: light grey coarse-grained spots with irregular shape and vitreous dark grey inclusions with irregular shape.
Colour: light to dark grey
Source: Meuse deposits.

Nodule 44:
Cortex: rolled cortex. Thickness 1-5 mm.
Texture: fine-grained.
Inclusions: irregular grey coarse-grained inclusions, sharply defined vitreous inclusions and some pyrite and fossil impressions.
Colour: light grey, dark grey, brownish grey.
Source: eluvial from Rijckholt or immediate vicinity.

Nodule 45:
Cortex: pebble patina, rolled cortex in deeper parts. Thickness 1 mm.
Texture: fine-grained.
Inclusions: irregular vitreous and fine-grained spots
Colour: grey.
Source: Meuse deposits.

Nodule 46:
Cortex: pebble patina, rolled cortex in deeper parts. Thickness 1 mm.
Texture: fine-grained.
Inclusions: irregular vitreous and fine-grained spots.
Colour: grey with pale spots.
Source: Meuse deposits.

RMU 50: flint of the Simpelveld-type
Cortex: unrolled fresh cortex. Dissolved calcareous remnants. Thickness 4-8 mm.
Texture: outside layered vitreous; inside fine-grained.
Inclusions: bands, large grey spots and tiny speckles
Colour: reddish brown, brownish grey, light grey.
Remarks: probably a single nodule.
Source: Simpelveld or immediate vicinity.

RMU 55: coarse-grained speckled flint
Cortex: pebble patina. Thickness 1-2 mm.
Texture: coarse-grained.
Inclusions: speckles and irregular grey spots.
Colour: brownish grey, greenish grey.
Source: Meuse deposits.

Nodule 56:
Cortex: pebble patina. Thickness 1-2 mm.
Texture: coarse-grained.
Inclusions: speckles with irregular grey spots
Colour: brownish grey.
Source: Meuse deposits.

Individual nodules:
Nodule 60:
Cortex: pebble patina. Thickness 1 mm.
Texture: vitreous to fine-grained.
Inclusions: brown bands, light regular and irregular spots.
Colour: light grey, yellow, brownish grey.
Source: Meuse deposits.

Nodule 65:
Cortex: rolled cortex with calcareous remnants. Thickness 1-2 mm.

Texture: vitreous to fine-grained in the centre.
Inclusions: small white spots and larger irregular fine-grained inclusions.
Colour: bluish grey.
Source: river deposits (Meuse?)

Nodule 70:
Cortex: pebble patina. Thickness 1 mm.
Texture: fine-grained.
Inclusions: indeterminate.
Colour: yellowish grey with red spots.
Remarks: flint was burned; probably from a single nodule.
Source: Meuse deposits.

Nodule 80:
Cortex: pebble patina. Thickness 1-2 mm.
Texture: fine-grained.
Inclusions: tiny speckles, small vitreous spots.
Colour: yellowish grey, brownish grey.
Remarks: brownish grey band on outside of nodule.
Source: Meuse deposits. Probably originally from vicinity of Rullen, Belgium.

Nodule 81:
Cortex: no visible remnants.
Texture: fine-grained.
Inclusions: small irregular spots, usually lighter than the matrix.
Colour: grey.
Source: unknown.

Nodule 82:
Cortex: pebble patina. Thickness 1 mm.
Texture: vitreous to fine-grained.
Inclusions: tiny speckles, small white spots, irregular spots, diffuse transitions.
Colour: white, brownish grey, brown.
Source: Meuse deposits.

Nodule 83: (quartzite)
Cortex: no visible remnants.
Texture: fine-grained.
Inclusions: thin grey layer on outside (?), tiny micas.
Colour: black, grey.
Source: unknown.

RMU 90: Wommersom quartzite
Cortex: rolled cortex. Thickness 1 mm.
Texture: fine-grained.
Inclusions: irregular yellow inclusions and tiny micas.
Colour: grey, brownish grey.
Source: Wommersom, Belgium.

RMU 91: phtanite
Cortex: no visible remnants.
Texture: fine-grained.
Inclusions: none.
Colour: black.
Source: vicinity Ottignies, Belgium.

RMU 98: burned flint

RMU 99: material that cannot be attributed to one of the groups described above.

2.7.4.2 Provenance

The majority of the artefacts display pebble patina. This flint must have been collected in the immediate vicinity, with Meuse deposits or the Meuse channel itself the most likely sources.
An exception is the flint of northern origin (RMU 01-03). This should come from Late Glacial ice-pushed deposits or river channels transporting material from these deposits. The southernmost of these deposits are the Veluwe and the Rijk van Nijmegen. The eastern boundary for the occurrence of northern erratic flint lies somewhat to the east of Krefeld and south of Dortmund. In the channel or deposits of the Rhine this material can be found as well. However, no exclusive traces of pebble patina have been found on the artefacts of a northern flint type in Merselo-Haag. So an ice-pushed ridge provenance is likely.
A minority of the flint has a fresh to rolled cortex surface. This indicates that the material was collected in the primary source area. The fresh limestone dissolved completely over time, due to the acid soil and water transport. Only in deeper parts of the cortex calcareous remnants have in some cases been preserved. Flint with a fresh to rolled cortex surface originates in Zuid-Limburg and the northeastern part of the Belgian provinces of Limburg and Luik, more in particular Rijckholt, Simpelveld, Rullen and the Haspengouw. Over half the flint originated in Zuid-Limburg, but must have been collected in the Meuse channel (table 2.7).
Finally there are some, often small, groups that can easily be distinguished but cannot be attributed to any source (RMU 55-82).
Three types of stone could be distinguished. The largest group consists of quartzite originating from Wommersom (RMU 90), near Tienen (Belgium). The second group consists of a single piece of phtanite (RMU 91) that should come from a small source area around the town of Ottignies (Belgium). The third group is also a type of quartzite (RMU 83), whose provenance could not be determined.

2.7.4.3 Distribution

For each group of raw materials, RMU's and nodules, a distribution map has been drawn. On the map showing the distribution of all finds, five clusters are evident within the area defined as Late Mesolithic (fig. 2.26). This corresponds with 16 groups of raw materials, in one or more of the five clusters. In the distribution patterns Rullen-, Rijckholt flint and Wommersom quartzite predominate. In addition individual nodules and groups (07 (fig. 2.33a), 55

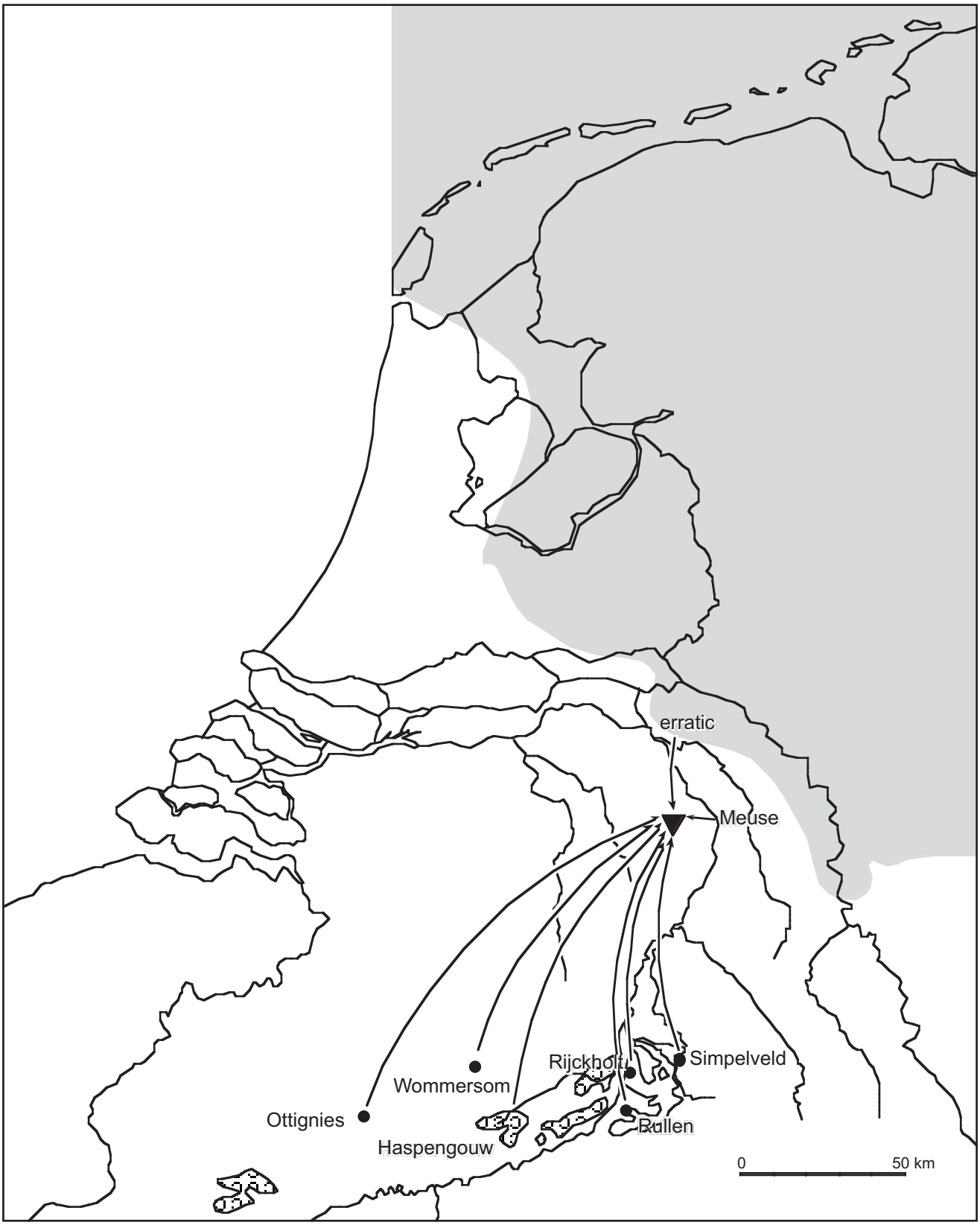

Fig. 2.30 Provenance of the various flint and stone types recovered in Merselo-Haag.

(fig. 2.33b), 56 (fig. 2.34a), 60 (fig. 2.34b), 65 (fig. 2.35a) and 83 (fig. 2.35b) can be distinguished that consist of small numbers.
In all clusters group 42, eluvial flint of the Rijckholt-type, occurs, with a strong emphasis on clusters 3 and 4. From nodule 07, a vitreous flint type of unknown origin, single pieces occur in clusters 2, 3 and 4. Flint group 44 occurs in clusters 1, 2 and 3. All other groups occur mainly in a single cluster. In cluster 1 nodules 23-26 occur, fine-grained flint types from the Meuse channel and an eluvium, as well as nodule 43 and flint group 55, both fine-grained flint types originally from the Meuse channel. In cluster 3 nodules 60 and 65 occur, both from river deposits. In cluster 4 flint nodule 45 and stone group 90: Wommersom quartzite,

Raw material group	n	%
01	62	1.89
02	3	0.09
03	1	0.03
05	12	0.37
06	2	0.06
07	14	0.43
10	41	1.25
15	41	1.25
20	163	4.96
21	3	0.09
22	13	0.40
23	25	0.76
24	6	0.18
25	9	0.27
26	17	0.52
27	5	0.15
30	50	1.52
31	5	0.15
40	264	8.04
41	3	0.09
42	617	18.78
43	7	0.21
44	648	19.73
45	25	0.76
46	52	1.58
50	4	0.12
55	6	0.18
56	16	0.49
60	19	0.58
65	41	1.25
70	9	0.27
80	3	0.09
81	2	0.06
82	4	0.12
83	6	0.18
90	135	4.11
91	1	0.03
98	569	17.32
99	382	11.63
Total	3285	99.99

Table 2.6 Late Mesolithic, numbers by raw material group

Raw material group	n	%
vitreous northern (01-03)	66	2.01
vitreous (05-07)	28	0.85
Haspengouw (10)	41	1.25
Lixhe (15)	41	1.25
Rijckholt/Rullen (20-27)	241	7.34
Rullen (30-31)	55	1.67
Rijckholt (40-46)	1616	49.19
Simpelveld (50)	4	0.12
unknown (55-56)	22	0.67
unknown (60)	19	0.58
unknown (65)	41	1.25
unknown (70)	9	0.27
unknown (80)	3	0.09
unknown (81)	2	0.06
unknown (82)	4	0.12
quartzite (83)	6	0.18
Wommersom (90)	135	4.11
Phtanite (91)	1	0.03
burned (98)	569	17.32
indet. (99)	382	11.63
Total	3285	99.99

Table 2.7 Late Mesolithic, raw material by provenance

Raw material group	Cluster 1	2	3	4	5
07	–	–	–	–	–
23	+	–	–	–	–
24	+	–	–	–	–
25	+	–	–	–	–
26	+	–	(+)	–	–
40	+	+	–	–	+
42	+	(+)	+	+	–
44	+	+	+	–	–
45	–	–	–	+	–
46	+	–	–	–	–
55	+	–	–	–	–
56	–	–	–	–	+
60	(+)	–	+	–	–
65	–	–	+	–	–
83	–	–	–	–	+
90	–	–	–	+	–

Table 2.8 Distribution of types of flint within the Late Mesolithic area.

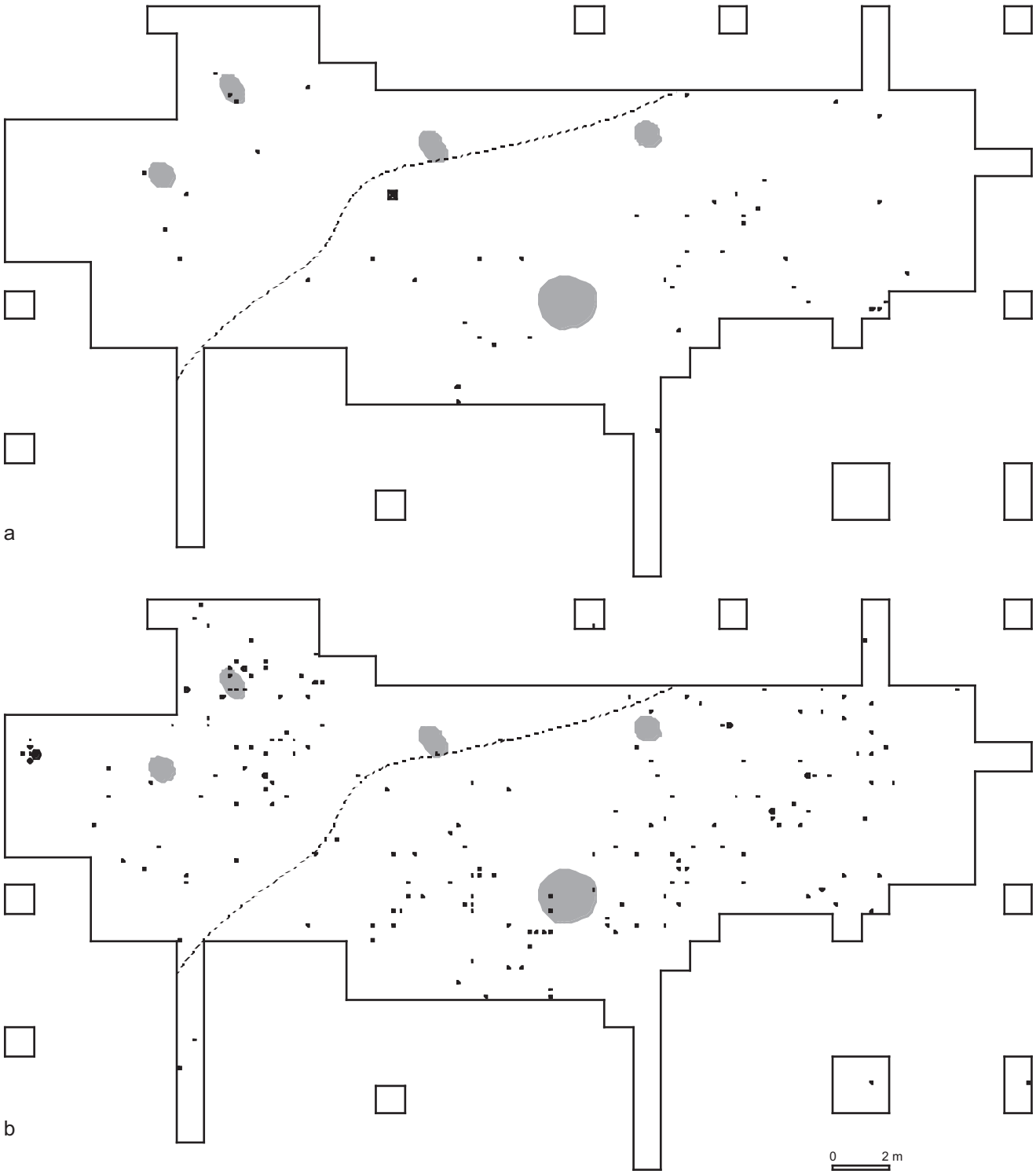

Fig. 2.31 Merselo-Haag. a: Relative distribution of RMU 10 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 2. The position of the core is indicated by a square. b: Relative distribution of RMU 20. Maximum number of finds per 25 cm-square is 4.

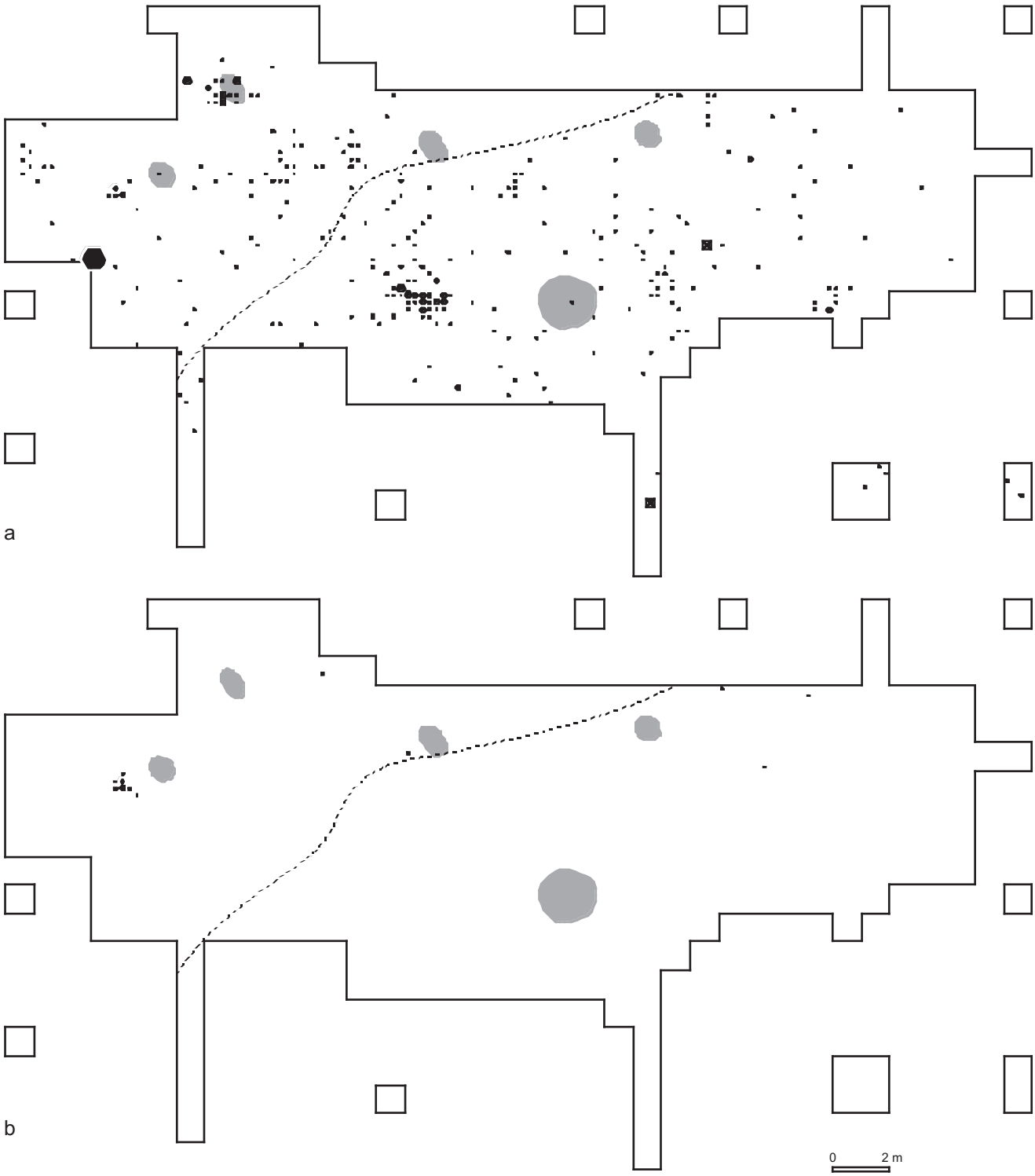

Fig. 2.32 Merselo-Haag. a: Relative distribution of RMU 30 in the undisturbed subsoil. The position of the core is indicated by a square. Maximum number of finds per 25 cm-square is 12. b: Relative distribution of RMU 50. Maximum number of finds per 25 cm-square is 4.

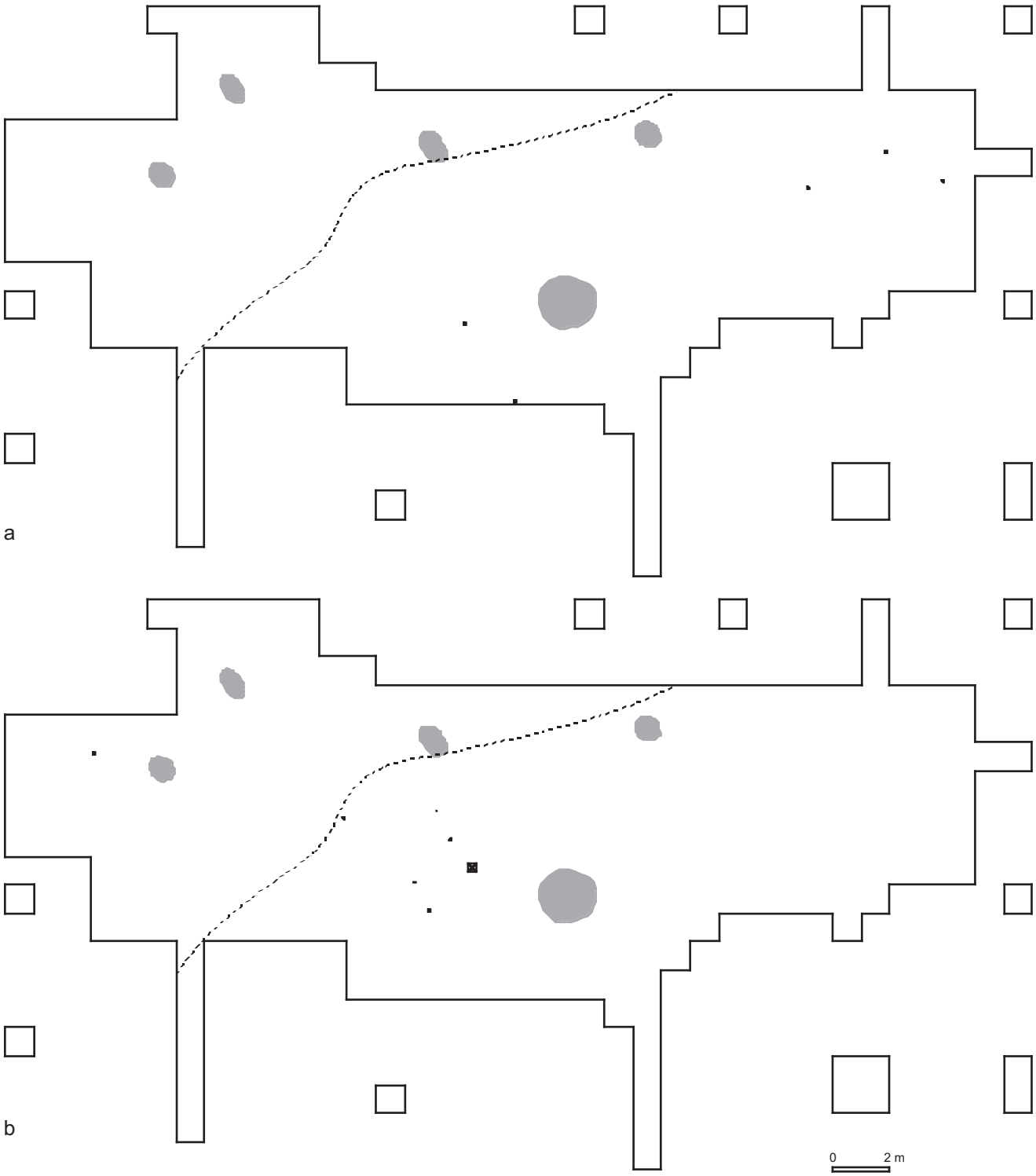

Fig. 2.33 Merselo-Haag. a: Relative distribution of flint group 7 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 1. b: Relative distribution of flint group 55. Maximum number of finds per 25 cm-square is 1. The position of the core is indicated by a square.

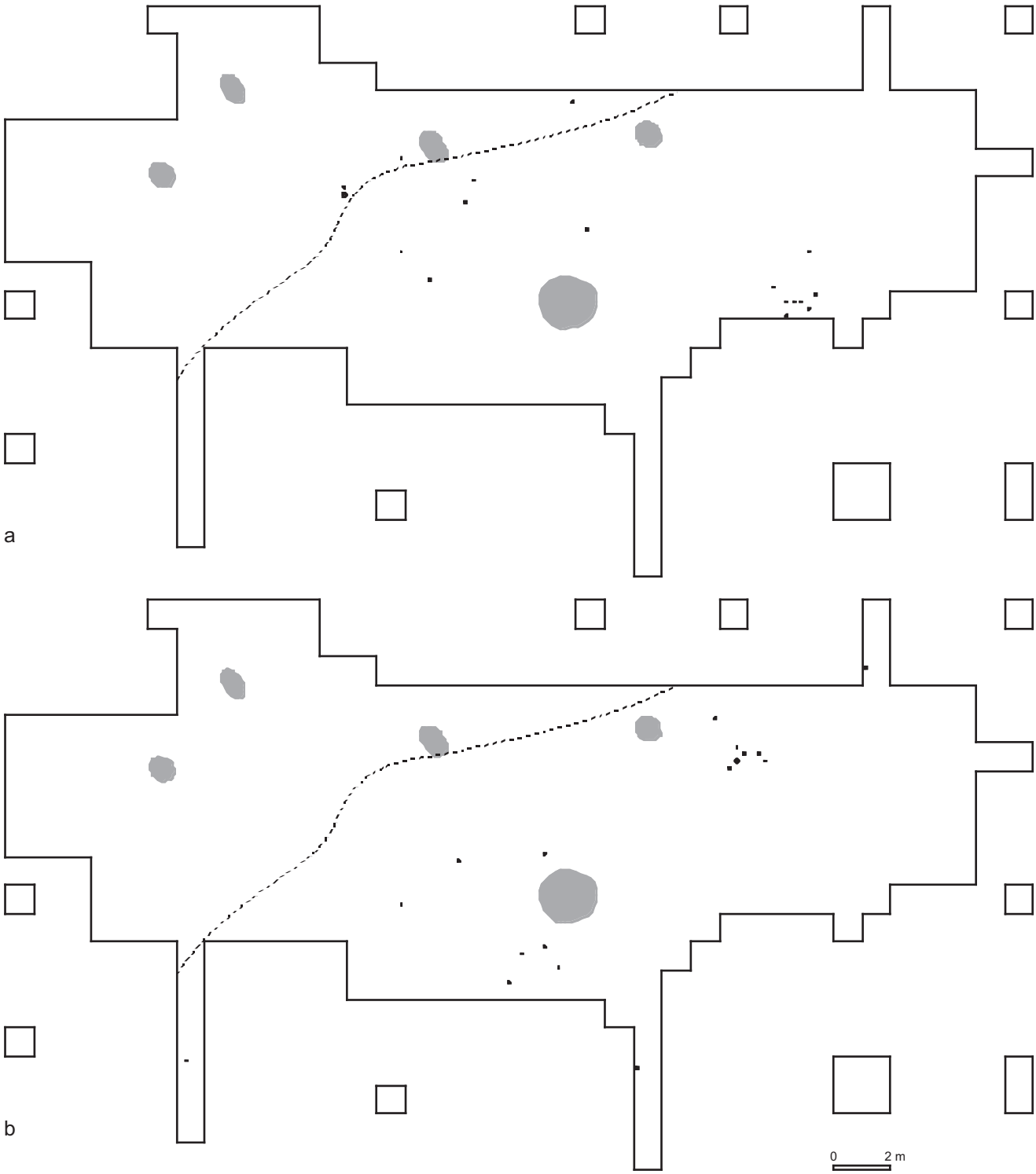

Fig. 2.34 Merselo-Haag. a: Relative distribution of flint group 56 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 3. b: Relative distribution of flint group 60. Maximum number of finds per 25 cm-square is 2.

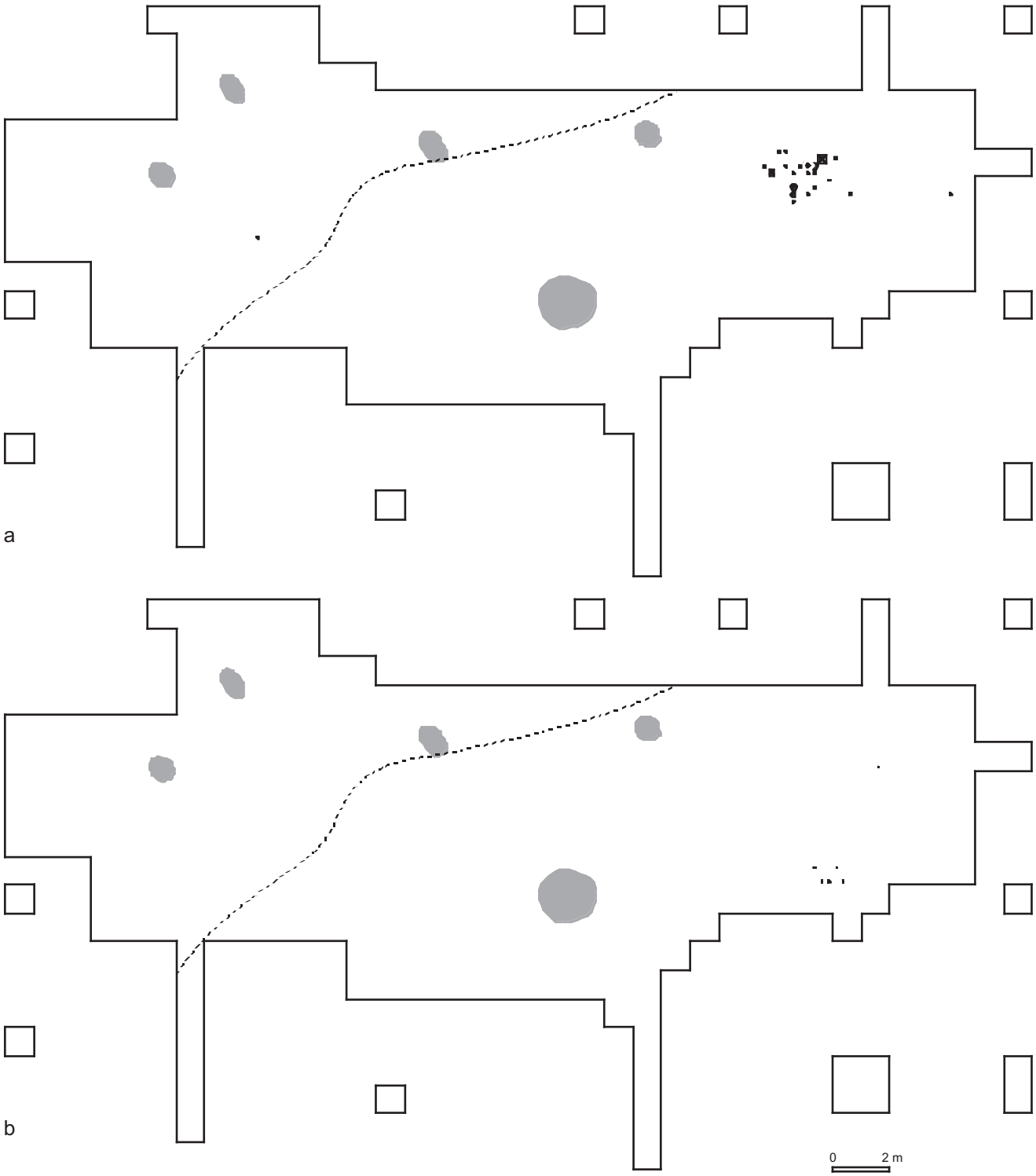

Fig. 2.35 Merselo-Haag. a: Relative distribution of flint group 65 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 5. The position of the core is indicated by a square. b: Relative distribution of quartzite type 83. Maximum number of finds per 25 cm-square is 1.

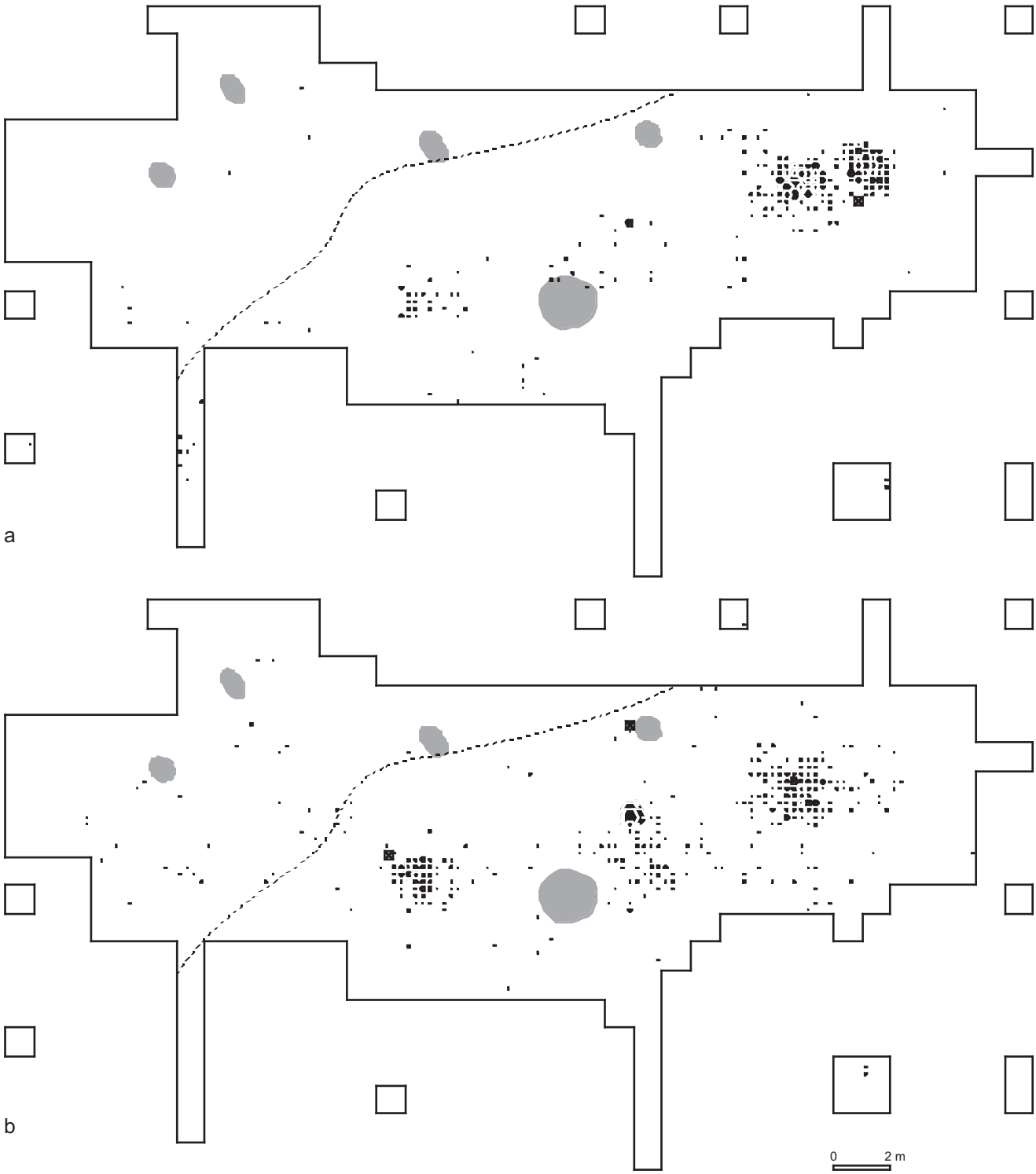

Fig. 2.36 Merselo-Haag. a: Relative distribution of flint group 42 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 9. The position of the core is indicated by a square. b: Relative distribution of flint group 44. Maximum number of finds per 25 cm-square is 12. The position of the cores are indicated by squares.

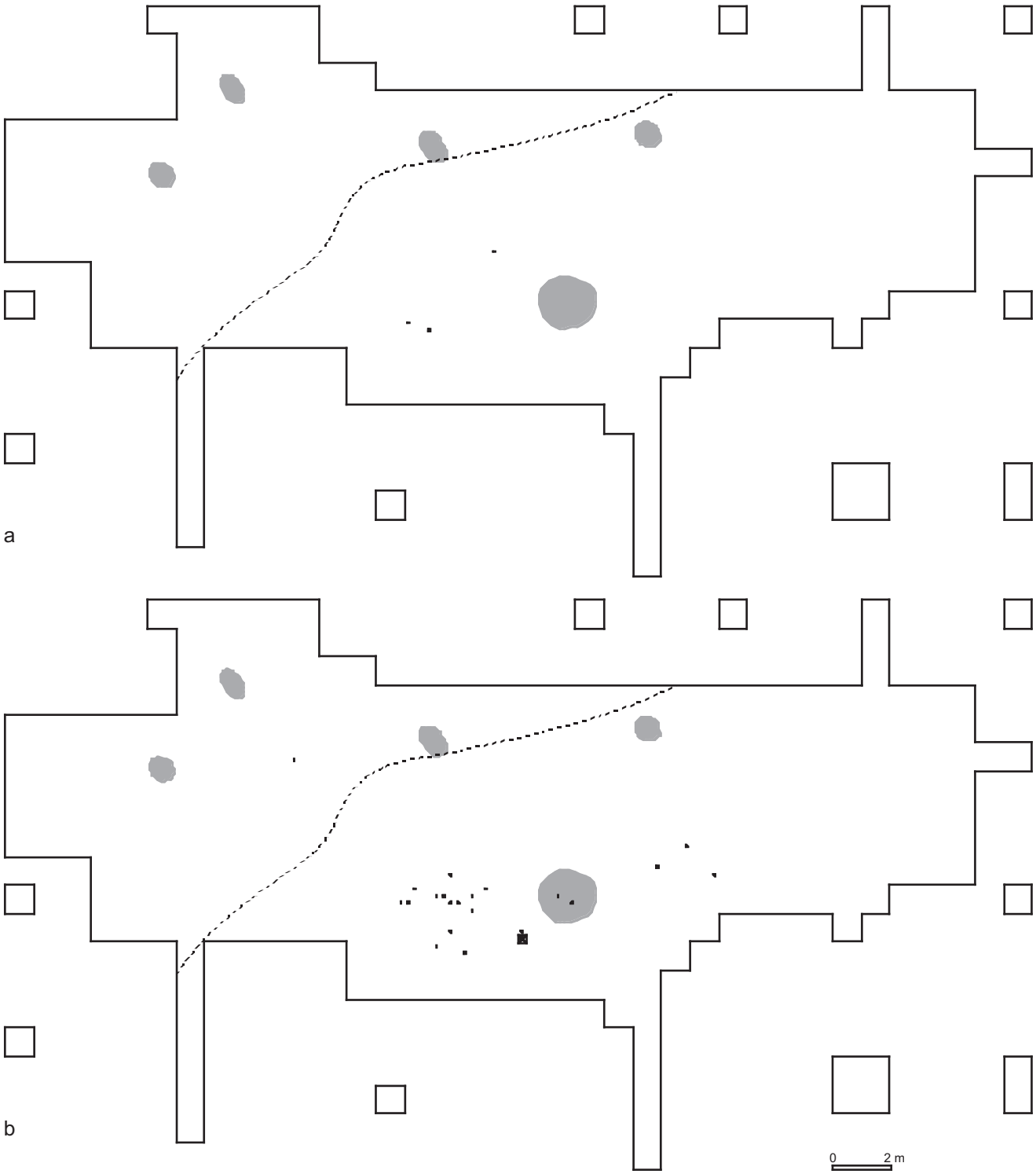

Fig. 2.37 Merselo-Haag. a: Relative distribution of flint group 23 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 1. b: Relative distribution of flint group 24. Maximum number of finds per 25 cm-square is 1. The position of the core is indicated by a square.

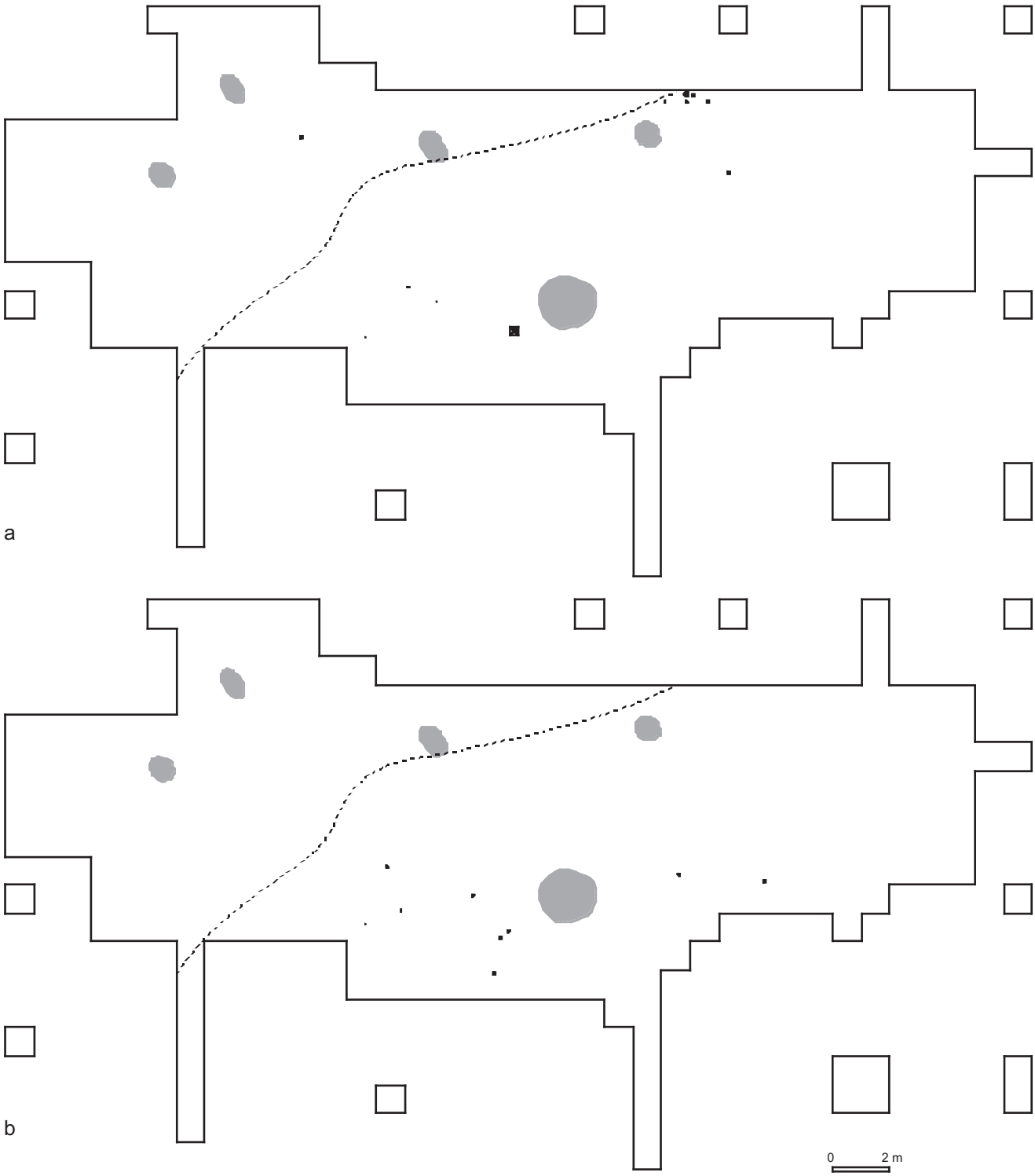

Fig. 2.38 Merselo-Haag. a: Relative distribution of flint group 25 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 2. The position of the core is indicated by a square. b: Relative distribution of flint group 26. Maximum number of finds per 25 cm-square is 1.

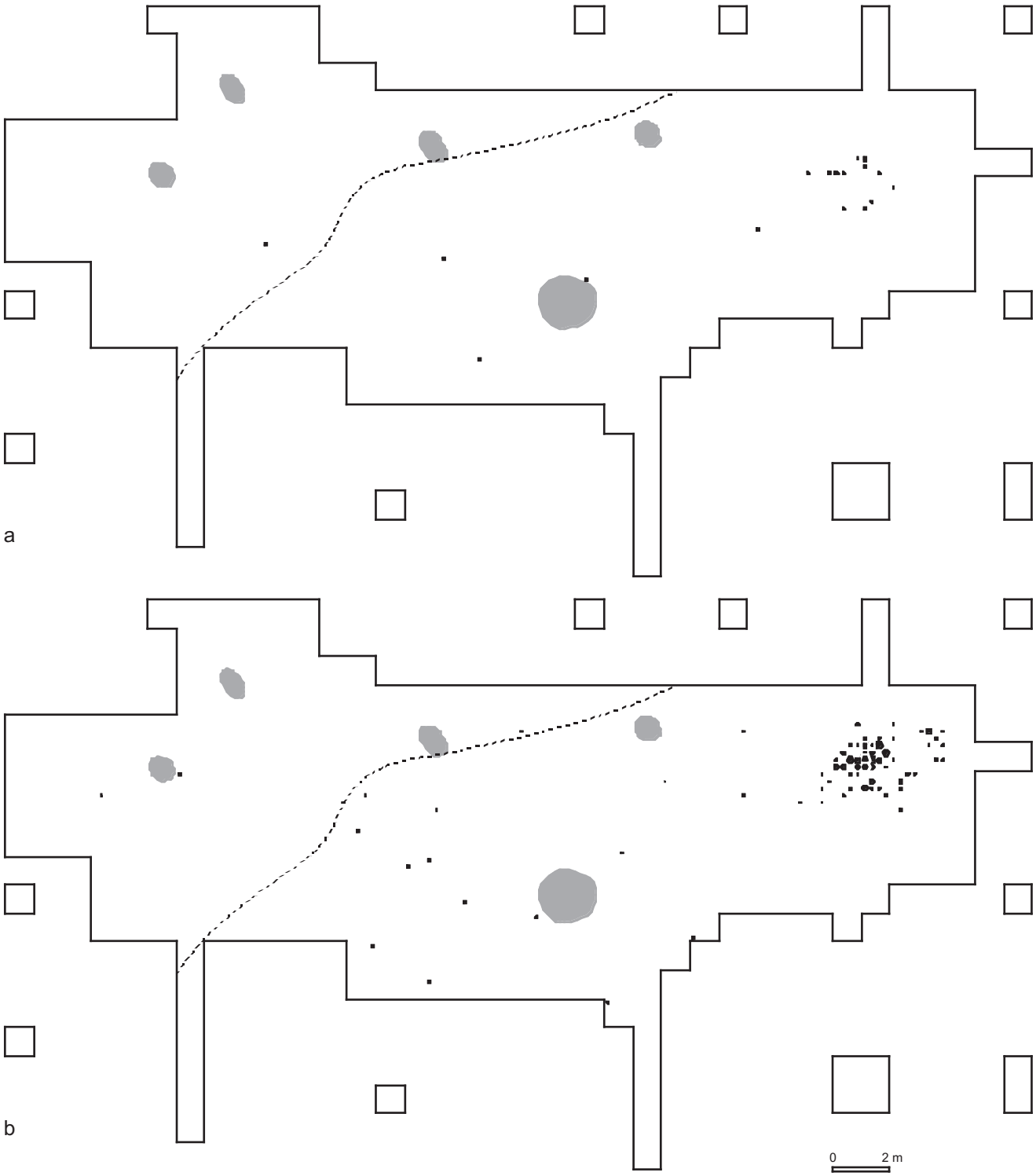

Fig. 2.39 Merselo-Haag. a: Relative distribution of flint group 45 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 2.
b: Relative distribution of quartzite group 90 (Wommersom quartzite). Maximum number of finds per 25 cm-square is 6.

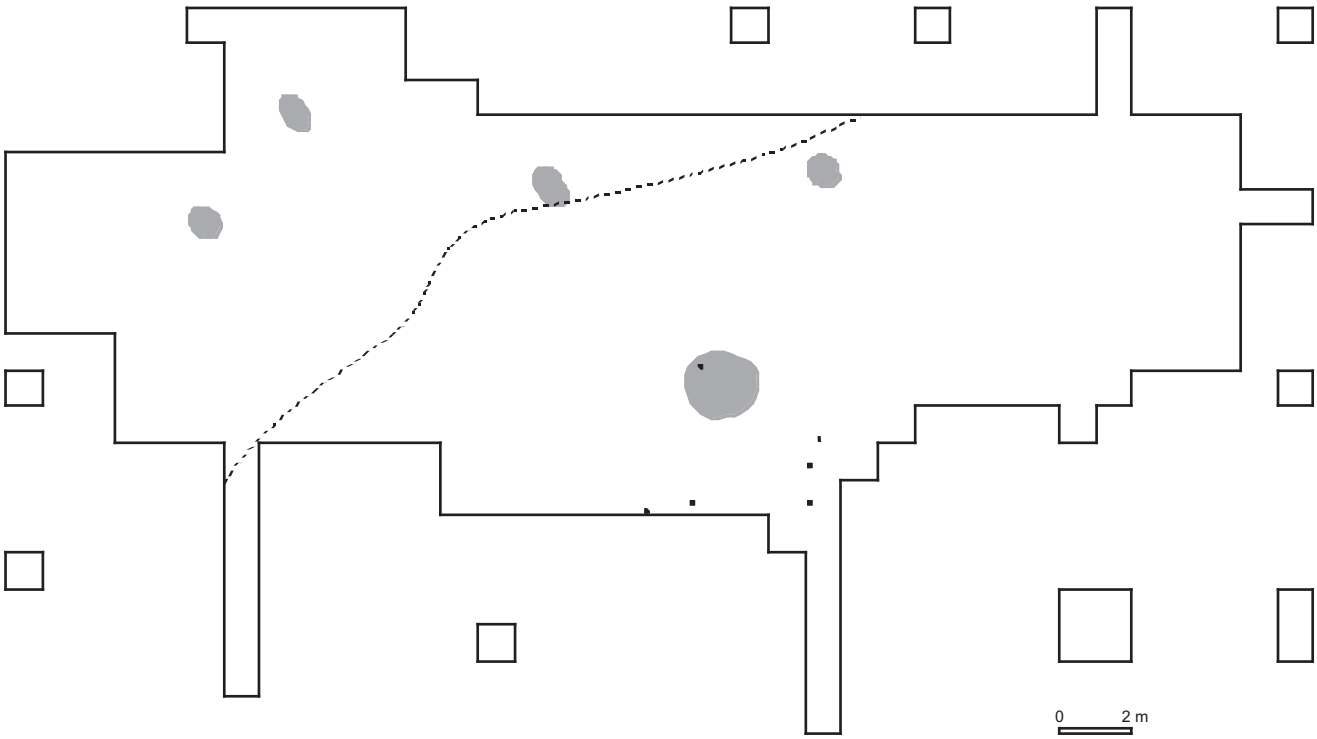

Fig. 2.40 Merselo-Haag. Relative distribution of flint group 70 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 1.

occur. In cluster 5 nodule 56, a coarse-grained flint from Meuse deposits and stone group 83, a quartzite of unknown origin, occur. Not matching any of these clusters there are also some tiny scattered groups (70 (fig. 2.40), 80, 81 en 82).

2.7.4.4 Conclusions

In the Late Mesolithic a wide range of flint types has been employed. The most important raw material was flint of the Rijckholt/Rullen-type, that could be collected in the Meuse, but was partly collected from an eluvium as well. Another indication for long-distance transport of flint is the presence of the Haspengouw flint with eluvial cortex. The presence of Wommersom quartzite (90), quartzite of unknown origin (83) and phtanite (91) are indicators for long-distance contacts as well.
Before any statements can made on how the raw materials were transported to this settlement, the various stages of processing at the site should be investigated.

2.7.5 PROCESSING

Traditional methods of investigation have been followed in studying the methods of processing the flint. For instance in the description of the flint various questions were taken into account: how the flint had been processed, whether that had occurred at the site or elsewhere and what the relation was between the various raw materials and the tools.
Special attention was paid to the question where the flint had been processed, more in particular whether it was possible to distinguish different stages of processing, which stages had been executed at the site and which elsewhere. In that way it might be possible to determine which part of the flint had been imported and in what form.

2.7.5.1 Primary technique

The flint was mainly worked in a soft hammer technique. Indicators for a hard hammer technique, such as pronounced bulbs of percussion and cones are almost completely absent. Weakly developed bulbs of percussion are very common, as are percussion lips. Platform reduction occurred to a limited extent, while platform preparation was rare. The conclusion therefore seems justified that the flint was worked in a direct hammer technique. The small percentage of percussion characteristic of a hard hammer technique as well as the fact that no hammer stones were found on the site, make it likely that the material was processed with bone or antler.

Late Mesolithic	blades		flakes		total	
	n	%	n	%	n	%
hard hammer	14	20.0	70	14.1	84	14.8
soft hammer	56	80.0	426	85.9	482	85.2
Total	70	100.0	496	100.0	566	100.0
platform reduction	10		30		40	
platform preparation	2		8		10	

Table 2.9 Flaking technique in relation to the primary processed material

Flakes are predominant among the flint waste. The stereotypical image of a prevalence of blades in the Mesolithic, does not hold here. This observation is reinforced by the fact that part of the blades may be considered imports.
Several factors may have caused the predominance of the flakes. It might for instance not have been necessary for the users of this site to make blades, the quality of the flint might have been too low, or their expertise was not sufficient. These factors may have contributed, but the excavation technique may play a part as well, since the smallest fragments are collected from sieving and tend to be flakes.
It is not possible to determine the exact quantitative share of blades, but it is clear that this share is not high and does not match the usual situation on Late Mesolithic sites[44].

	n	%
blades	502	16.3
flakes	2173	70.7
indet. fragments	397	12.9
Total	3072	99.9

Table 2.10 Primary processing

negative pattern	n	%
regular	157	23.5
irregular	117	17.5
indeterminate	394	59.0
Total	668	100.0

Table 2.11 Regularity of blades and flakes.

The dimensions of the primary processed material are not large. The smaller flake material, up to approx. 15 mm is mainly represented. Larger artefacts occur in limited numbers. Apart from the fact that the large amount of small flake material is the result of the method of collection, it also allows the conclusion to be drawn that the flint was processed at the site. A small part, however, has larger dimensions and does not appear to have been processed at the site. A good example is provided by the Wommersom quartzite. The length/width graph shows (fig. 2.41c) the finest fraction to be highly under-represented; this material was probably barely worked at the site. Most likely some of the larger pieces were brought in as semi-manufactured items. Besides processing at the site, an import component should be taken into account as well.

The material processed gives the impression that not a great deal of attention was lavished on the production of flakes and blades. Maybe this attention was not necessary, but it may also be that the expertise of the flint worker(s) was not very great. There is a marked contrast between the rest products of local flint production and imported artefacts. The locally produced material demonstrates a low to average skill, whereas the imported flint is a testimonial to the artisanship of the maker(s).
Besides the primary waste, secondary production waste may be distinguished as well. These represent a processing stage intermediate between primary production and the tool. Part of the small flake material will have been retouch waste. The most striking example of secondary production waste is the microburin. These have been found on many Mesolithic sites in large numbers, but occur to a very limited extent only in Merselo-Haag. Only one item can assigned to this category with certainty (fig. 2.55:10); the other specimen is doubtful, due to recent damage (fig. 2.55:11).

2.7.5.2 Cores

In the same way that flakes dominate the waste material, flake cores dominate as well. These cores show few signs of systematic processing. Often an arbitrary edge was selected for the removal of a series of flakes. This might be repeated on other locations until the core had been exhausted. In addition there are also cores that had been processed only very slightly, where only a small number of artefacts have been manufactured, before it was discarded. Large parts of the original surface — usually pebble patina — are often still in evidence.
Blade cores are present in smaller numbers. Three different types can be distinguished: cores with single and multiple striking platforms and 1 pyramidal core. The dimensions of the blade negatives vary widely in length and width. Cores for the production of microblades do not occur.

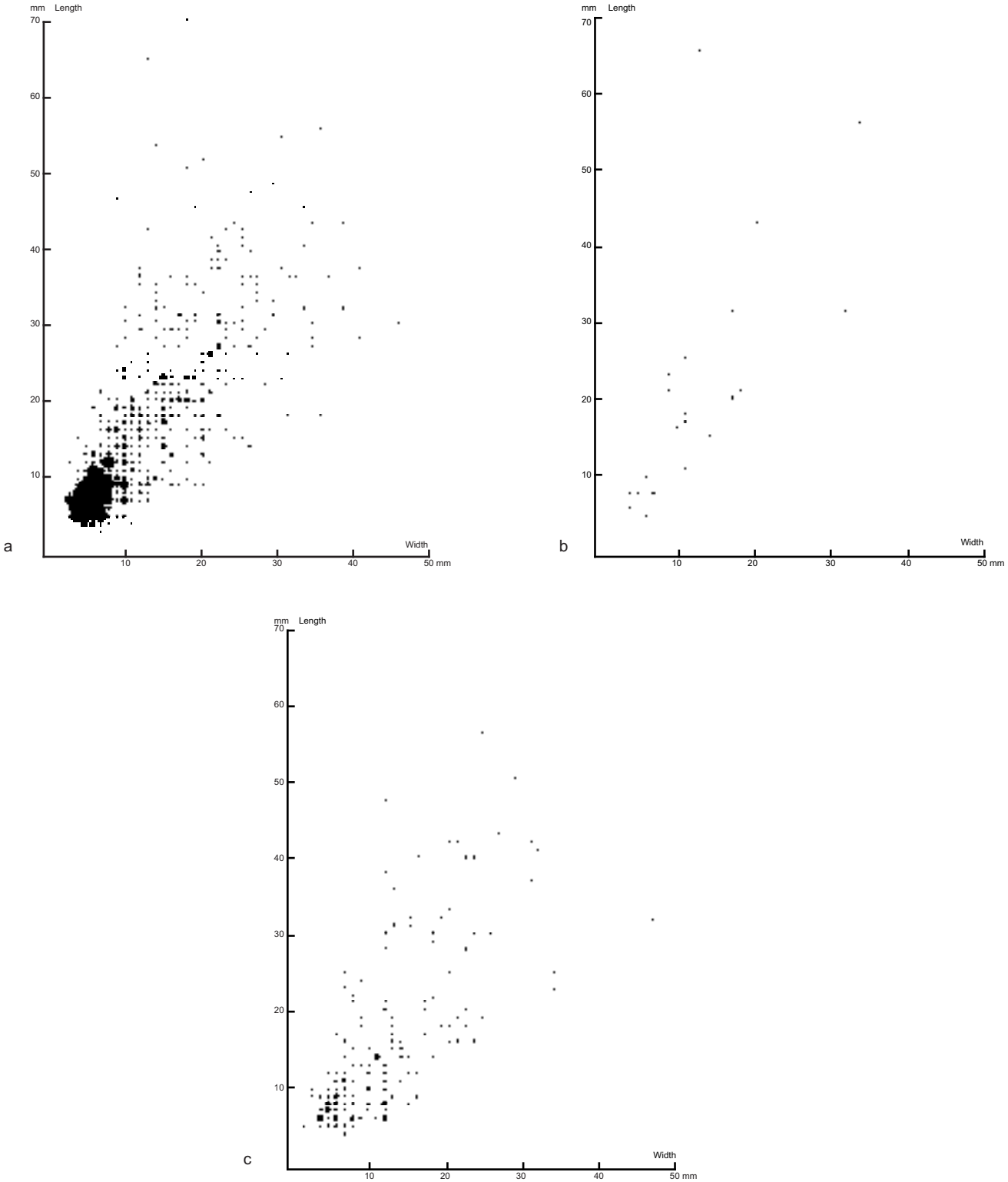

Fig. 2.41 Merselo-Haag. a: Length/width ratios of complete blades and flakes from the Early Mesolithic, b: Length/width ratios of complete blades and flakes from the Late Mesolithic, c: Length/width ratios of complete blades and flakes of Wommersom quartzite.

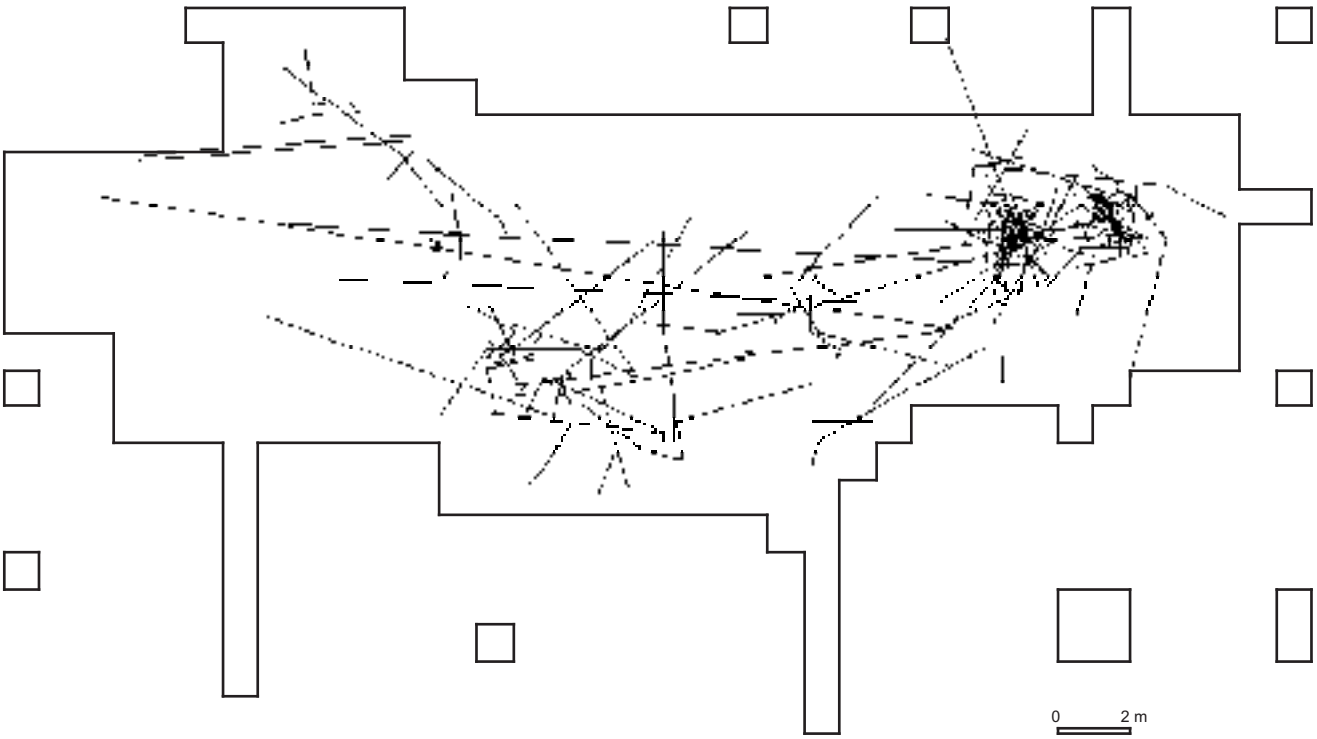

Fig. 2.42 Merselo-Haag. Summary of all pieces of flint that fit together.

Type	n	%
flake core	20	64.6
blade core (1 striking platform)	4	12.9
blade core (2 opposite striking platforms)	6	19.4
pyramidal core	1	3.2
Total	31	100.1

Table 2.12 Cores

2.7.6 REFITTING

The refitting programme has been long-term and extensive. Preliminary results show that approx. 8.5 % (366 items) of artefacts can be made to fit[45]. The largest joint consists of 17 pieces that fit together. In most cases, however, joints consist of two pieces.

Some general conclusions may already be drawn in relation to the processing of flint at the site. First of all, considerable parts of the finishing sequence are lacking. There are no indications that those stages occurred elsewhere, so the most likely cause must be disturbance of the site. In particular levelling activities for the cart track crossing the site should be considered in this respect. The small percentage of joints may point to this as well.

Second, the same small clusters can be discerned in the refitting lines as were visible in the distribution of all finds. This is also an indication for the integrity of the site. Almost all refitting lines occur within the area defined as Late Mesolithic. Only a few refitting lines can be distinguished between the Early- and Late Mesolithic areas. This concerns three joints, two of which appear to be the result of secondary displacement, as the artefacts are within the body of the track and the direction of the refitting lines matches this as well. The first joint consists of two pieces of Wommersom quartzite coming from the plough soil. The second joint is a flake from the B-level in the Early Mesolithic area, matching a core from the Late Mesolithic area. The core comes from the plough soil.

The refitting line of the third joint is indicative for a wider area of activities than suggested by the distribution of arrowheads and several raw material groups. The joint consists of two artefacts with traces of use. It was impossible to determine in which stage the activities occurred.

The patterns of joints consisting of more than two items always correspond to the individual flint clusters. These clear and small concentrations of refitting lines are the reflection of a single series of activities with a large historical integrity.

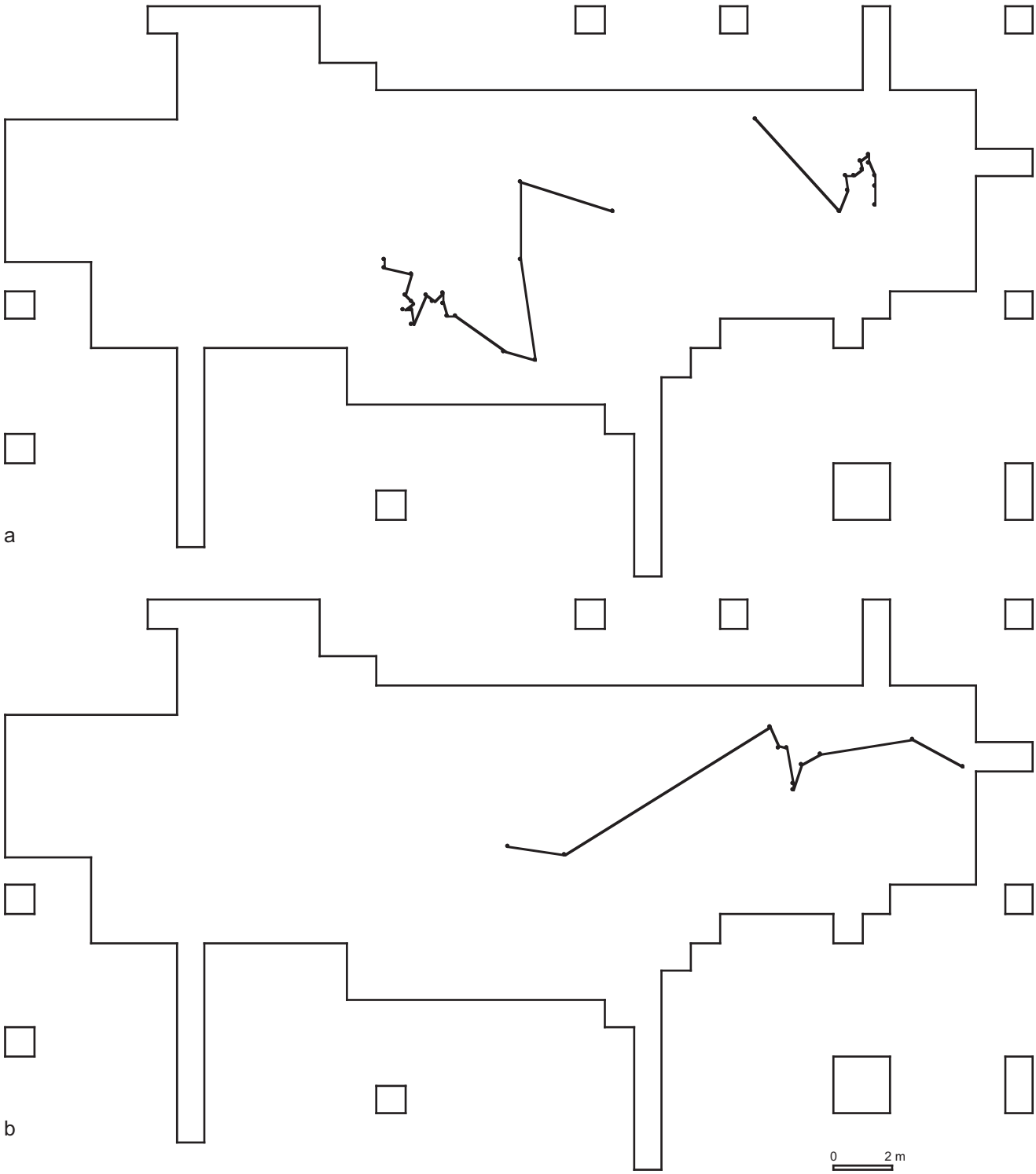

Fig. 2.43 Merselo-Haag. a: Refit groups 30 and 68; b: refit group 52.

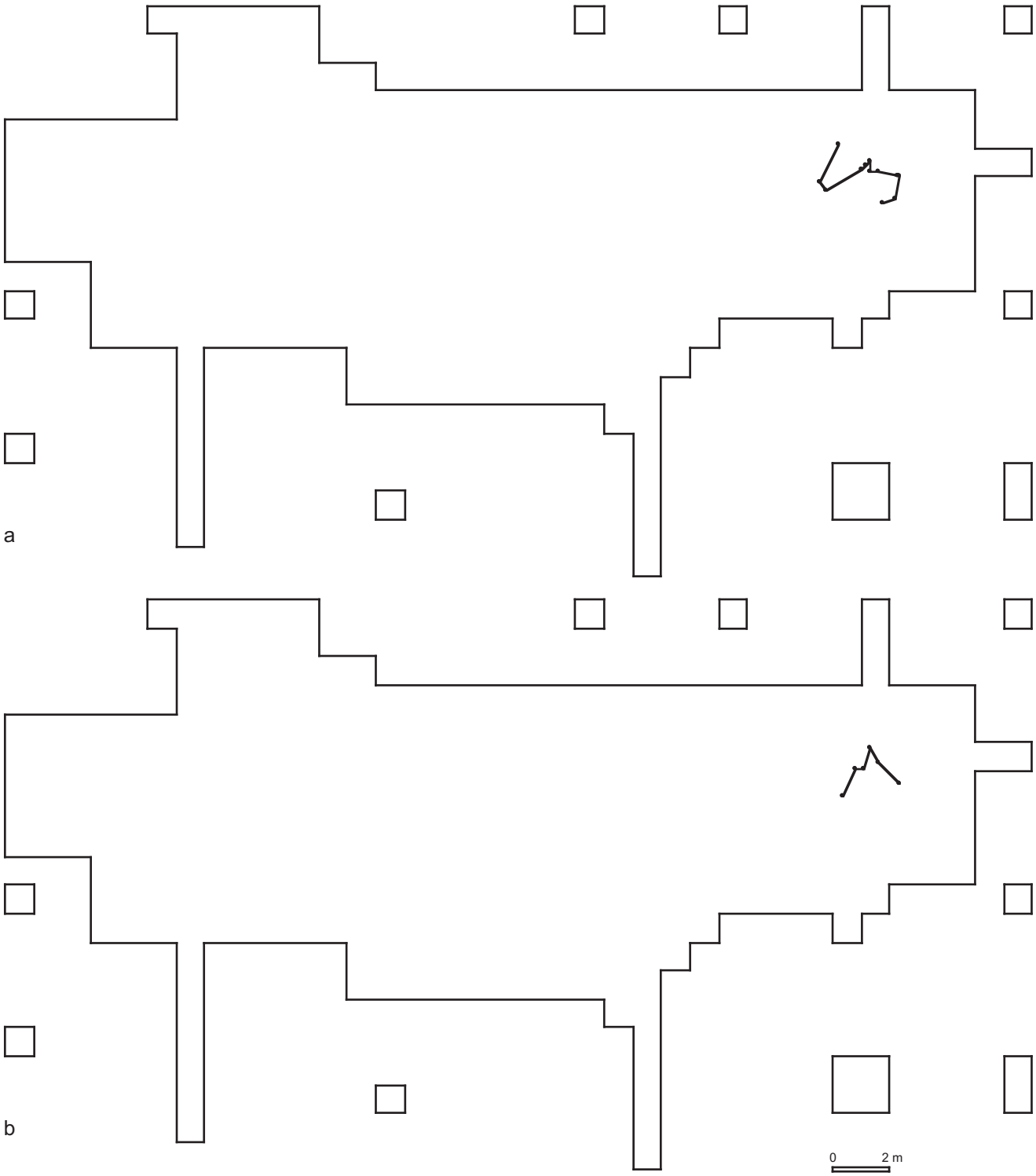

Fig. 2.44 Merselo-Haag. a: Refit group 49; b: refit group 66.

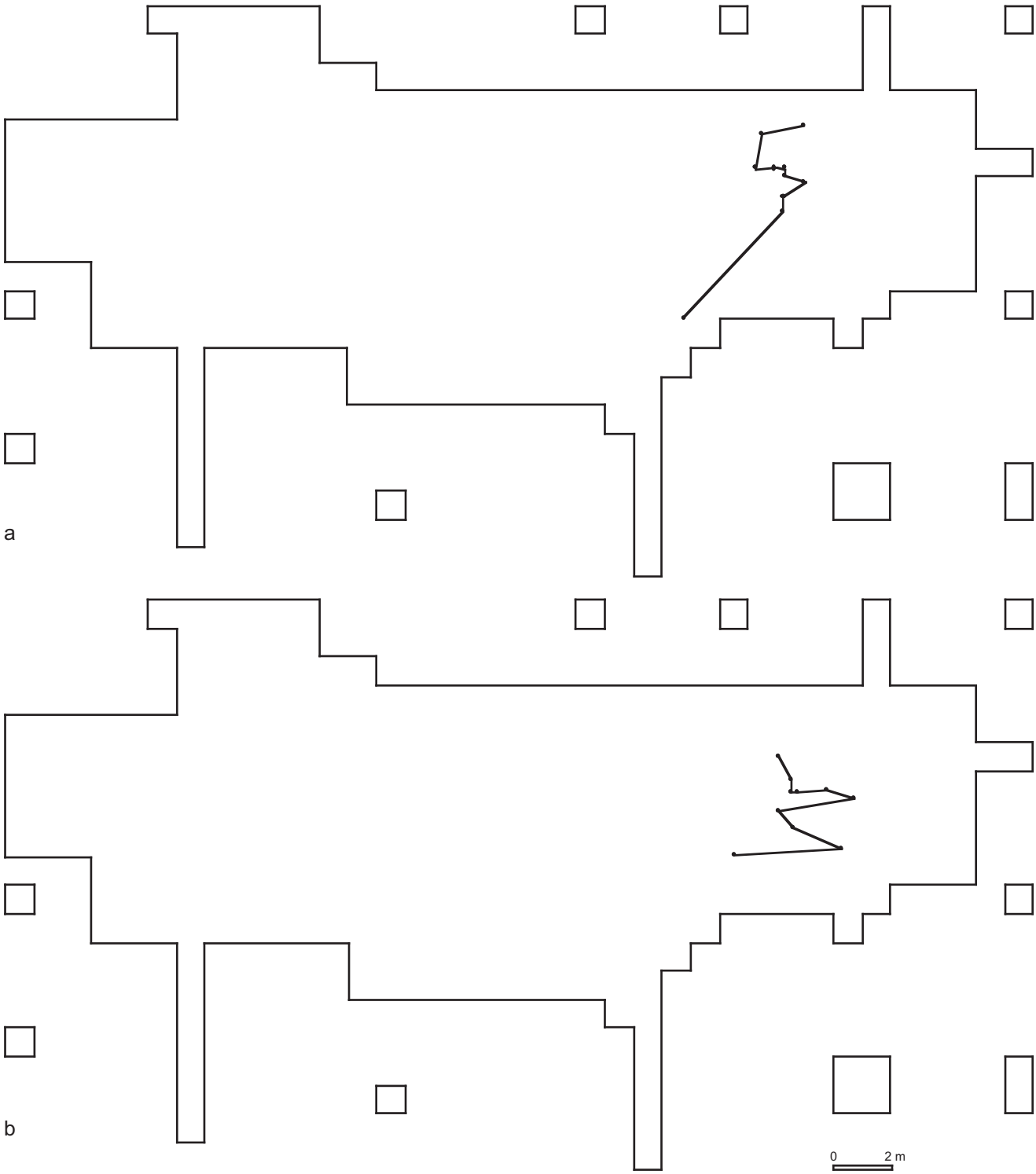

Fig. 2.45 Merselo-Haag. a: Refit groups 11/29/84; b: refit groups 48/91.

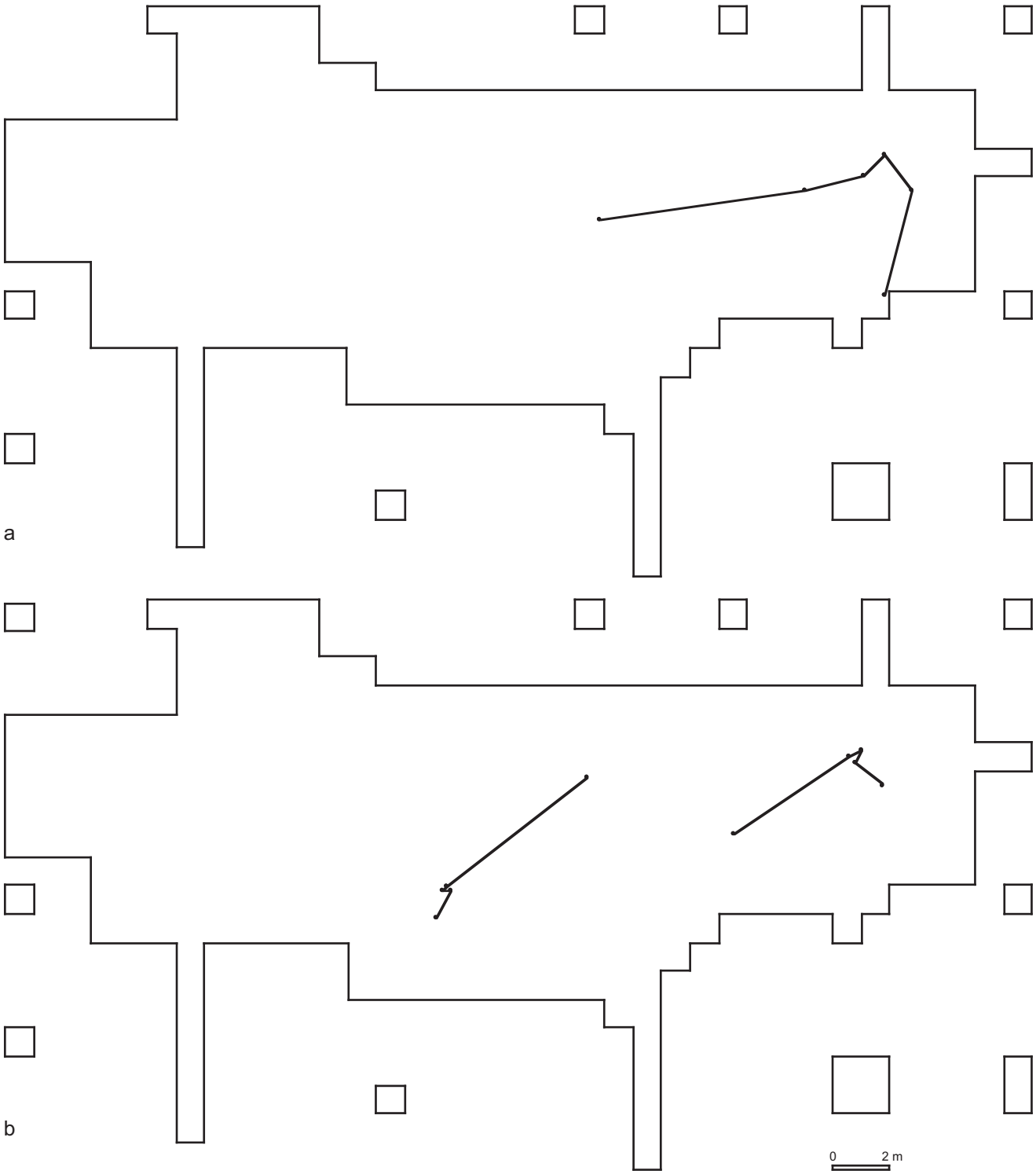

Fig. 2.46 Merselo-Haag. a: Refit group 16; b: refit groups 6 and 64.

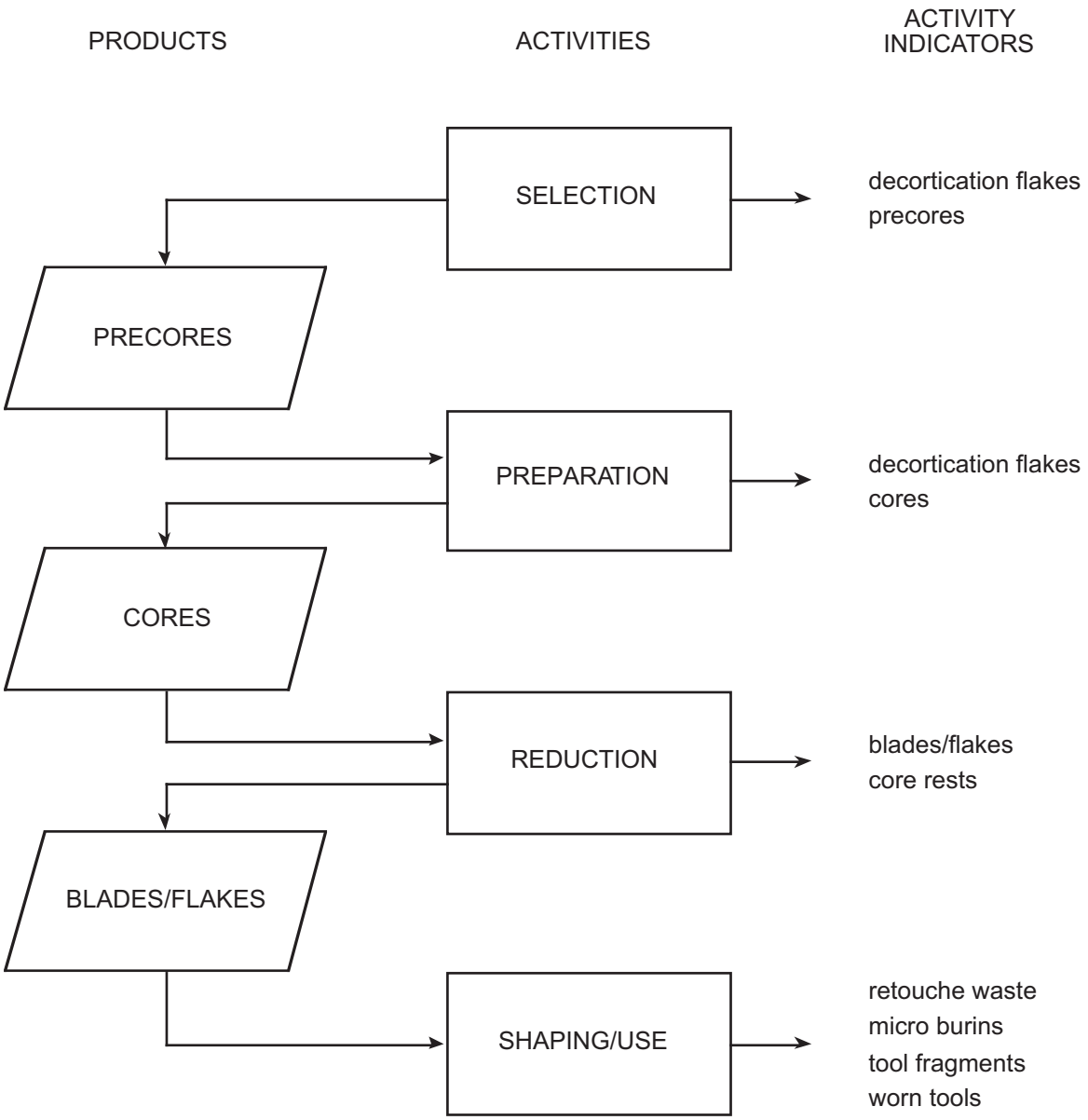

Fig. 2.47 Merselo-Haag. Diagram of the stages of flint processing and use that can be distinguished.

Among the various clusters a number of connecting lines can be discerned. It is not clear whether these connecting lines are additional indications for local activities. In order to determine which activities occurred and in which sequence, it is necessary to combine data from the refitting study, the distribution of the raw material, the method of flint processing and the tool use.

2.7.7 PRODUCTION SEQUENCE AND DISCUSSION

The flint abandoned at Merselo-Haag displays several features that provide information on the stages of flint production.

There is a vast amount of literature on the production process of flint[46]. For the analysis of production waste the approach of De Grooth provides a good general model for

Find group	n	1 selection	2 preparation fl.	bl.	co.	3 reduction fl.	bl.	co.	4 use
07	17	0	1	1	0	10	3	1	1
23	25	0	0	0	0	20	4	1	0
24	5	3	0	0	0	2	0	0	0
25	6	0	2	0	0	4	0	0	0
26	17	0	4	0	0	10	2	1	0
42	573	2	9	4	0	452	91	2	13
43	10	0	1	0	0	5	3	0	1
44	635	4	15	3	0	516	88	3	6
45	26	0	5	3	0	13	4	0	1
55	6	0	0	2	0	1	2	1	0
56	17	1	2	0	0	12	2	0	0
60	20	0	1	0	0	17	2	0	0
65	39	1	2	0	0	28	5	2	1
70	8	0	5	0	0	3	0	0	0
83	6	0	0	0	0	0	0	0	6
90	142	0	0	0	0	84	49	0	8

Table 2.13 Processing stages by number

Find group	1 selection	2 preparation	3 reduction	4 use	remarks
07	–	+	+	+	
23	–	–	+	–	
24	+	–	(+)	–	core missing
25	–	+	+	–	core missing
26	–	+	+	–	
42	+	+	+	+	
43	–	+	+	+	core missing
44	+	+	+	+	
45	–	+	+	+	core missing
55	–	+	+	–	
56	+	+	+	–	core missing
60	–	+	+	–	core missing
65	+	+	+	+	
70	–	+	+	–	core missing
83	–	–	–	+	
90	–	–	(+)	+	core missing

Table 2.14 Overview of the reduction sequence

the Dutch LBK. She distinguishes 7 production stages: acquisition of raw material, first selection, preparation, reduction, shaping/retouching, use and discard.
In order to describe the production sequence at Merselo-Haag 4 stages may be singled out, to wit: selection of nodules for production, preparation of the cores, reduction sequence and shaping/retouching in combination with the use of tools.
The artefacts that are the results of the first activity, the selection of nodules for production, are rejected pre-cores and decortication flakes. The latter may however also stem from the second activity, preparation of the cores. The only indication for this first production stage is the presence of rejected pre-cores. For Merselo-Haag these have been defined as pieces or cores where over 75% of the cortex is still present.
The second production stage is the preparation of cores. As correlates for this were selected: flakes and blades with over 75% cortex on the dorsal surface and cores with 50-75% cortex.
The third stage that can be distinguished is the reduction of cores. Characteristic for this production stage are artefacts like flakes, blades and discarded cores.
The fourth stage is the production and use of tools. Indications for production are fine retouch waste and debris like microburins. This stage is almost impossible to prove. Microburins are very rare on this site and the retouch waste is absent because it is too small to be collected, despite the use of sieves. The use of tools is attested by the presence of tools that may or may not be broken and worn.

Regarding the various raw material groups, part of these turn out to have been brought as nodules to the site without having been tested in advance. On the site production work was started; usually with success, as almost all successive stages are present. Flint group 24 is an exception. The nodule concerned disintegrated upon the first blow and was discarded without more ado.
Almost all flint groups provide indications for preparation and reduction, with the exception of flint group 23 and both quartzites (83 and 90). Of quartzite type 83 only the actual stage of use is present, in the form of tools. Wommersom quartzite has been processed only very slightly at the site. There is a sharp contrast between the very fine flake material and the high number of long blades. Production stages for this group of blades are absent. Finally it is striking that a large number of cores has not been retrieved, although at the site processing can be demonstrated.
Such a classification of the flint waste material does indicate which processing stage is found on the site, but it does not indicate whether it was actually processed at the site. Artefacts may after all have been brought from somewhere else. In order to obtain clarity on this matter, a study into the occurrence of fine processing waste by raw material group may be performed. Each raw material group was divided into length classes. When more than 40 artefacts occur in a single artefact group, a fall-off-curve in terms of percentage was calculated. Almost all raw material groups have been processed at the site, since in most cases a large number of artefacts is present in the classes 0-9 mm and 10-19 mm. Exceptions to

Find group	0-9 mm	10-19 mm	20-29 mm	30-39 mm	40-49 mm	≥50 mm
07	2	8	8	0	0	1
23	9	10	4	3	0	0
24	1	1	1	0	0	3
25	0	0	8	0	1	0
26	2	10	6	1	1	0
42	293	239	57	28	6	4
43	0	1	3	2	2	2
44	354	261	56	18	9	2
45	2	8	7	6	2	2
55	0	1	0	2	2	2
56	2	6	6	6	2	1
60	7	9	4	1	0	0
65	21	15	5	2	1	0
70	2	4	2	0	0	1
83	2	4	0	0	0	0
90	67	50	17	4	5	3

Table 2.15 Survey of dimensions of artefacts by raw material group for the Late Mesolithic

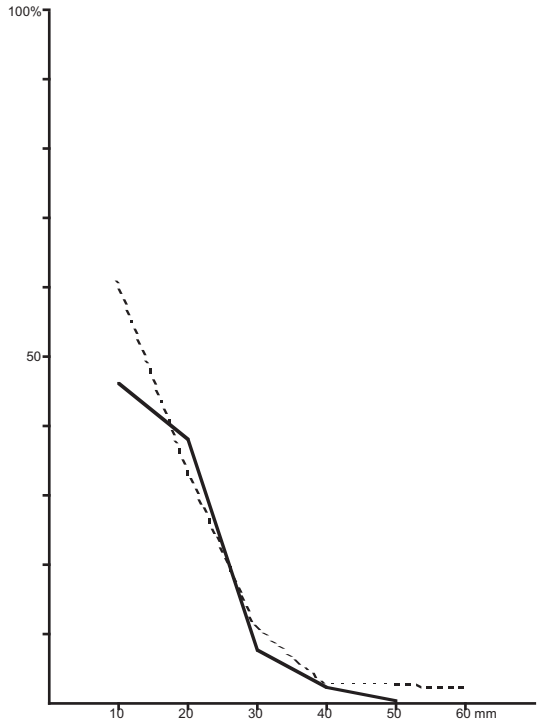

Fig. 2.48 Merselo-Haag. Fall-off curves of the sizes of artefacts from flint groups 42 and 90 (Wommersom quartzite, dotted line).

this are the groups 25 and 55 where local processing does not appear to have occurred.
The situation concerning the Wommersom quartzite is more complicated. According to the fall-off-curve it should have been processed at the site, since it displays a marked similarity to that of the groups 42 and 44. A comparison with the length/width graph of flakes and blades (fig. 2.41), the refitting study and analysis of the stone processing make it clear that a number of large pieces (fig. 2.58) has not been processed at the site. They must have been brought to the site and subsequently left there.
So the majority of the flint was worked at the site. Some groups like the Wommersom quartzite occur both in the shape of processing of nodules or pre-cores at the site and as imported semi-manufactured products, to wit blades. When the groups are small in size, it is almost impossible to make this distinction. Some groups, like raw material group 83, only occur in the form of tools.

2.7.8 TRACES OF USE

The artefacts turned out to have too much patina to allow analysis of traces of use by means of a microscopic study of wear traces[47].
However, almost all tools proved to display macroscopically visible damage by use. In addition a large number of unmodified artefacts display traces of use. This damage by use is recognizable as slight roundings, splintering and non-intentional retouch[48].

Use damage	blade	%	flake	%
minimal	12	46.2	16	51.6
moderate	11	42.3	12	38.7
serious	3	11.5	3	9.7
Total	26	100.0	31	100.0

Table 2.16 Degree of use damage

Use damage	blade	flake
spontaneous	1	5
rounded	2	5
splintered	3	3
denticulated	4	2
Total	10	15

Table 2.17 Types of use damage.

	n
right angled trapezes	11
oblique trapezes	3
right angled or oblique	9
Total	23

Table 2.18 The morphology of Late Mesolithic trapezes

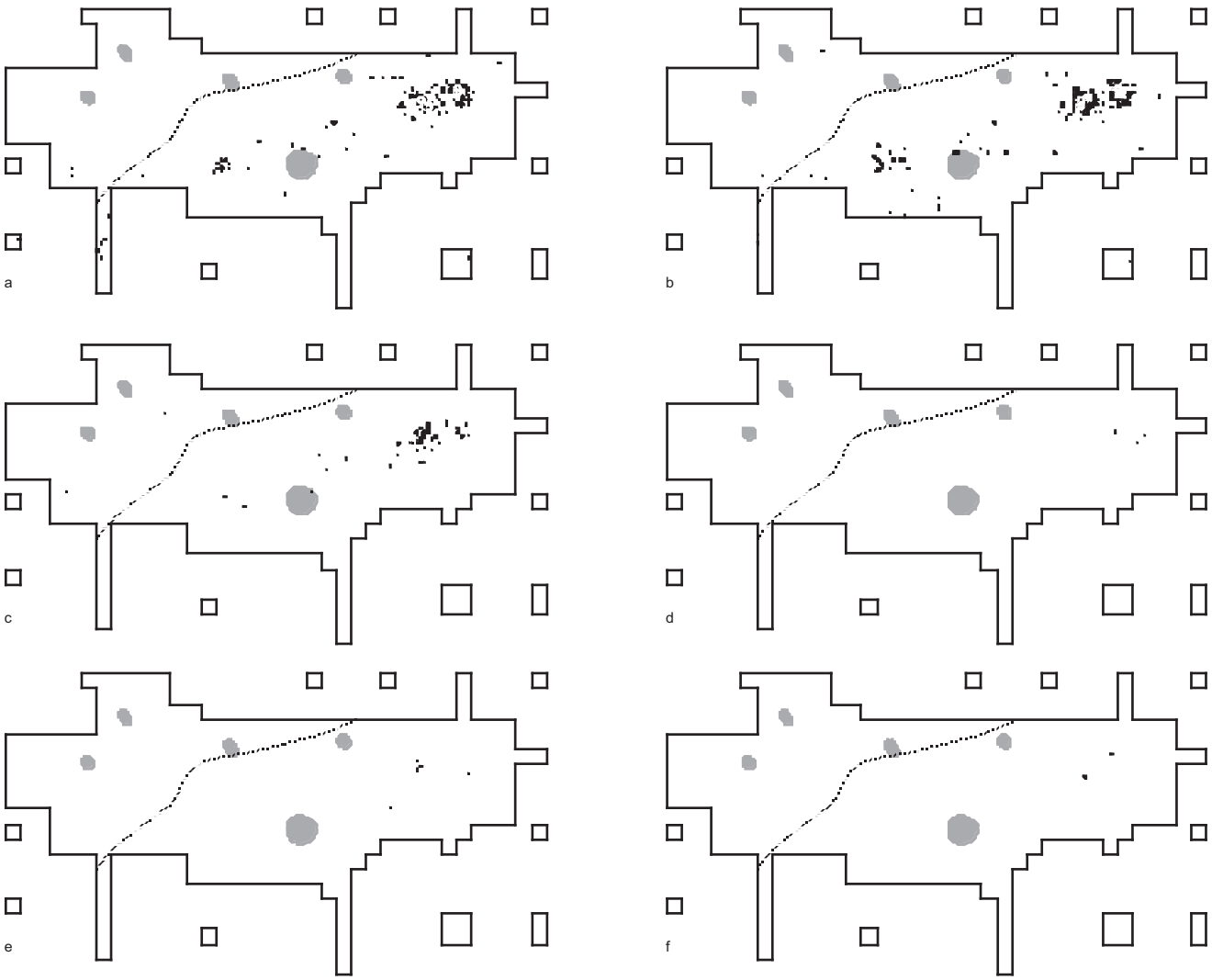

Fig. 2.49 Merselo-Haag. Relative distribution of various size categories of flint group 42 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 9. a: flint <10 mm, b: flint 10-19 mm, c: flint 20-29 mm, d: flint 30-39 mm, e: flint 40-49 mm, f: flint ≥ 49 mm.

The majority of the unmodified artefacts with traces of use consists of blades. The ratio between unmodified blades and flakes is approx. 20:80. This ratio is approx. 50:50 for the artefacts with traces of use. Three levels of traces of use have been distinguished.
First of all minimal damage, usually visible as a slight degree of irregular splintering. The possibility should not be ruled out that part of this group consists of artefacts damaged by soil processes or during excavation and sieving.
The second level consists of moderate damage visible over a larger area of the processed surface, usually in the shape of rounding and splintering. The third group consists of artefacts with serious intensive damage, covering a large part of the surface, in the shape of splintering and denticulated edges.
Another type of traces of use is the impact damage on arrowheads. These traces of damage by use have received a great deal of attention in this study, as they may provide data for a functional interpretation of the site.
The Late Mesolithic points consist mainly of trapezes, which can be divided into two groups: a larger group of right angled trapezes and a smaller group of oblique trapezes[49]. Some fragments — centre parts of similar points — could not be assigned to either of these types.

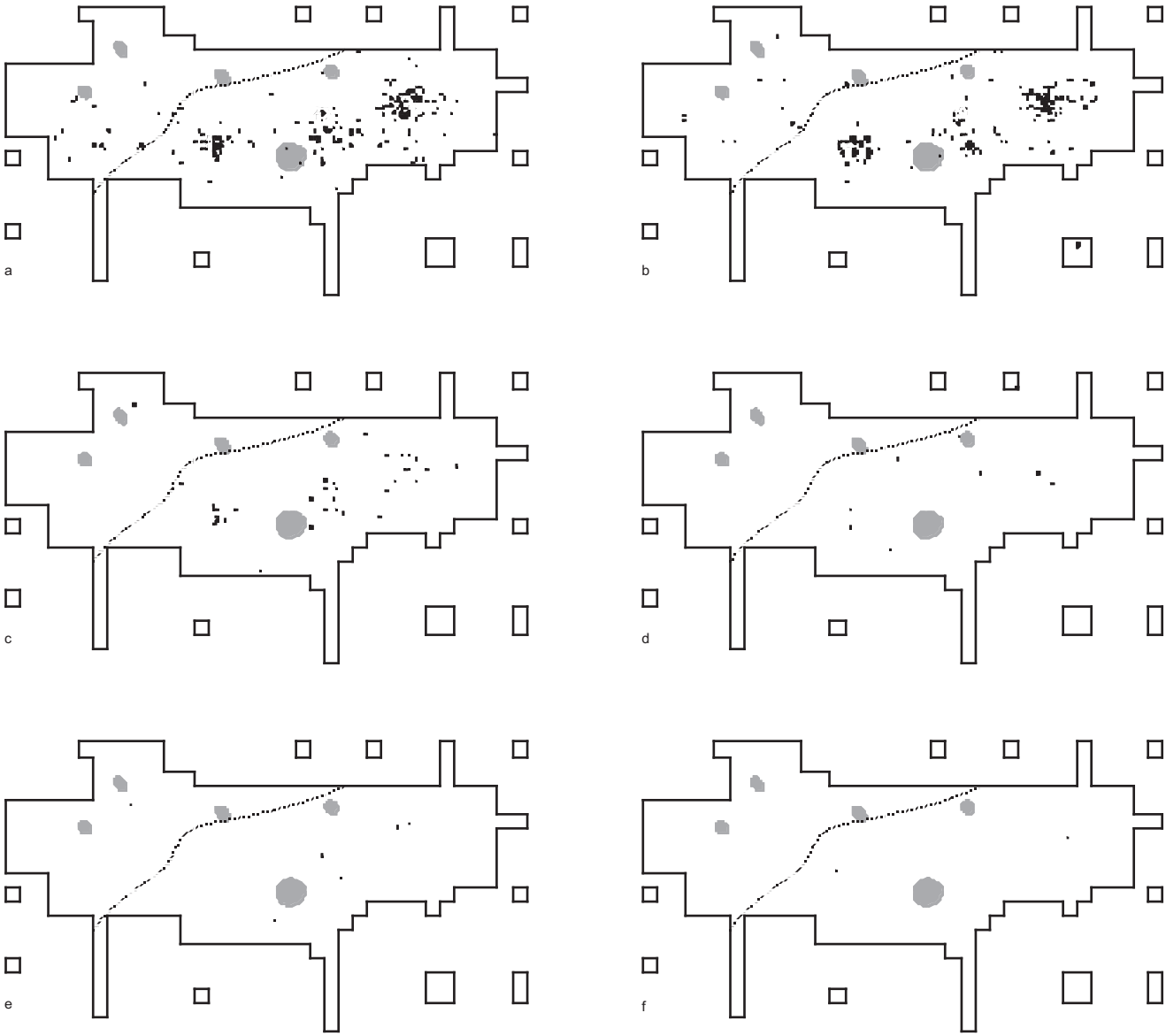

Fig. 2.50 Merselo-Haag. Relative distribution of various size categories of flint group 44 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 12. a: flint <10 mm, b: flint 10-19 mm, c: flint 20-29 mm, d: flint 30-39 mm, e: flint 40-49 mm, f: flint ≥ 49 mm.

Trapezes are often considered inserts for composite tools. A number of trapezes placed in a row would then constitute the cutting edge of the tool. Instances of this are the 'slotted bone points' and bone daggers from the south of Scandinavia and Russia[50]. Having been used as barbs is also not out of the question[51].
That the artefacts may be considered points, can be inferred from the presence of macroscopic traces of damage by use (table 2.19). Damage to the lateral sides does not occur, making a cutting function unlikely for the artefacts. On the other hand, damage to the distal and proximal ends is numerous and consists of small splinters at the tip and fractures and splinters on the planes of fracture. Experimental research into fracture patterns in arrowheads demonstrates that in 40-50% diagnostic damage is visible after use[52]. This concerns splinters at the tip and 'step' and 'hinge fractures' of the point. Often fine splinters can be discerned on the original dorsal and ventral surfaces as well (fig. 2.52).

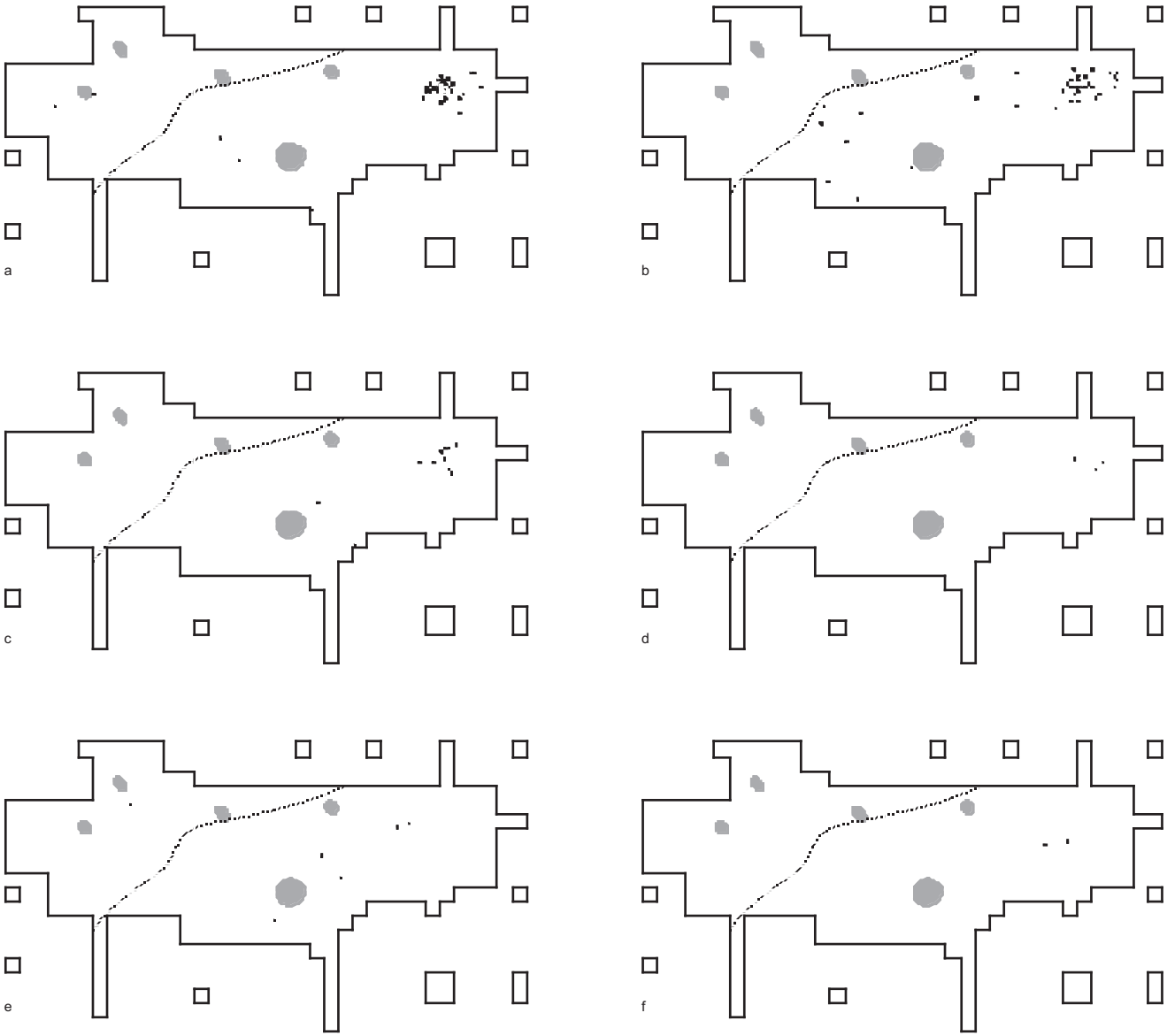

Fig. 2.51 Merselo-Haag. Relative distribution of various size categories of flint group 90 in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 6. a: flint <10 mm, b: flint 10-19 mm, c: flint 20-29 mm, d: flint 30-39 mm, e: flint 40-49 mm, f: flint ≥ 49 mm.

Four other types of points occur, too: two LBK-like points (fig. 2.54: 20-21) and two C-points (fig. 2.56: 7-8). On the plane of fracture of one of the LBK-like points traces of use as an arrowhead have been discovered as well. The other displays a recent fracture. Both C-points exhibit traces of use. Of 23 trapezes only a single one proves to have been unused, or to be more precisely traces of use can not be recognized. In two the pattern of fracture could not be determined due to a high degree of burning. All others display traces of damage by use. In comparison with the results obtained in experiments, this is a strikingly high percentage. It is therefore an indication for repeated and intensive use and possible retooling on the site.

2.7.9 TOOLS

Among the tools points are predominant (table 2.20). When backed blades are also considered to be hunting gear, this type of tool contributes over 50%.

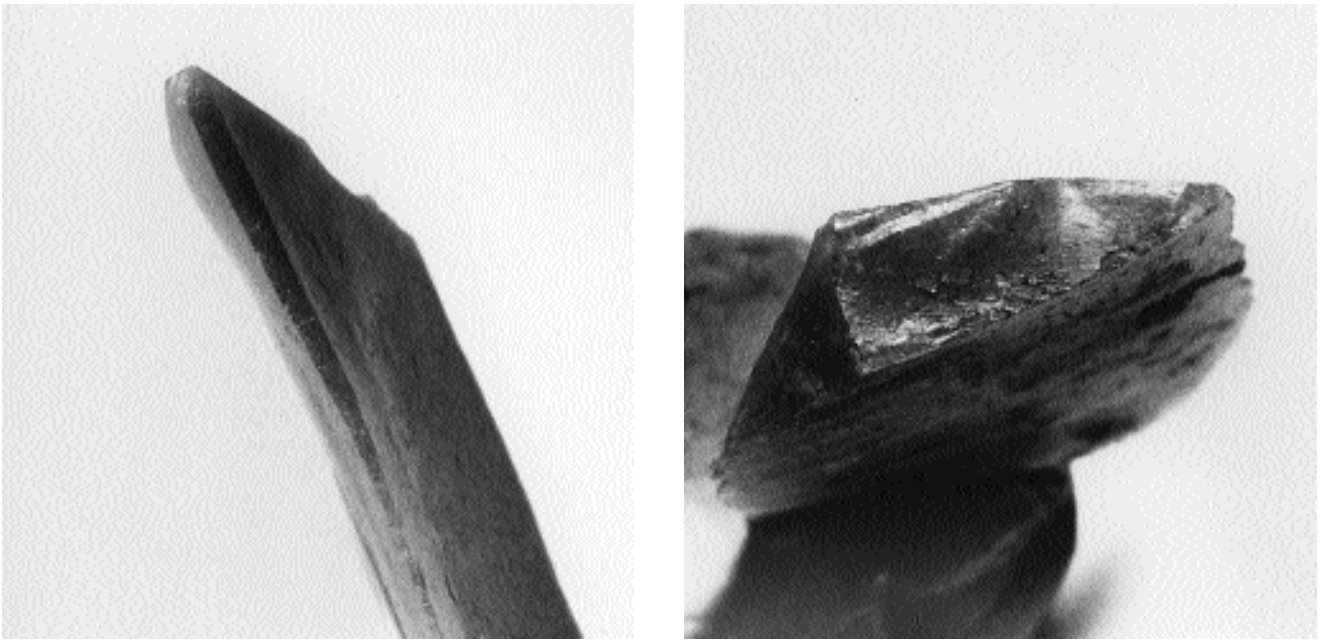

Fig. 2.52 Merselo-Haag. Photos of traces of use on the tip of points. Left: blade like impact traces; right: hinge fracture with splintering.

Type of point	unused	impact damage	burned
C-point	1	1	0
trapezes	1	20	2
triangle	0	0	1
LBK-like point	0	1	1
Total	2	22	4

Table 2.19
Use damage on Late Mesolithic points

	n	%
points	25	34.7
burins	–	0.0
scrapers	11	15.3
backed blades	14	19.4
retouched blades/flakes	22	30.6
Total	72	100.0

Table 2.20 Tools

	n
C-points	2
trapezes	20
LBK-like points	2
triangles	1
blade scrapers	2
flake scrapers	9
backed blades	14
retouched blades	7
retouched flakes	9
notched blades	4
microburins	2
Total	72

Table 2.21 Tools by type

2.7.9.1 Description of tools

Points (fig. 2.54)

Twenty trapezes, two C-points and one triangle have been found, as well as two damaged points showing some similarities to Bandkeramik points. Trapezes represent both the narrow and the wide type, all have been made from blades. The retouch has mainly been applied from the ventral side, in some instances from both ventral and dorsal sides. Three points belong to the type with a square base, 11 to the type with an oblique base. In nine fragments the type could not be ascertained.

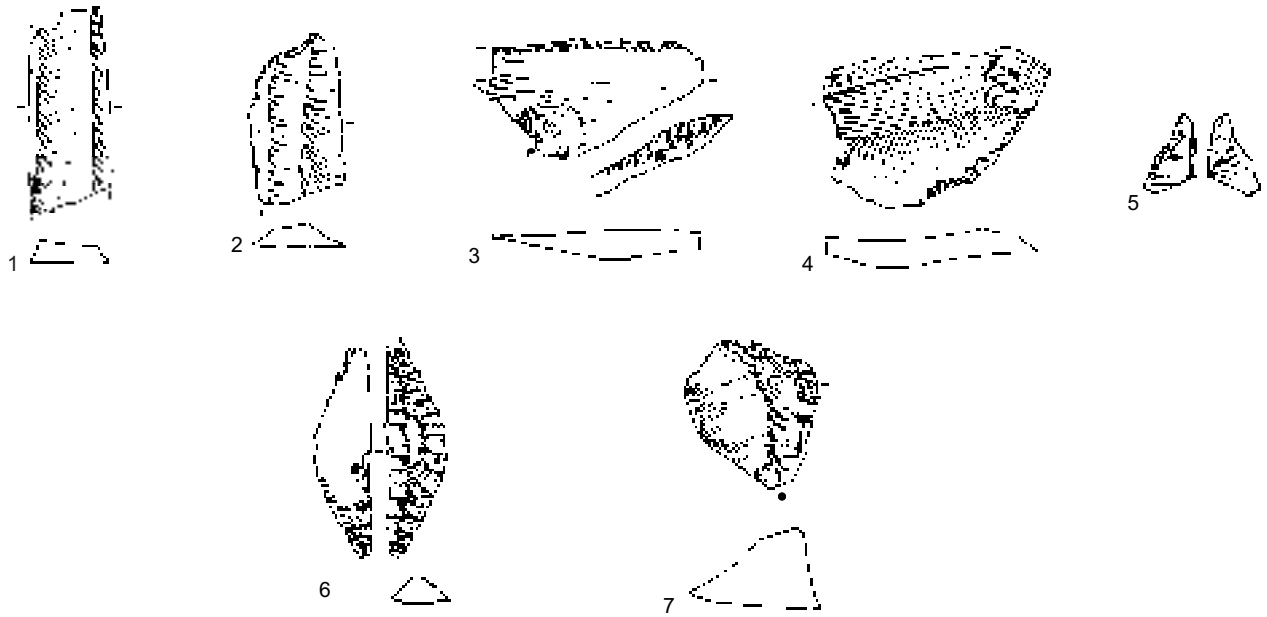

Fig. 2.53 Merselo-Haag. Surface finds and artefacts from test pits. 1-2 retouched blades, 3-4 retouched flakes, 5 microburin, 6 Feuille de Gui, 7 scraper. Scale 1:1.

One C-point was made of Wommersom quartzite. The raw material and its position in the Late Mesolithic area are indications for a Late Mesolithic age of this point. The other C-point was found in the Early Mesolithic area. On the basis of the arguments put forward above this is attributed to the Late Mesolithic as well. Yet there is a possibility that this type of point was in use in both Early and Late Mesolithic.
The triangle may be considered to belong to the group of points, but usually this tool appears to have been used as a barb in a composite tool, as evident for instance from the remnants of arrows found in an aurochs that had evaded its pursuers in Prejlerup, Denmark[53].
Two points are present that show strong similarities to so-called LBK-points due to surface retouch applied to the ventral side and steep retouch on one of the lateral sides. In one point the left side has been steeply retouched to a small degree; in the other the right side has been steeply retouched, and a surface retouch applied on the dorsal side as well. Both items display a remarkably strong white patina.

Scrapers (fig. 2.55: 1-6)
Out of 11 scrapers in all, only two have been made from a blade; the remaining 9 are from flakes. Among the flake scrapers are 3 scrapers with end retouch, two side scrapers and four multi-sided scrapers. Two of the latter possess a scraper area taking up between 25 and 50% of the artefact. Of the other two, between 50 and 75 % of the circumference has been equipped with retouch. Some items (fig. 2.55:1, 5) exhibit marginal retouch at the distal end.

Retouched blades and flakes (fig. 2.55: 7-9)
Fourteen retouched blades have been recovered from the Late Mesolithic area. These display no regularities in how they were processed. One or more sides have been retouched and in some instances truncation occurs. Three blades display a notch.
Among the nine retouched flakes a similar pattern can be discerned. Many of the flakes have been broken.

Microburins (fig. 2.55: 10-11)
Of both microburins only the proximal part remains. The base was a blade with regular parallel negatives. In both cases a notch has been applied to one side.

Backed blades (fig. 2.57)
Fourteen backed blades have been recovered. All pieces were made from a blade and are only 2 mm thick. Width ranges from 2 to 4 mm. Thirteen backed blades have been broken and only the medial fragments are present. The fourteenth has been broken as well, but has a retouched oblique base. To all a fine steep retouch has been applied, from the ventral side.

2.7.10 Stone

Apart from the Wommersom quartzite and phtanite mentioned before, no stone at all has been recovered from the excavation area. So hammer, mill- and grind stones are absent. The exception is a single large piece of calcareous stone found in the disturbed top layer of the track. This stone displays no traces of processing and therefore appears not to be prehistoric.

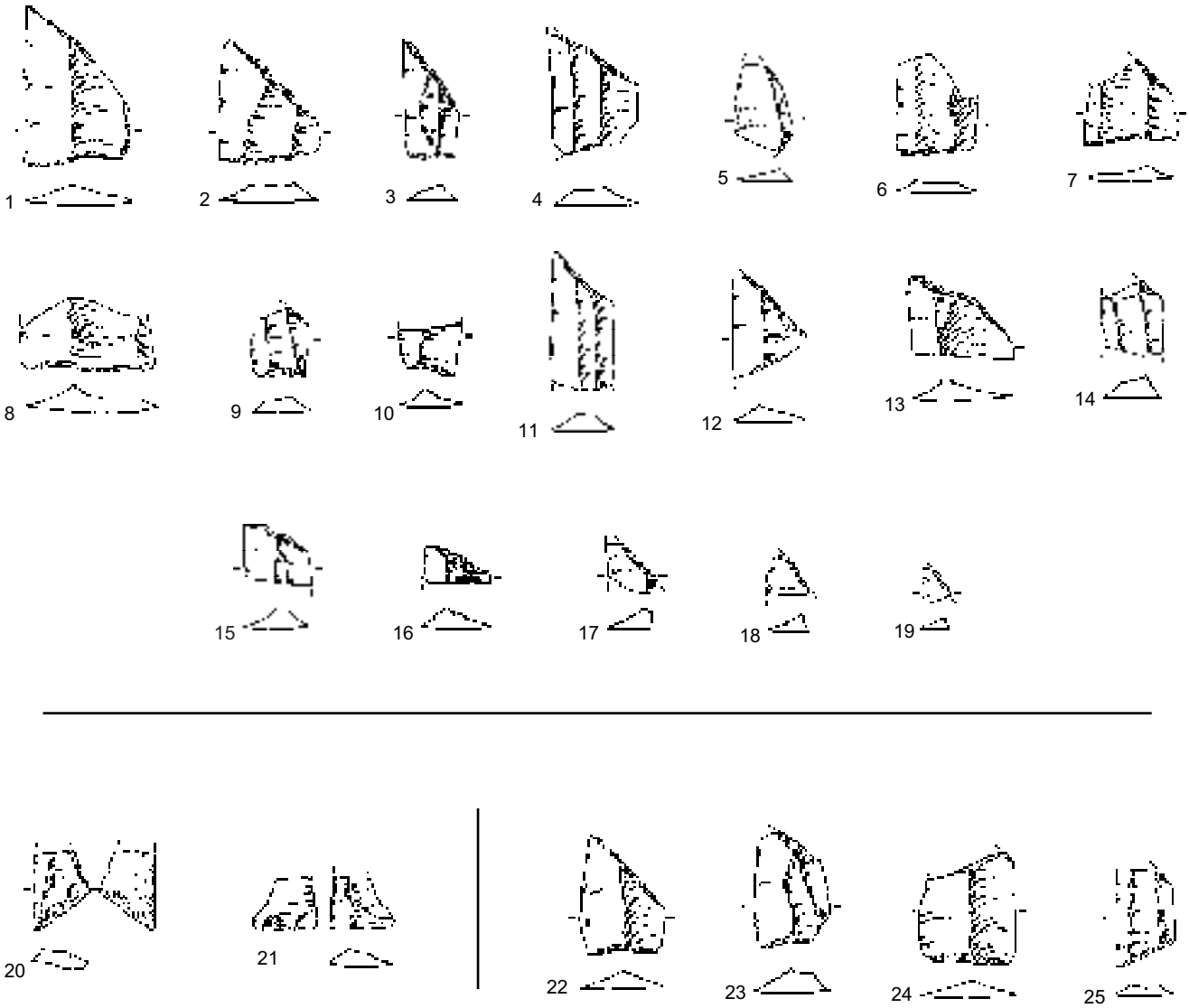

Fig. 2.54 Merselo-Haag. Late Mesolithic trapezes. 1-19 trapezes and fragments from the excavation, 20-21 LBK-like points, 22-25 trapezes, surface finds. Scale 1:1.

2.7.11 Dating

In order to determine the age of the site, two C14-samples of charcoal from hearth 2 and hearth 4 have been dated. Hearth 4 was located near the Late Mesolithic concentration and might be associated with it. The wood composition of the hearth itself pointed to a greater age than first expected. This was confirmed by the results of the C14-analysis. The sample had an age of 8225 ± 50 BP (GrN-17406).

Hearth 2 was located in the area with many Early Mesolithic finds. We assumed an association between the hearth and activities in this area as well. The wood composition did not confirm this, nor did the results of the C14-dating: 5120 ± 60 BP (GrN-17407).

This disappointing result was not entirely unexpected. Mesolithic sites on the sands of the south are notorious for their anomalous C14-dates[54]. Over 40 % of the dates differ to a great extent from the date expected. Often it is assumed that a Mesolithic site has been used only once, but mostly traces and flint prove not to come from a single instant of use. Prominent landscape features -like Merselo-Haag- have been attractive settlement locations for numerous activities for millennia. Multiple phases are therefore to be expected.

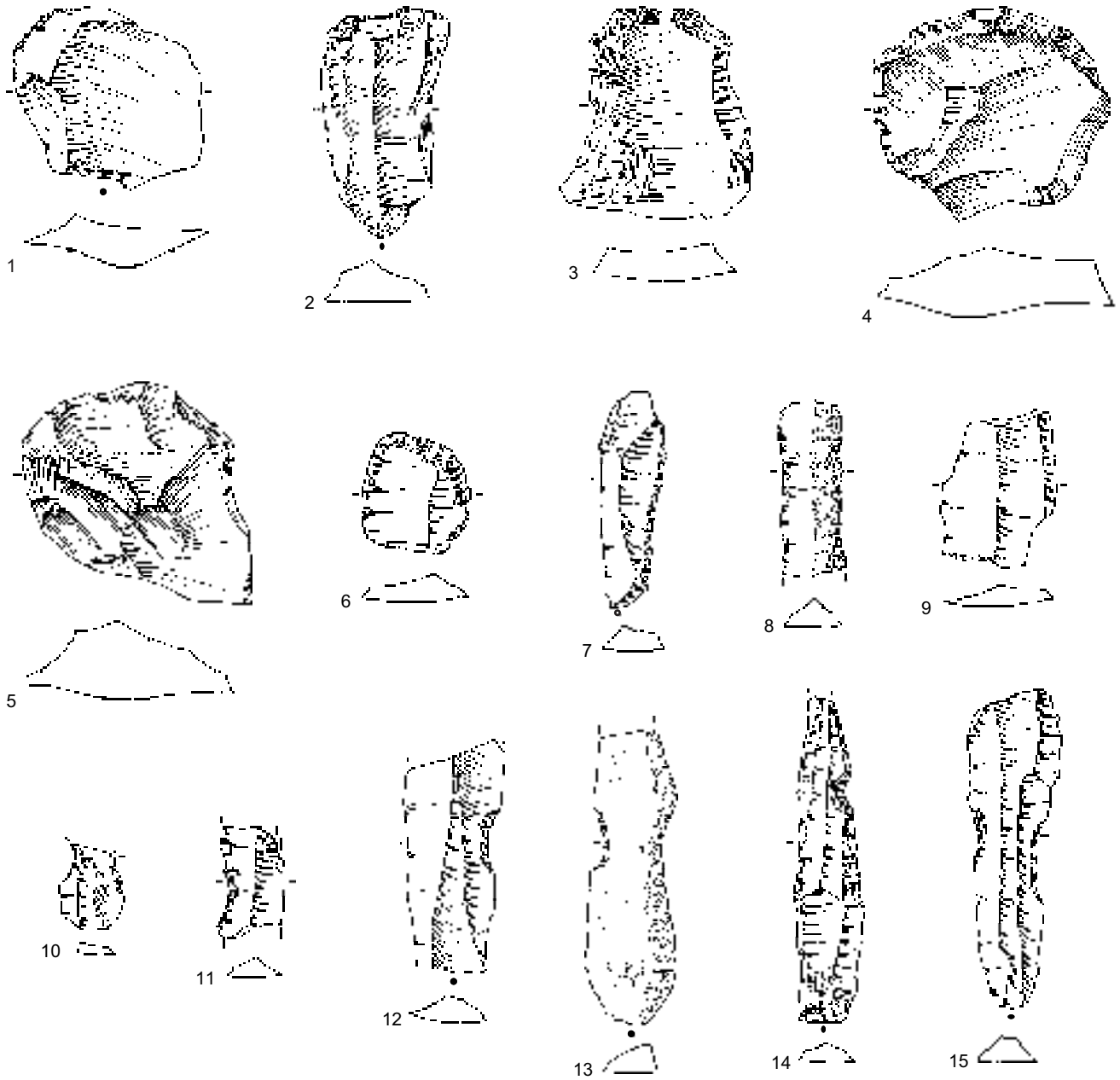

Fig. 2.55 Merselo-Haag. Late Mesolithic tools. 1-6 scrapers, 7-9 retouched blades, 10-11 microburins, 12-15 notched blades. Scale 1:1.

Large-scale investigations, as in Meeuwen[55], Havelte[56] and Brecht[57], demonstrate that most sites consist of a succession of small concentrations, reflecting many activities, often separated in time as well. So it is not surprising that typologically older or younger elements are often seen as intrusive in such situations, like the anomalous C14-dates.

The research into large numbers of hearths in the peat district in Groningen clearly demonstrates that sites may have been in use over long periods of time[58]. Moreover, from this research and recent research in Belgium[59] the fact emerges that many hearths are specifically located outside the zone of flint concentration.

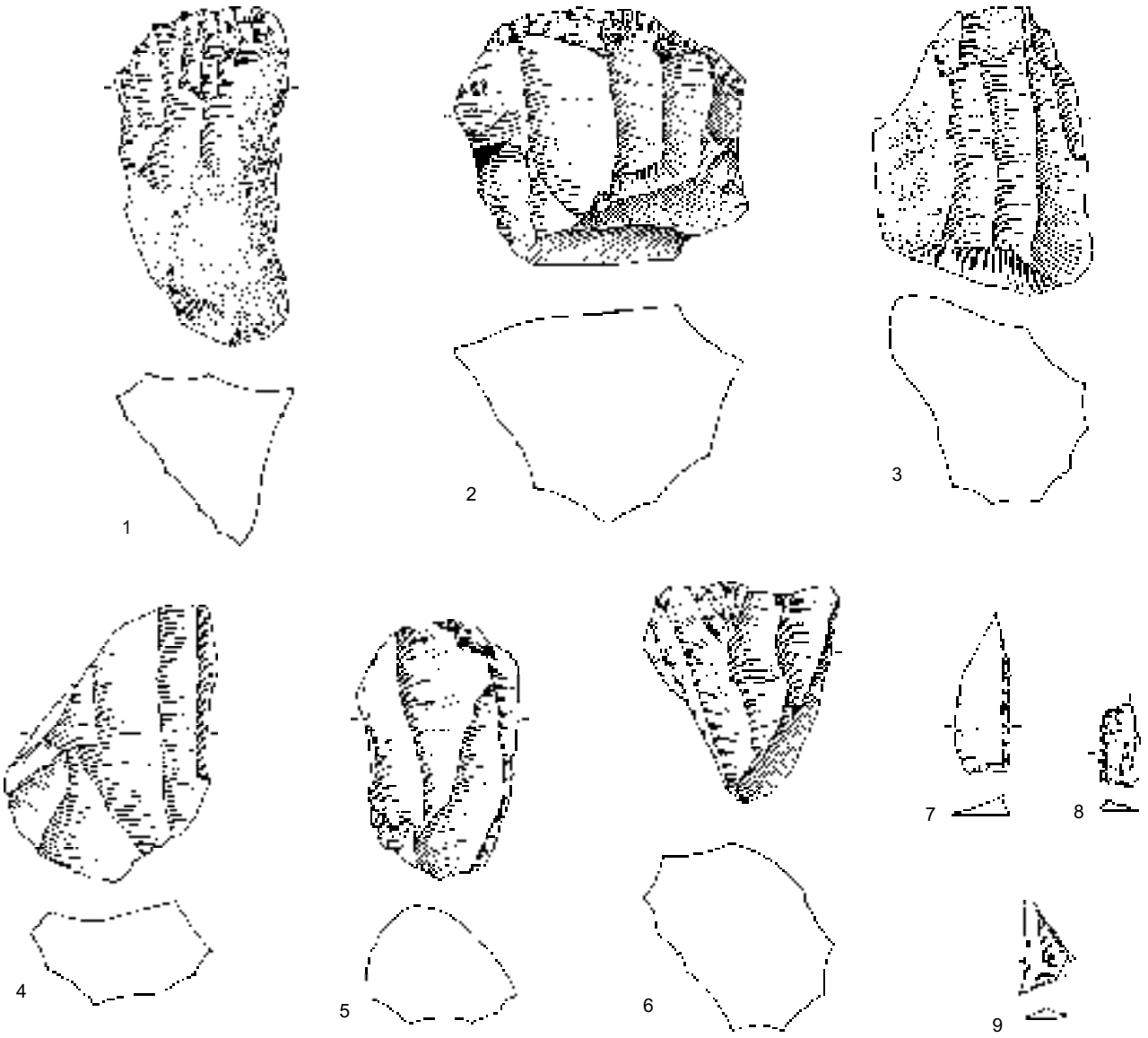

Fig. 2.56 Merselo-Haag. Late Mesolithic: 1-6 cores, 7-8 C-points, 9 triangle. Scale 1:1.

Fig. 2.57 Merselo-Haag. Late Mesolithic: backed blades. Scale 1:1.

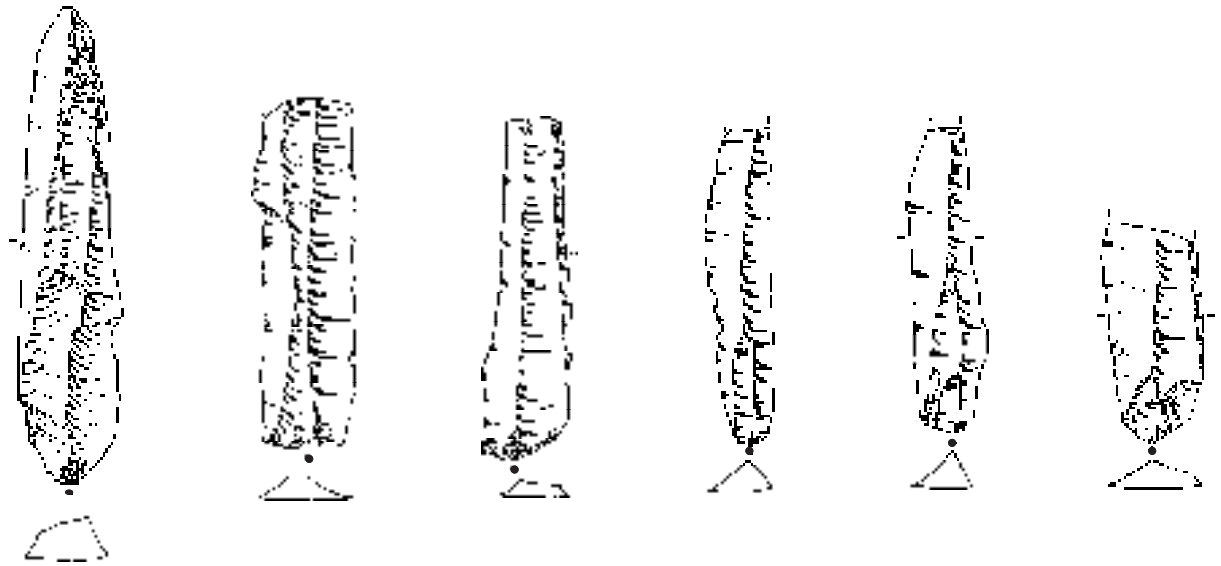

Fig. 2.58 Merselo-Haag. Late Mesolithic: imported blades without retouch. Scale 1:1.

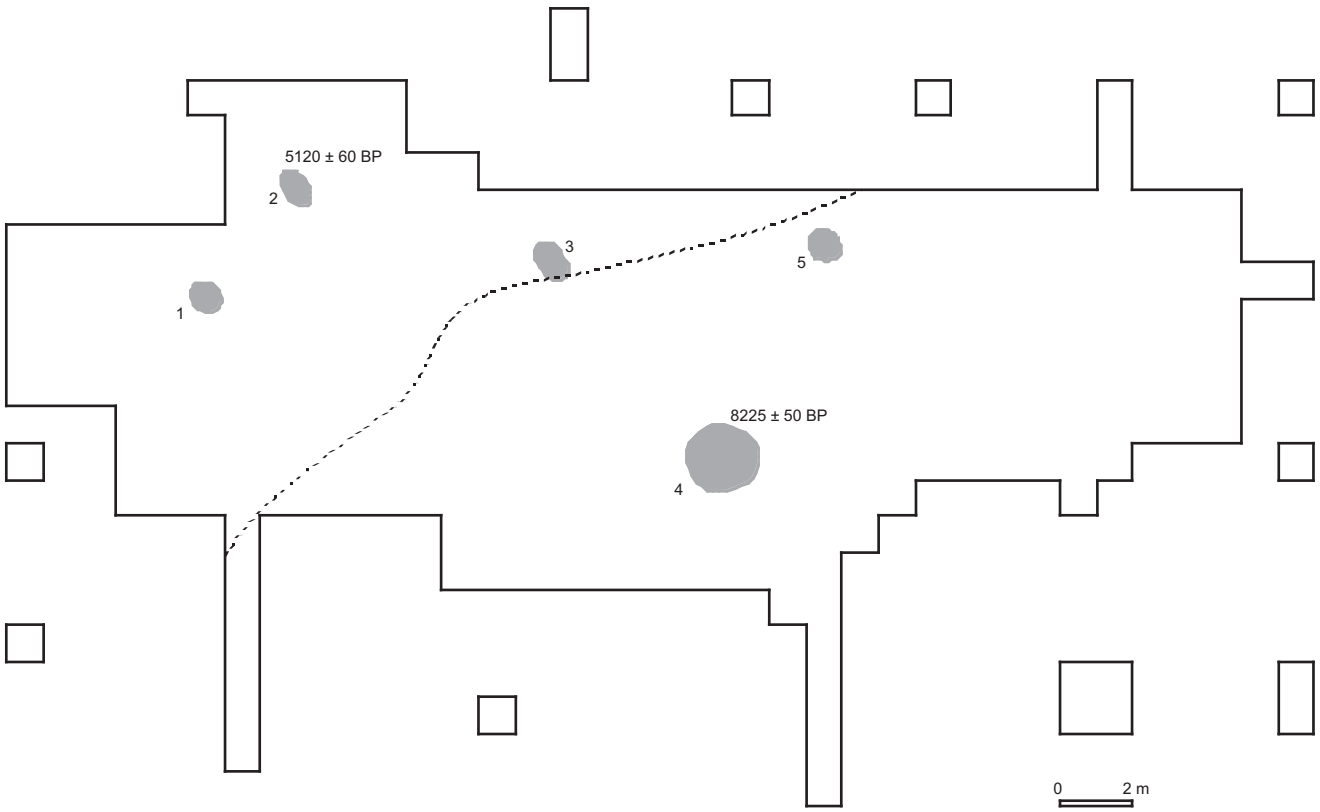

Fig. 2.59 Merselo-Haag. Summary of hearths with dates.

In addition there is the question of possible contamination of the sample by older or younger charcoal. In the study of charcoal remnants and carbonized hazel shells from a small Early Mesolithic hunting camp at Posterholt, it appeared both younger and older charcoal was present in the find layer[60].
In Merselo-Haag the presumed association proved not to match the C14-results. But even assuming that these indicate the correct age of the hearths, the actual C-14 results would pose a new problem. The typological data point to the use of the area in two periods: an Early Mesolithic, characterized by A-, B- and D-points and burins, and a Late Mesolithic period, characterized by trapezes and backed blades. The oldest C14-date matches hardly the age of Early Mesolithic complexes[61].
The younger date suggests the area was used in the Middle Neolithic, i.e. the period of the Michelsberg culture. No traces at all of use in this period have however been found. Not a single Middle Neolithic artefact has been recovered. So the question arises whether this date should be linked to a Neolithic activity, or whether we are dealing here with an extremely late stage of the Mesolithic. Most Mesolithic C14-dates after 5500 BP are generally classified as 'too young' and rejected.
A hearth from the Early Mesolithic site Hazeputten I has yielded an age of 5380 ± 40 BP (GrN- 5998)[62]. This is considered to be 'too young'. The finds on this site consist of Early Mesolithic elements as well as Late Mesolithic elements, to wit trapezes and backed blades[63]. The same applies to a hearth on the site Moerkuilen I, with an age of 5365 ± 70 BP (GrN-6371). Here, too, is a site where several periods are represented, in particular Early, Middle and Late Mesolithic[64]. Trapezes and backed blades may be considered to be Late Mesolithic artefacts. The site Valkenswaard-Achterste Brug has yielded a C14-date of 5390 ± 50 (GrN-12022)[65]. The finds include mainly points with surface retouch and triangles. Trapezes, on the other hand, are absent here.
The question obviously should be: how long did the Late Mesolithic last? A distinction should be made into different regions. In the west and north of the Netherlands, as evidenced from the donken research in the area of the Betuwelijn[66] and the study of the Hoge Vaart[67], the end of the Mesolithic may be supposed to have been around approx. 5400 BP. It is also clear that the transition was not sharply defined, as many of the typical Mesolithic features continue.
In the coversand area the situation appears to be different. The sites with C14-dates in the period 5400-5100 BP should not be classified 'too young' immediately. All of these sites, with the exception of Valkenswaard-Achterste Brug, have yielded Late Mesolithic artefacts and Neolithic tools do not occur.
The idea that the Late Mesolithic might have lasted longer in parts of the coversand area, is supported by the finding of a MK-pot in the centre of a Late Mesolithic find concentration at Dilsen-Dilserheide[68]. An association between flint and the pot is likely, as other material from Michelsberg settlements does not occur on this site.
It is remarkable that all these Mesolithic sites with very late dates are located in the coversand area which is, on the one hand, far removed from the older Neolithic centres in the löss zone and which, on the other hand, has itself yielded no or hardly any Middle Neolithic (Michelsberg) finds. We may therefore not rule out that in this area with infertile sandy soil the Mesolithic continued over a longer period[69].

2.7.12 Spatial distribution and functional aspects

In this paragraph several remarks will be made concerning the find distribution that are relevant to the interpretation of the Late Mesolithic area of activity. In addition attention will be paid to site- and off-site patterns, activity areas and the question whether some type of dwelling has been erected on the site.
In accordance with Foley[70] the excavation area of Merselo-Haag can be considered an accumulation over time of activities. These may be divided into two groups. The first group consists of activities that occur on a single location and result in an accumulation of (flint) waste, in such a way that we now consider this location a 'site'. The second group consists of activities that were expressed less obviously in waste and often also occurred outside the areas now defined as sites. These activities are therefore referred to as off-site activities. Can we make a distinction between site- and off-site activities for the purpose of reconstructing what activities were deployed by groups of hunter-gatherers there in the past?

2.7.12.1 Clusters and function (fig. 2.60-66)

In the overall find distribution clusters can clearly be distinguished. These clusters, defined in the chapter on raw materials above, have been numbered 1 through 5 (fig. 2.26). A sixth cluster, consisting mostly of burned flint, lies to the southwest of a large surface hearth in the area around co-ordinate 94/343. This is the only hearth to be clearly evident as well in the distribution of burned flint and charcoal. Over the entire excavation area a thin scattering of burned flint occurs. At 100/346 a charcoal concentration is visible that corresponds to hearth 5. This hearth, however, has an Early Mesolithic age.
The cores occur in larger numbers in the southwestern part of the Late Mesolithic area, while in the northeastern part, clusters 3 and 4, their numbers are small. Flakes occur in all clusters, while a relatively large number of blades was found in cluster 4.

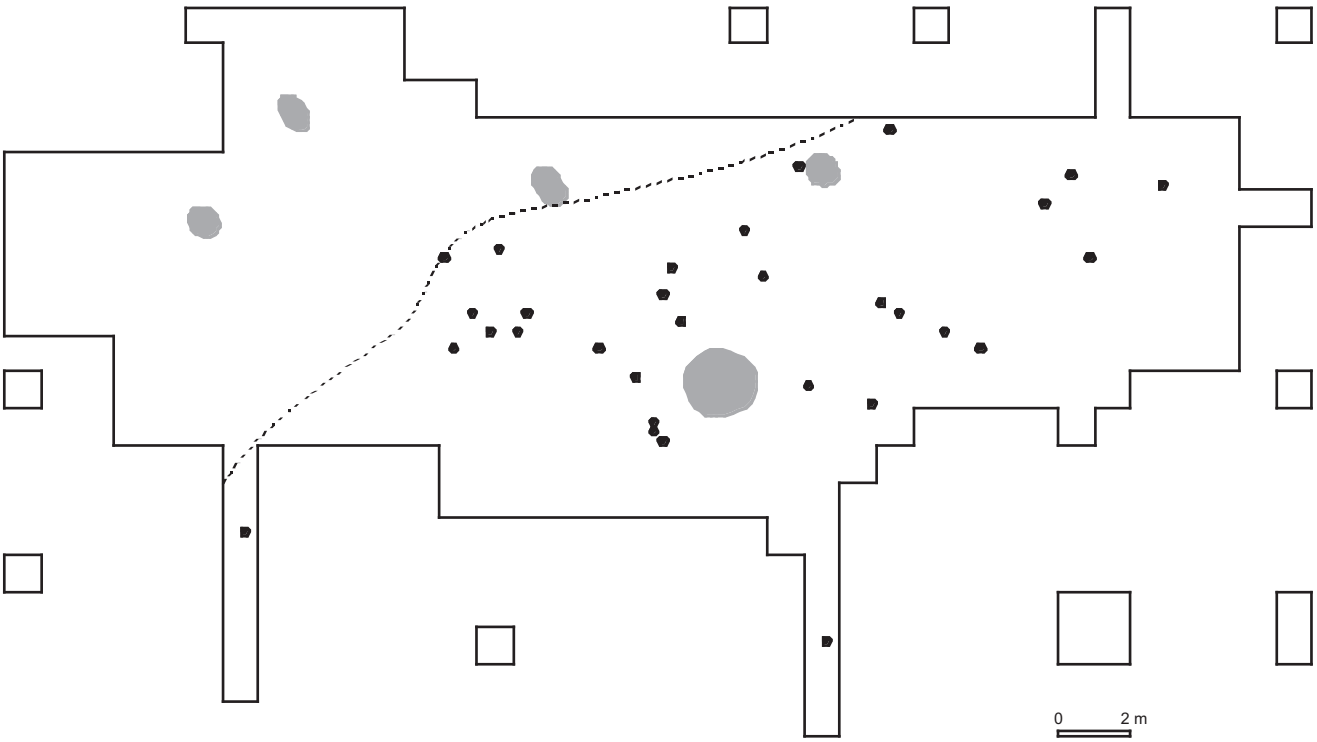

Fig. 2.60 Merselo-Haag. Late Mesolithic: distribution of cores in the undisturbed subsoil.

The results of the refitting of the flint correspond to the patterns already observed in the distribution of the various raw material groups.
Artefacts with traces of use and tools are almost non-existent in clusters 1 and 2, and dominate in clusters 3 and 4. The artefacts with minimal and moderate traces of use are scattered over the entire Late Mesolithic area, with a greater density in clusters 4 and 5. The artefacts with extensive traces of use occur mainly in cluster 4.
In clusters 3 and 4 not only most artefacts with traces of use occur, but notched blades, flake scrapers, points and backed blades are found there as well. Cluster 5 consists exclusively of a small number of backed blades. The other tool categories, such as retouched flakes, blades and blade scrapers, display a less marked association with the clusters. These are present in almost all clusters.
Clusters 1 and 2 may be considered to reflect the processing of flint. Although in clusters 4 and 5 flint processing did occur, other activities were performed there as well, and to a large extent. Compared to clusters 4 and 5, clusters 1 and 2 contain smaller numbers of the various types of tool, giving the impression that the activities associated with them on these locations should not be considered primary activities, but rather more additional. This concerns mostly simply retouched flakes and blades.

The fragments of points, in particular trapezes, and their distribution provide more indications for the activities there. These are mainly fragments of points where the tip, a large part of the top or even part of the medial is absent. These appear to have come off during re-shafting of points.
The distal and medial fragments are less concentrated. These may have broken on the site, but it is also possible they came to the site inside prey animals. These would have been slaughtered there and the fragments fallen to the ground.
The fragments of bases left after re-shafting, are close together in the area where 'domestic' activities occurred (clusters 3 and 4). Remarkably, the smallest fragments occur there. These may have been the fragments left in the meat when the point was removed, that reappeared upon consumption.

unused	1
base present	14
medial part present	4
top present	4
indeterminate	2
Total	23

Table 2.22 Fragmentation and use of Late Mesolithic points.

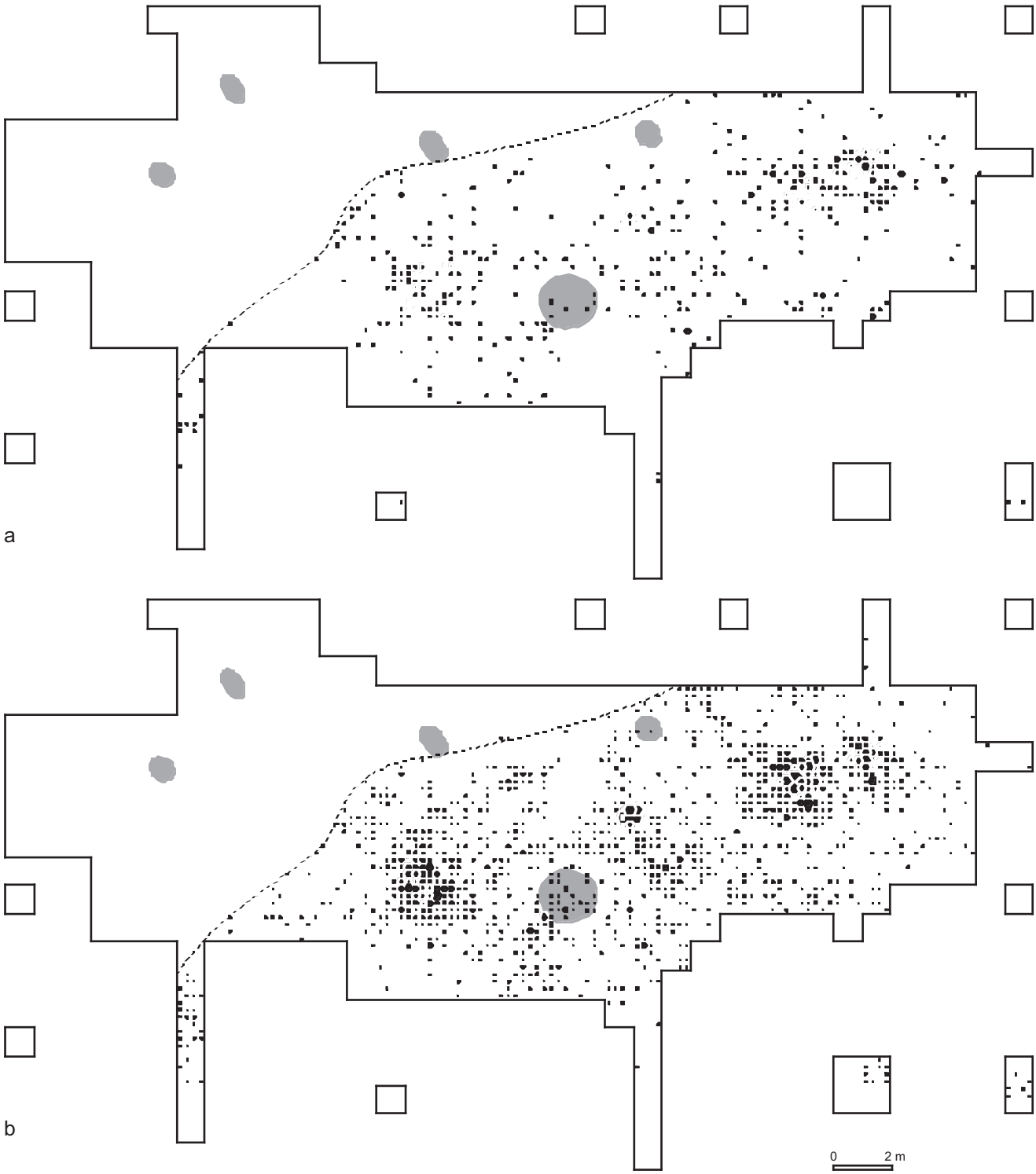

Fig. 2.61 Merselo-Haag. Late Mesolithic. a: Relative distribution of blades in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 6. b: Relative distribution of flakes in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 14.

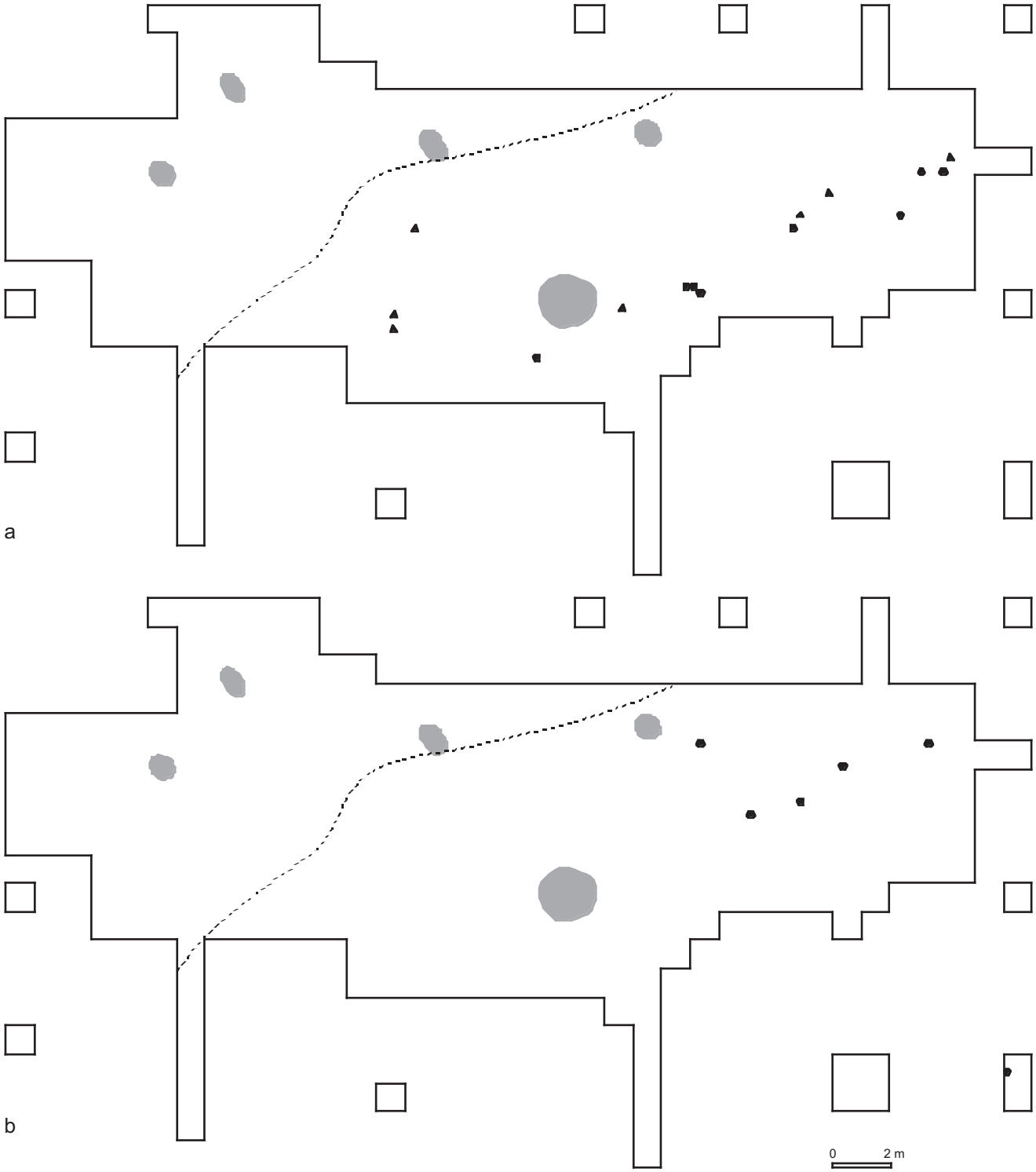

Fig. 2.62 Merselo-Haag. Late Mesolithic. a: Distribution of retouched blades (triangles) and retouched flakes (dots) in the undisturbed subsoil. b: Distribution of notched blades and microburins.

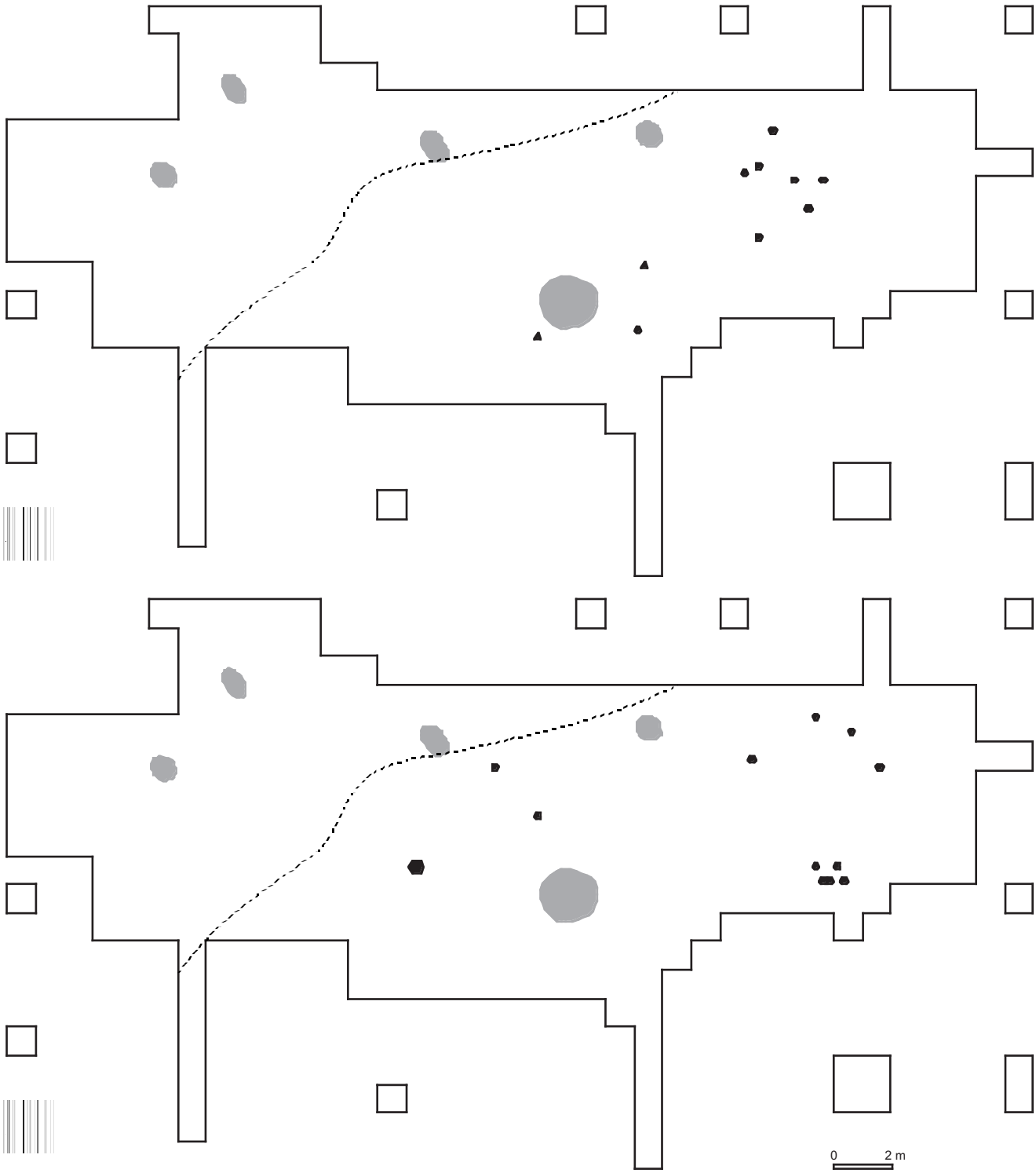

Fig. 2.63 Merselo-Haag. Late Mesolithic. a: Distribution of blade scrapers (triangles) and flake scrapers (dots) in the undisturbed subsoil. b: Distribution of backed blades.

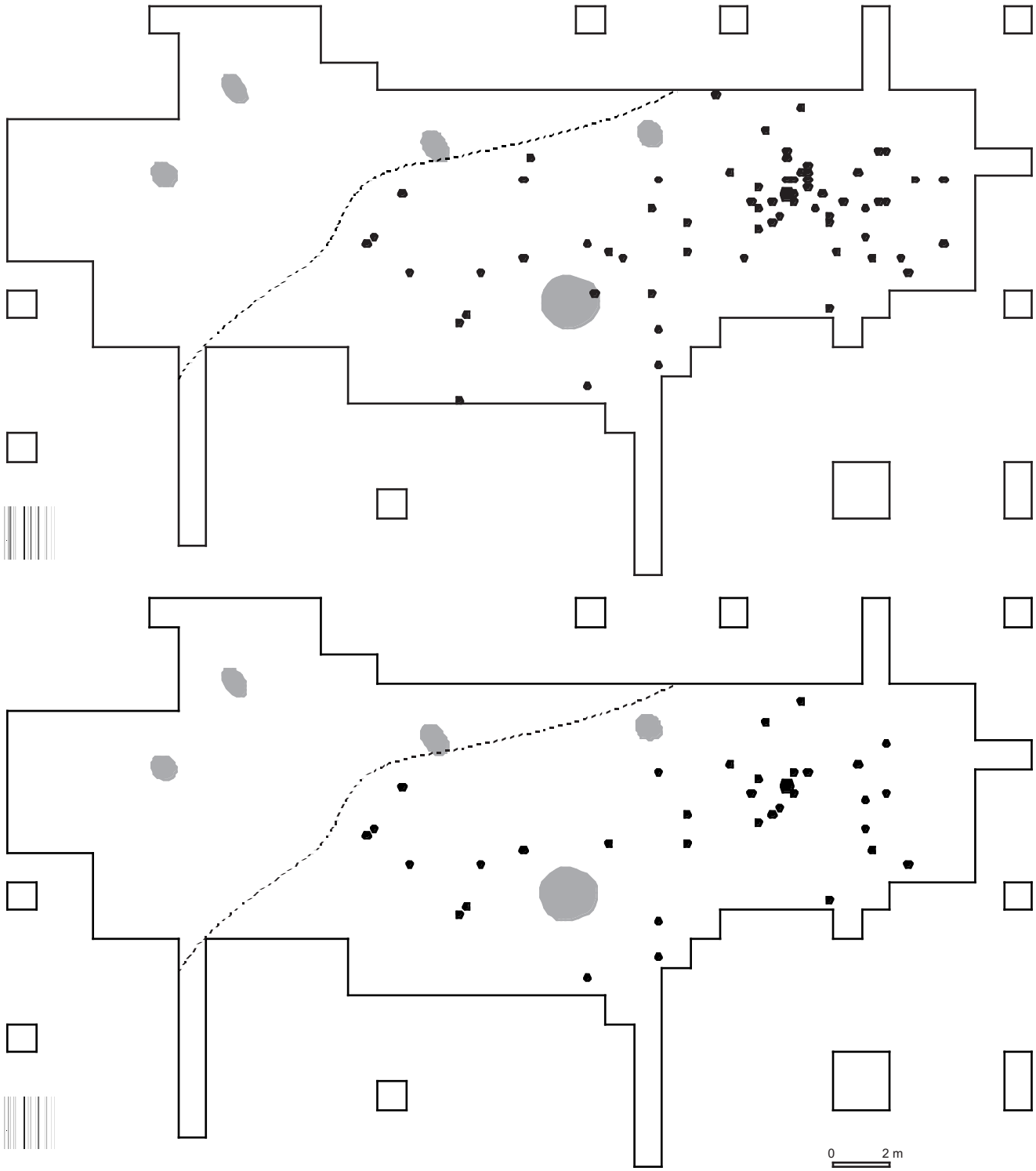

Fig. 2.64 Merselo-Haag. Late Mesolithic. a: Distribution of all unretouched artefacts with traces of use in the undisturbed subsoil. b: Distribution of all unretouched artefacts with minimal traces of use.

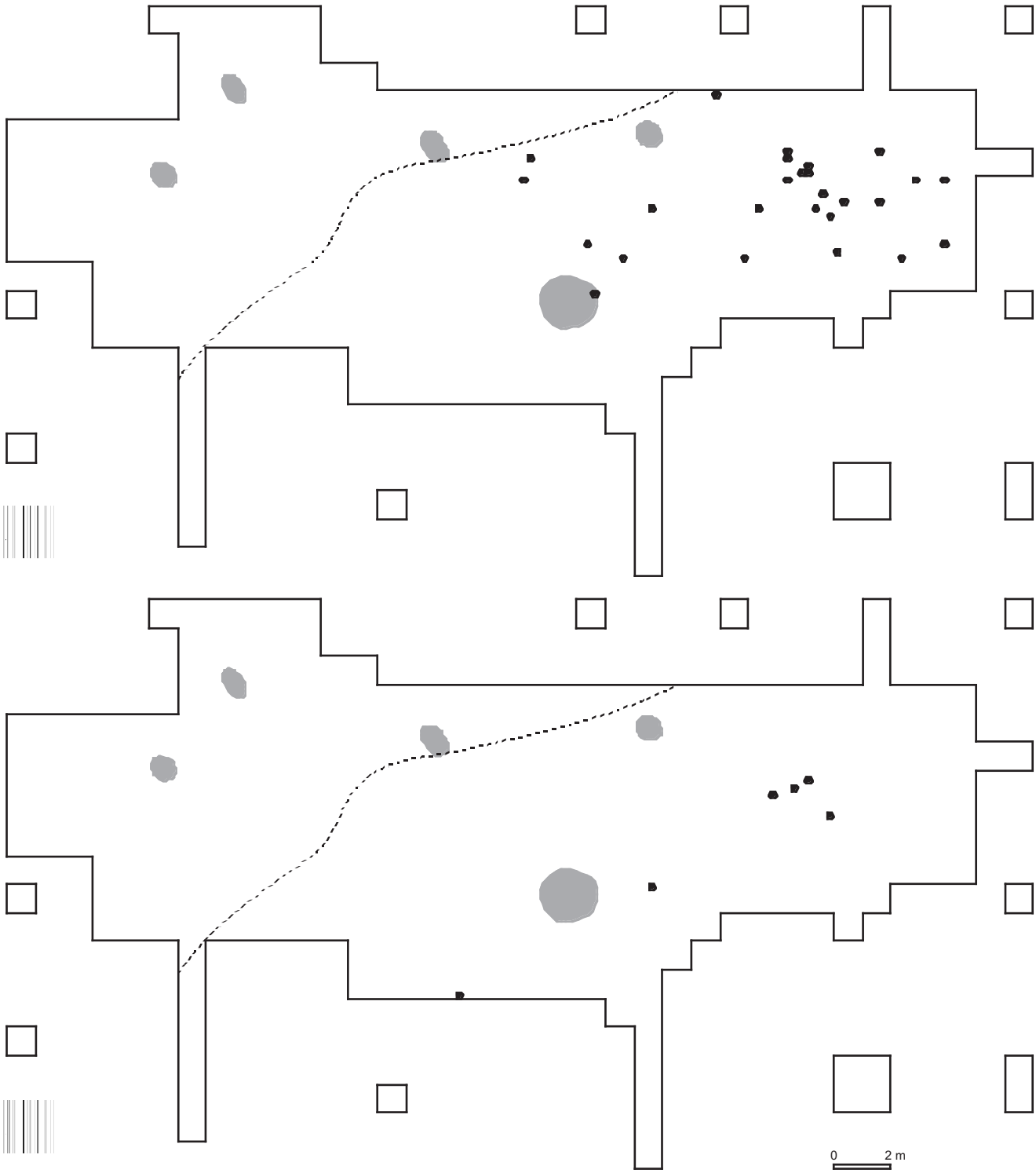

Fig. 2.65 Merselo-Haag. Late Mesolithic. a: Distribution of all unretouched artefacts with intermediate traces of use in the undisturbed subsoil. b: Distribution of all unretouched artefacts with intensive traces of use.

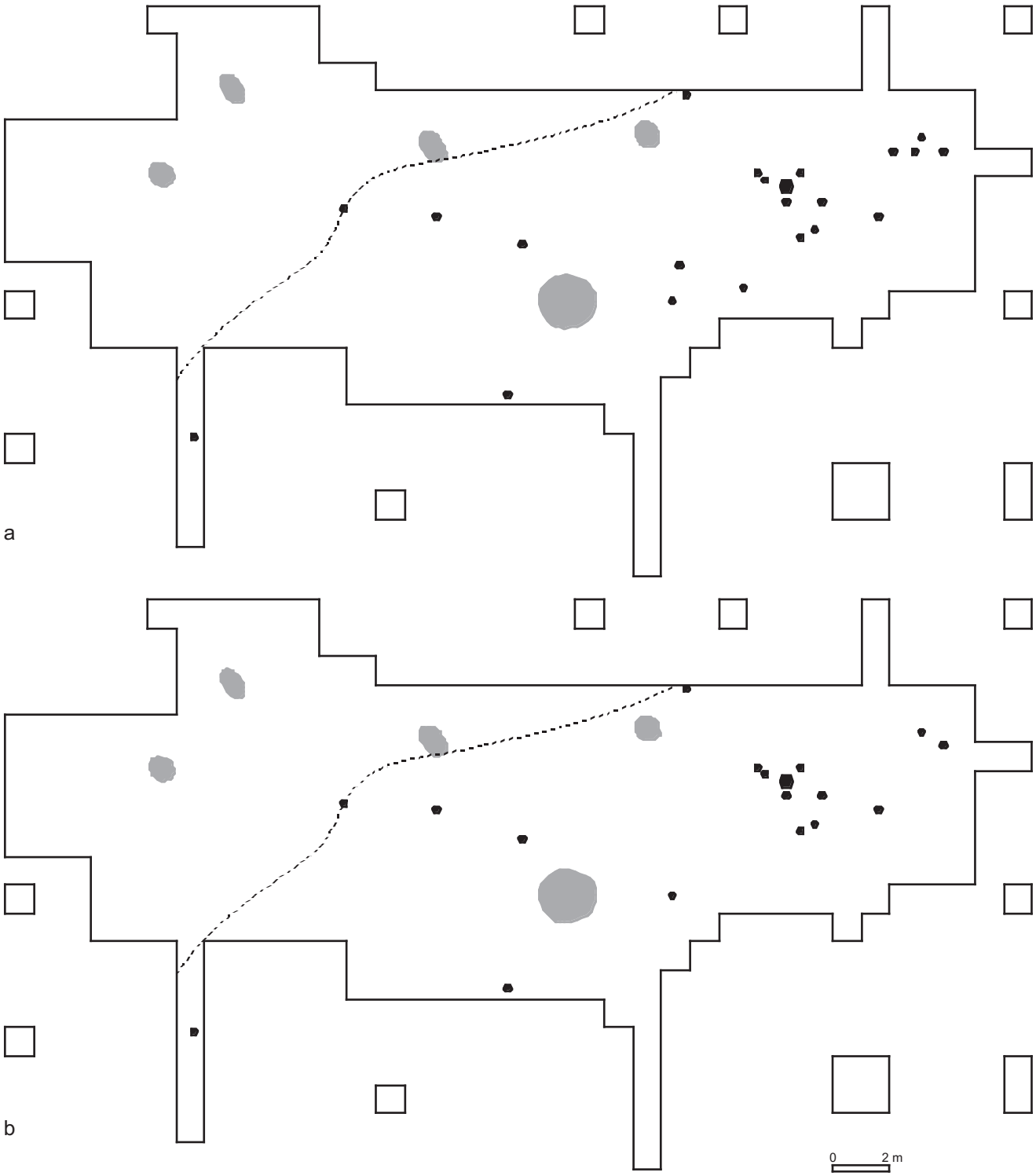

Fig. 2.66 Merselo-Haag. Late Mesolithic. a: Distribution of all points in the undisturbed subsoil. b: Distribution of trapezes.

The backed blades occur mainly in clusters 4 and 5 and are present in a thin scattering over the western part of the Late Mesolithic area. Their large numbers in cluster 5 and the fact these are all of the same type of stone, make it likely that a ready-made composite tool was left here. That this is not an off-site activity from an earlier or later period, is rendered likely by the fact that a backed blade from this special type of stone has been found in cluster 4 as well. An association between these clusters therefore seems likely.

The spatial analysis makes it clear that two functional zones may be distinguished:
– in the west an area consisting of two clusters where primarily flint was processed, and additionally some other activities occurred, such as possibly the dismemberment of catch.
– in the northeastern part a zone consisting of two small clusters where, in addition to flint processing, mainly activities occurred such as the repair of arrows, working with scrapers and possibly the consumption of food. South of this zone a composite tool was left, the backed blades of which formed the imperishable components.

2.7.12.2 Chronology
Important data for the determination of the number of moments of use are provided by the refitting study. From this it can be inferred that the clusters in the Late Mesolithic area are the result of a single moment of use. This corresponds with the conclusions provided by the analysis of the distribution of the various raw material groups. Raw material group 42 has been processed in both clusters, with a clearly visible division. Group 44 occurs almost exclusively in cluster 3, as do groups 60 and 65. In cluster 4 groups 45 and 90 occur. Moreover, there are indications that part of the finds may be considered the result of off-site activities. Among these are some tools found far from a cluster, sometimes even belonging to a raw material group not processed at the site during a specific phase. An example of this are the triangles found both in the Early- and in the Late Mesolithic areas. It is impossible to determine exactly to which moment of use these should be attributed.
Another indication for off-site activities are the raw material groups or individual nodules with a distribution outside the clusters with a predominance of waste or with a clustering in a zone containing hardly anything else. Because these off-site patterns can not be dated, they might of course also be the result of activities performed during one of the defined moments of use. Examples of such raw material groups are the westernmost cluster of 20, the northern cluster of 26, 50, 56 and 70.
The scattering of finds within the excavation area may therefore be considered an amalgam of site- and off-site activities. The Late Mesolithic clusters are the result of a single moment of use, the duration of which can however not be discovered. The acuity of the distribution pattern is suggestive of a relatively short use.

2.7.12.3 Dwellings or open air?
In the northeastern zone -between clusters 3 and 4- a remarkably sharp divide can be discerned. In this area activities other than flint processing have occurred as well. This raises the question whether the shape of the find spread may be an ‘imprint’ of some type of dwelling, or whether this was an open-air site.
To answer this question a comparison should be made with known Late Mesolithic hut floor plans. However, these do not exist in the Netherlands, so for comparison two well-preserved Early Mesolithic floor plans from huts in Ulkestrup, Denmark, have been selected. As equivalents two open-air sites have been used: Barmose and Duvensee, both having the same conservation conditions as Ulkestrup.
The site Ulkestrup-Lyng has an age of 8370-8050 BP[71]. Two floor plans of huts have been uncovered. The distribution of the finds (fig. 2.67-68) makes it clear that the majority of the flint was inside the huts, and only a small part outside[72]. Judging from the distribution of the cores, flint processing occurred inside the hut as well. The tools: points, backed blades and scrapers, occur for the most part within the floor plans of the huts as well.
More open-air settlements are known. In Scandinavia and the north of Germany some well-preserved examples have been excavated. In most cases these had a floor of birch or pine bark, often with a hearth. We shall limit ourselves here to two examples: Barmose I and Duvensee-8.
In Barmose I a floor of birch bark was found[73]. Due to differences in excavation and documentation methods it is not possible to determine the exact shape. On the floor a hearth has been found. The distribution of the flint shows a pattern that is completely different from that of the Ulkestrup huts (fig. 2.69). Whereas in Ulkestrup a repetition of overlapping patterns occurred in the hut, there was differentiation in Barmose. All flint is clustered in the northwest corner of the birch bark floor. The cores on the other hand are distributed much more widely and located around the hearth, mainly outside the area where all flint waste was left. The tools: points, burins and scrapers, are located like a ring on the southeastern side of the waste cluster. With the exception of the cores, all other find categories are on the birch bark floor.
A second instance of an open-air site is site 8 in Duvenseer Moor[74]. Here, too, a small floor, this time made of pine bark, was excavated. Data on the distribution of the flint waste are absent. The distribution of the cores and tools displays many similarities to the pattern of Barmose

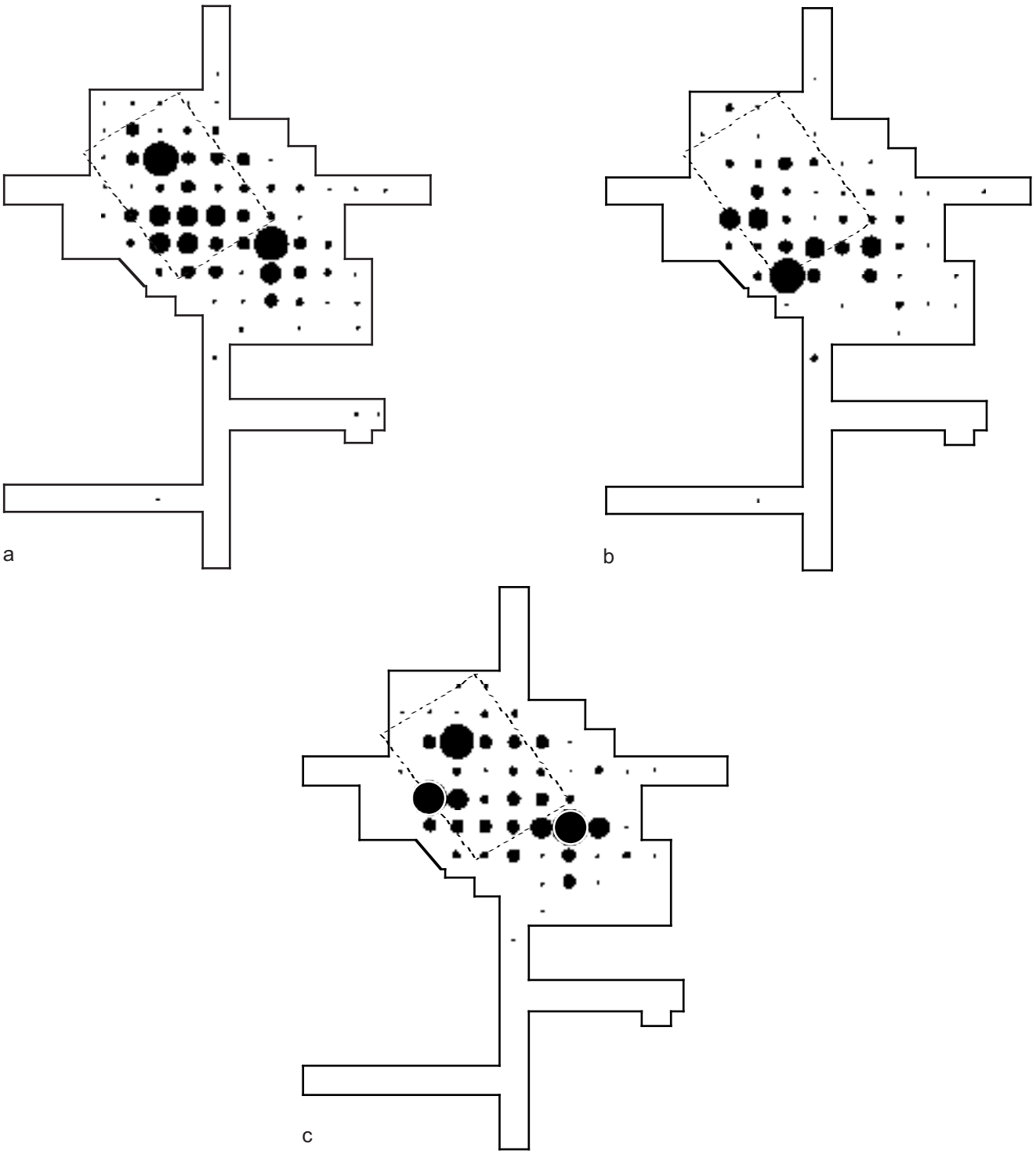

Fig. 2.67 Excavation plan of Ulkestrup I. The outline of a hut has been indicated by a dotted line (after K. Andersen, Jørgensen & Richter 1982). a: Relative distribution of all flint, b: relative distribution of cores, c: relative distribution of scrapers and backed blades.

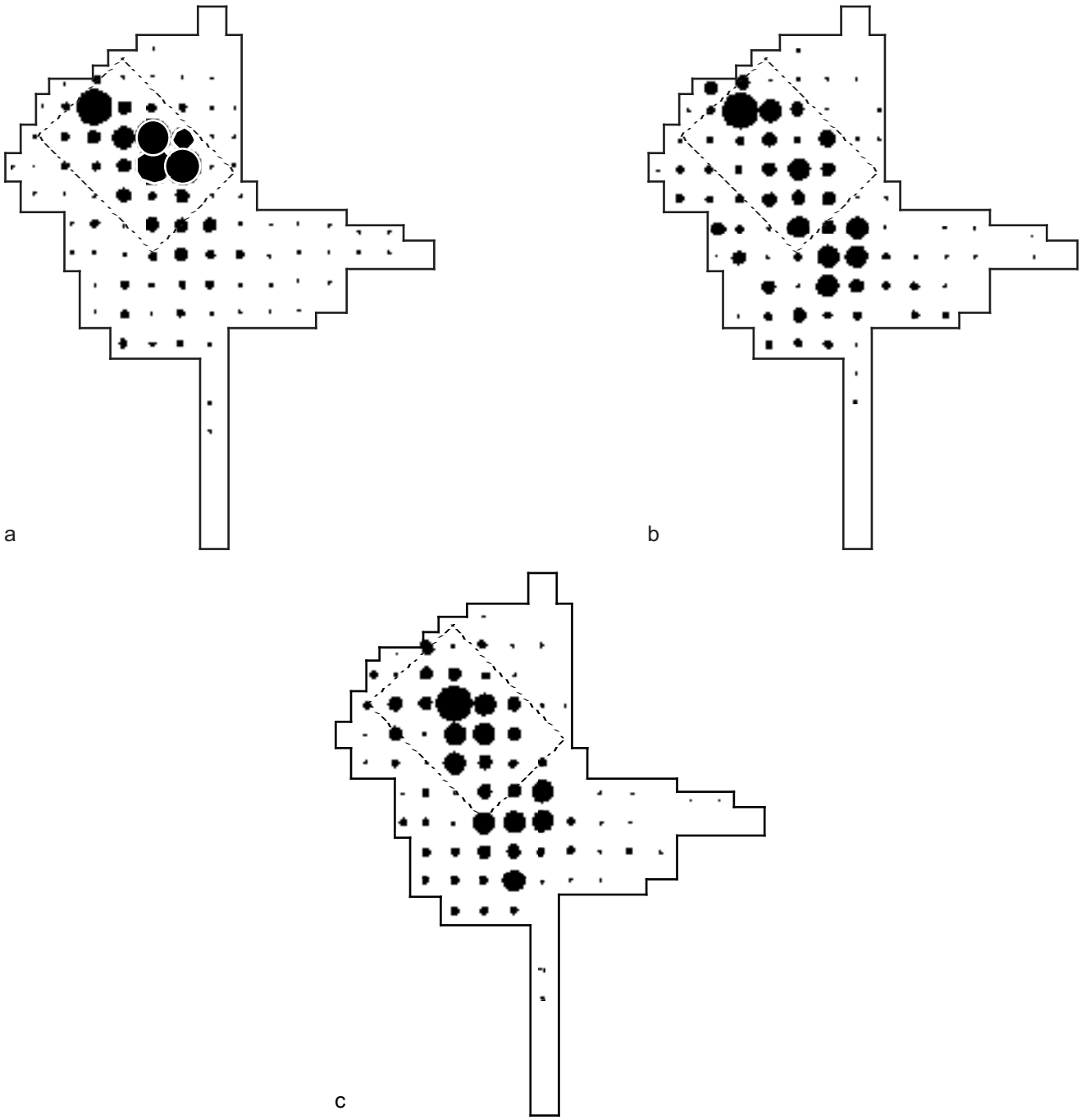

Fig. 2.68 Excavation plan of Ulkestrup II. The outline of a hut has been indicated by a dotted line (after Andersen, Jørgensen & Richter 1982). a: Relative distribution of all flint, b: relative distribution of cores, c: relative distribution of points, scrapers and burins.

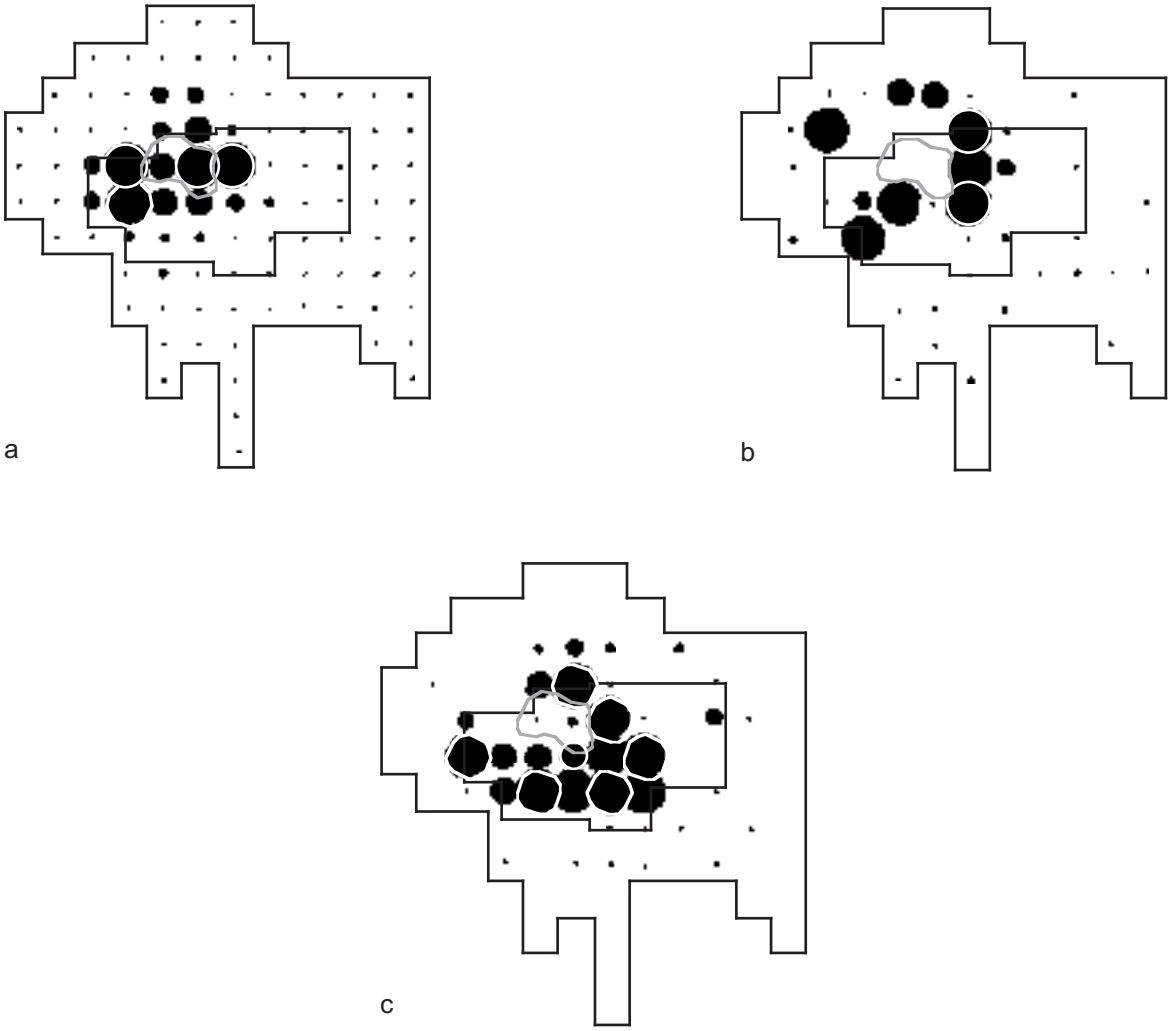

Fig. 2.69 Excavation plan of Barmose I. The outline of a floor made of birch bark has been indicated by a line in the centre. A hearth is indicated with a grey line (after Johansson 1990). a: Relative distribution of all flint, b: relative distribution of cores, c: relative distribution of points, burins and scrapers.

(fig. 2.70). The cores are scattered over a large area, but are specifically absent from the floor area. The distribution of microlites shows a marked association with the pine bark floor.

Although few data are available, sites with huts appear to display their presence by a homogeneous, overlapping distribution pattern of various types of flint categories, in contrast to open-air sites where we notice a differentiation in distribution patterns of various artefact classes. When we compare the data from Ulkestrup with the distribution pattern of flint in Merselo-Haag, the presence of a hut in Merselo is not very likely. The overall distribution of the material does not indicate the presence of a hut, and the distribution patterns of the various raw material groups and artefact categories show quite a lot of differentiation as well. When we project a rectangular floor plan of 6 by 4 metres, considered to be typical of Maglemose[75], over the entire distribution pattern, no areas may be pointed out that could correspond to it. The conclusion therefore seems justified that there has been no hut in Merselo-Haag.

Remarkable is the area containing no finds at all that is clearly evident between clusters 3 and 4. Any number of reasons may be proposed for this, like e.g. the presence of a birch bark mat, position of a wind screen, location of a fallen tree or processing of flint by various people. However, no definitive explanation for this phenomenon could be put forward.

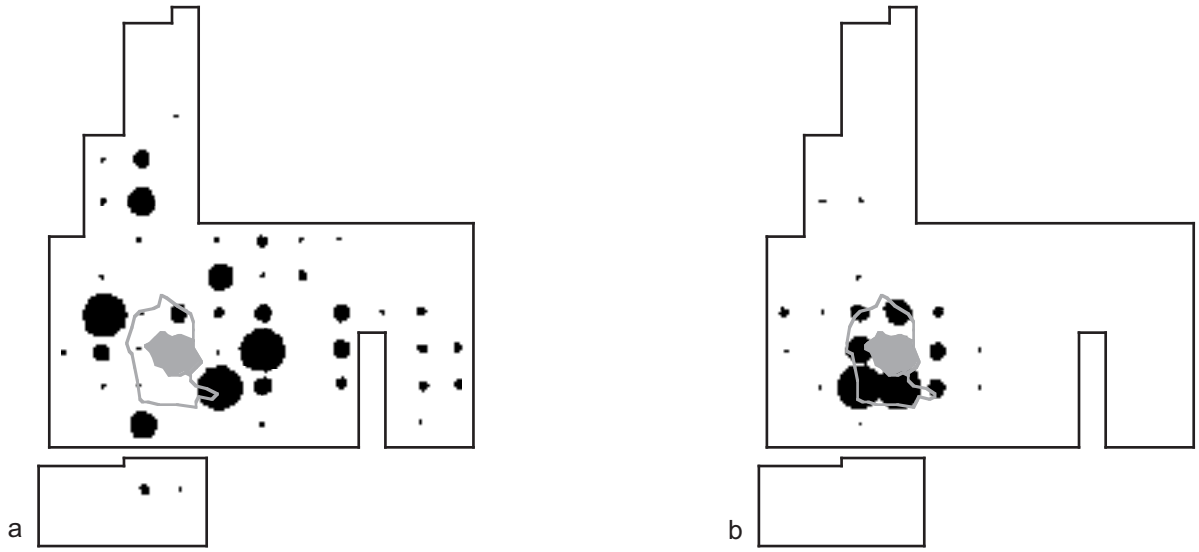

Fig. 2.70 Excavation plan of Duvensee-8. The outline of a floor made of pine bark has been indicated by a grey line; the hearth in grey (after Bokelmann et al. 1981). a: Relative distribution of cores, b: relative distribution of microlites.

The most likely interpretation is that in the Late Mesolithic a small group of hunter-gatherers camped out in the open air in Merselo-Haag. A wide range of activities were caried out. There appears to be a preponderance of activities that may be associated with hunting, with additional activities testified to by the presence of some scrapers, retouched flakes and blades and artefacts with traces of use. Beside these activities, occurring mainly concentrated in clusters 3 and 4, there are two more zones, clusters 1 and 2, where flint was processed almost exclusively. On the basis of the research into the raw materials used and the refitting study, it seems likely these activities occurred more or less simultaneously. No dwelling has been erected on the site. Contrary to general belief, the dug hearths did not form the centres of all activities. The hearths are actually outside the primary areas of activities.

2.7.13 EARLY MESOLITHIC

In the western part of the site part of an Early Mesolithic find scatter was uncovered, that had been disturbed to some degree. The western and northern boundaries could not be ascertained. We confine ourselves to a short description of the finds and a spatial analysis with functional interpretation of the site.

2.7.13.1 Finds

The flint used comes mainly from the Meuse, with a preponderance of flint of the Rijckholt- and Rullen-types (table 2.23). A minority consists of flint from the north and from the vicinity of Simpelveld. This can be inferred from the remnants of fresh cortex on some artefacts.

Raw material group	n	%
vitreous northern (01-03)	59	5.8
vitreous (05-07)	10	1.0
Haspengouw (10)	12	1.2
Lixhe (15)	22	2.2
Rijckholt/Rullen (20-27	108	10.5
Rullen (30-31)	54	5.3
Rijckholt (40-46)	237	23.1
Simpelveld (50)	19	1.9
unknown (55-56)	7	0.7
unknown (60)	2	0.2
unknown (65)	3	0.3
unknown (70)	0	0.0
unknown (80)	1	0.1
unknown (81)	0	0.0
unknown (82)	3	0.3
quartzite (83)	0	0.0
Wommersom (90)	9	0.9
Phtanite (91)	0	0.0
burned (98)	322	31.4
indeterminate (99)	157	15.3
Total	1025	100.2

Table 2.23
Merselo-Haag, Early Mesolithic. Flint provenance

The flint was mostly processed with a soft hammer technique. The primary technique was not aimed at the production of blades. Ratios between blades and flakes are almost identical to those of the Late Mesolithic period, although blade cores have been recovered. All stages of processing have been found. There are no indications that blades or other semi-manufactured goods have been moved to the site.
A small number of unmodified blades and flakes shows traces of use. All Early Mesolithic points but one show traces of use or damage by burning.
The number of tools is not very large (table 2.24). The largest group consists of points, followed by retouched blades and flakes (table 2.25).

	n
A-points	1
B-points	1
C-points	-
D-points	1
segments	3
points of unknown type	5
trapezes	–
LBK-like points	–
triangles	2
burins	1
blade scrapers	1
flake scrapers	6
backed blades	–
retouched blades	5
retouched flakes	4
notched blades	–
microburins	–
Total	30

Table 2.24 Merselo-Haag, Early Mesolithic. Survey of tools

	n	%
points	13	43.3
burins	1	3.3
scrapers	7	23.3
backed blades	–	0.0
retouched blades/flakes	9	30.0
Total	30	99.9

Table 2.25 Merselo-Haag, Early Mesolithic. Tool categories.

Description of the Early Mesolithic tools

Points (fig. 2.71: 1-13)
Eight points are clearly Early Mesolithic. In addition there are 5 fragments that could be characterized as Early Mesolithic due to their shape and method of processing. All have been made out of blades and possess steep retouch on one or two sides. From 7 points the type can be distinguished: 1 A-point, 3 segments, 1 B-point and 2 triangles. The group of fragments also consists of different types of points.

Scrapers (fig. 2.72: 4-6)
Of the 7 scrapers one has been made out of a blade, the others out of flakes. The blade scraper has end retouch. Of the flake scrapers 3 have end retouch over a small part of the working edge. This retouch is oblique to the bulb of percussion. Of the two scrapers with circular retouch, one has retouch over less than 50% of the circumference, whereas the other has retouch over 50 to 75% of the circumference. One scraper has more circular retouch, while another one has circular retouch over 50% of the flake. Finally there is a single flake scraper with two opposite, non-alternating scraper sides.

Burins (fig. 2.72: 11)
Only one burin has been retrieved, at a considerable distance from the Early Mesolithic core area. This is a RA-burin, made out of blade with a working edge on the left side. The distal end has broken off.

Retouched blades and flakes (fig. 2.72: 7-10)
Five retouched blades have been retrieved from the Early Mesolithic area. Among these are two blades with retouch on the right side, one blade with retouch on the left side, one blade with end retouch and one fragment of a blade with retouch, where the original position of the retouch can no longer be ascertained.
Of the four retouched flakes, one has retouch on the distal end, opposite the striking platform. The other three have retouch on one of the sides.

2.7.13.2 Find distribution

The pattern of the overall find distribution within the Early Mesolithic area shows a thin scattering with small clusters inside (fig. 2.25). The plan of the excavation is only part of the original area in use. The site can be demarcated to the east and south, but the find spread appears to continue towards the northeast.
There appears to be no relation between the hearths and the find spread. The younger age of the hearth is an indication that the burned flint was not burned until after deposition in the Early Mesolithic. To the south of the Early Mesolithic area two small clusters may be discerned, consisting mainly of burned flint shattered in situ by heating and cooling (fig. 2.28). In this area no charcoal was recovered from the sieve residu. Although the presence of surface hearths can not be excluded in this area, it is not very likely they were located here.
Flint processing appears not to have occurred on specific

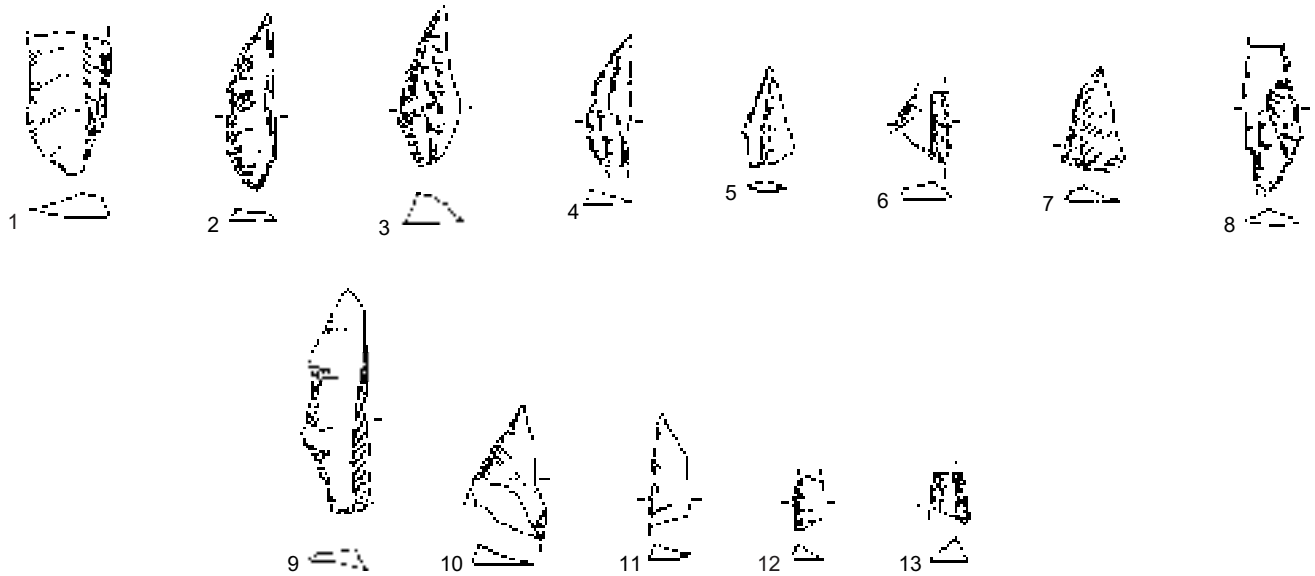

Fig. 2.71 Merselo-Haag. Arrowheads from the Early Mesolithic find area and typologically attributed specimens. 1 fragment A-point, 2-4 segments, 5 asymmetric triangle, 6 B-point, 7 D-point, 8-12 fragments of points. Scale 1:1.

locations. The cores are scattered and occur mainly outside the area with the largest find density. Moreover, the refitting study shows that pieces fit together over a relatively large area and over large distances. There are hardly any concentrations of pieces fitting together.
In the Early Mesolithic area mainly artefacts with traces of use occur, retouched flakes, part of the retouched blades, the majority of the scrapers and points (fig. 2.75-2.76). Outside this core area a small number of tools occurs, such as several retouched blades, two flake scrapers, one burin and some point fragments.
Most activities will have occurred within the core area. The large number of artefacts with traces of use and the scrapers may indicate a wide range of domestic-like activities here. The relatively large number of points appears to be the reflection of repairs to hunting gear. The artefacts outside this area might be associated with other activities, perhaps the dirty ones, such as cleaning the catch. However it is also possible that these should be attributed to off-site activities from some other stage of use. Nothing definite can be stated about this. No soil traces have been found that might indicate the presence of a hut. The density and nature of the find spread do not indicate this either. Analysis of Mesolithic floor plans of huts in Denmark and Germany proves that most flint is found inside the huts, often in association with a hearth surrounded by the burned flint[76].
On the basis of the find distribution and the tools recovered, the site may be described as part of a small base camp of limited size. The relatively large number of points indicates that hunting was probably the most important activity. The number of users and the length of use can not be ascertained due to the disturbances. The activities occurring on this location were not centred around a hearth. Actually, the hearths are located outside the find concentration. An interpretation as open-air encampment is most likely.

2.8 The Late Mesolithic of Merselo-Haag in a wider context

So, was Merselo-Haag a hunting camp, a small base camp or simply a regular base camp? Ethnography provides examples of such encampments[77]. These are often some sort of 'ideal images', much harder to identify in archaeology[78]. Yet in this chapter we shall attempt to gain an insight into the range of settlement types and which types of settlements can actually be identified.
When we compare the results of the Merselo-Haag study with excavation complexes elsewhere in the south of the Netherlands and the adjoining areas, it is quite obvious that much has been excavated in the past, but that it was not easy to come to unambiguous conclusions. Due to differences in excavation technique, degree of detail, execution and publication it is not easy to make comparisons. Partly due to the fact that so many sites are mixed, it proved hard to place Merselo-Haag in a wider context in this study. In our comparison only 'clean' sites have been used, where we had to restrict ourselves to the level of categories of tools.

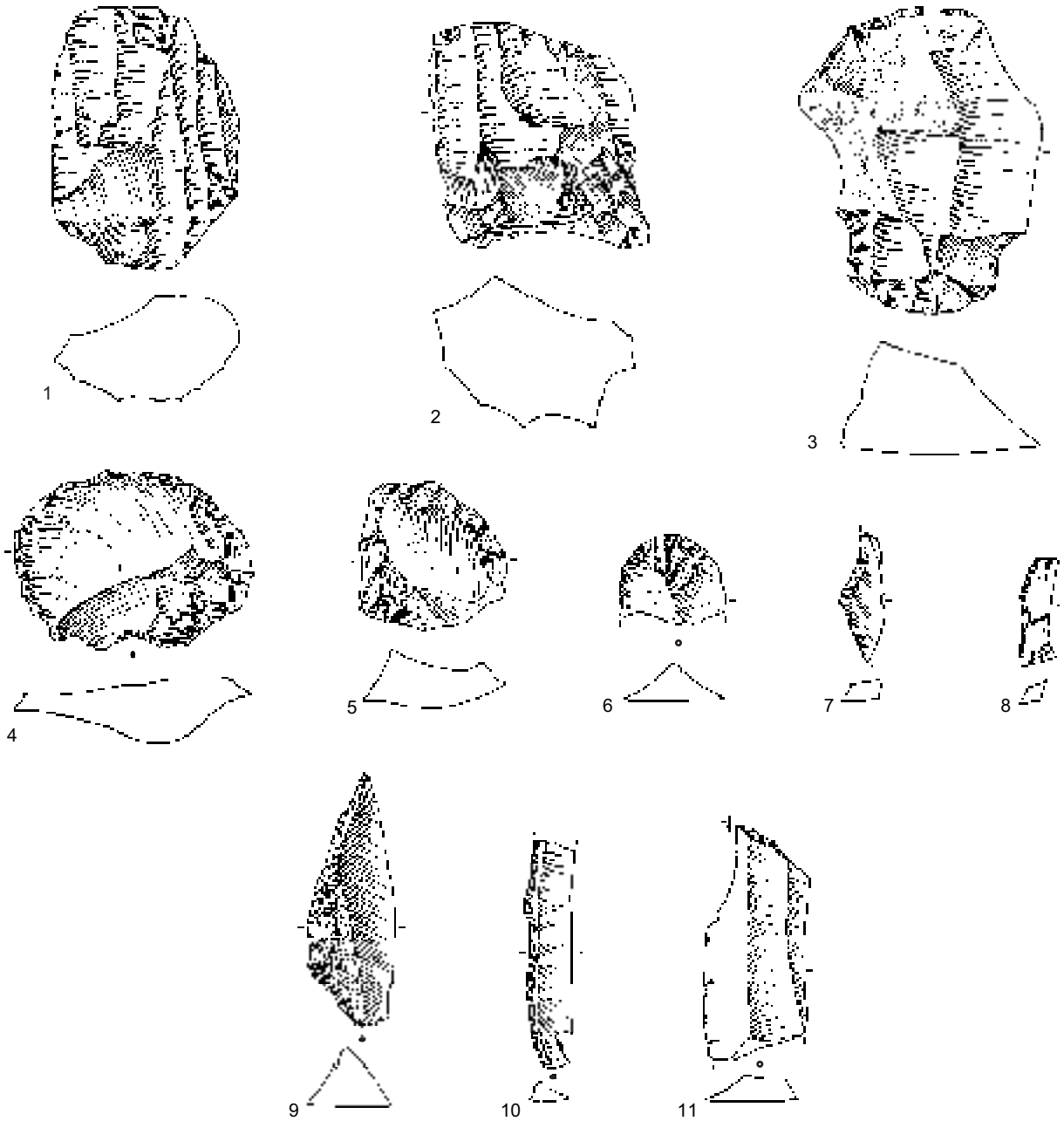

Fig. 2.72 Merselo-Haag. Early Mesolithic: 1-3 cores, 4-6 scrapers, 7-10 retouched flakes and blades, 11 RA-burin. Scale 1:1.

2.8.1 LATE MESOLITHIC SITES IN THE NETHERLANDS AND BELGIUM

Whereas we have a relatively large number of 'clean' sites for the Early Mesolithic, this is quite different for the Late Mesolithic. Late Mesolithic sites are generally mixed with (Middle) Neolithic material. Unmixed sites do not occur in the south of the Netherlands, whilst in Belgium only three have been excavated and described in sufficient detail. In addition, the find composition of one site, Meeuwen-In den Damp, is lacking.

The data of the remaining sites have been summarized in table 2.26.

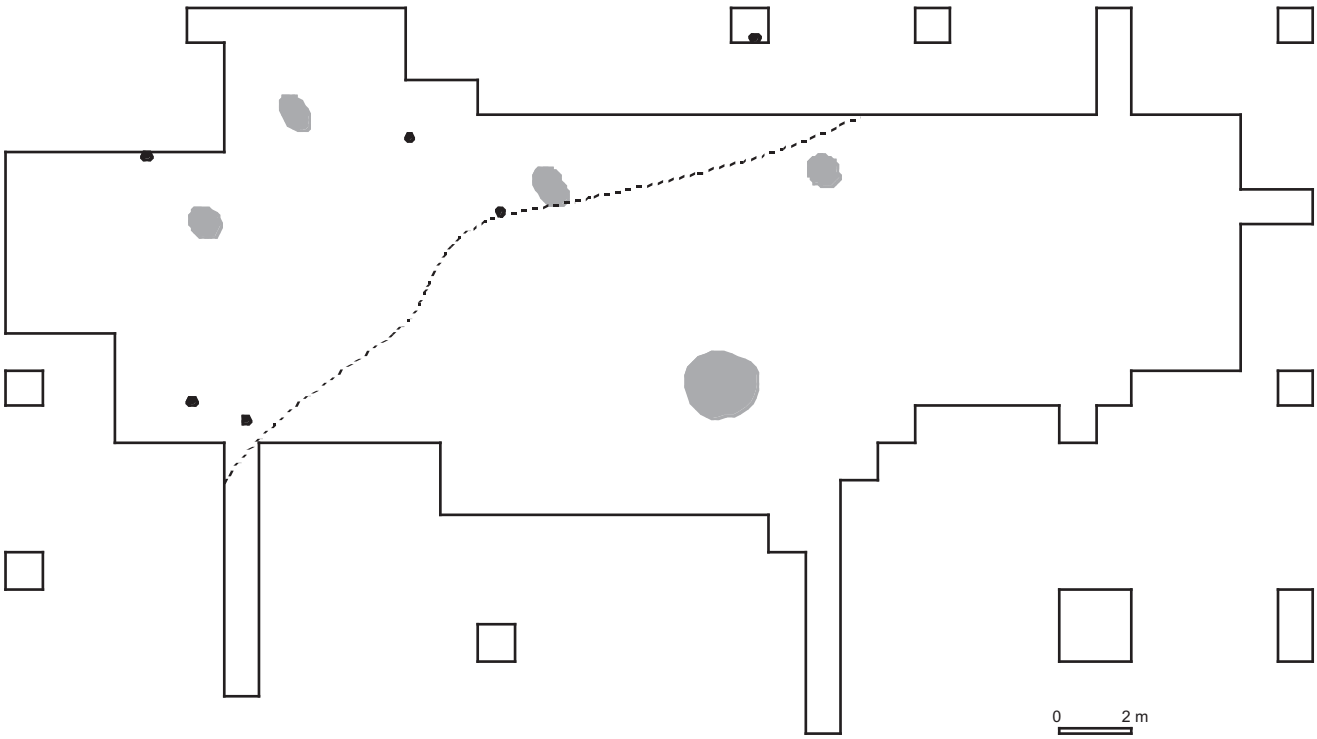

Fig. 2.73 Merselo-Haag. Early Mesolithic. Distribution of cores in the undisturbed subsoil.

Dilsen-Dilserheide[79]
In 1990 and 1991 three excavation pits were dug on the Dilserheide. In the westernmost pit an area of 146 m^2 was investigated in detail, within an overall excavation area of 20 × 25 m. Late Mesolithic artefacts were found here in association with a Michelsberg pot. The Late Mesolithic find distribution is part of a larger area, estimated on the basis of surface finds to be approx. 40 × 60 m in size.
The entire find distribution displays a thin scattering of flint with some clustering, the most striking of which is in the north. Although not entirely excavated, this appears to be an oval cluster with dimensions of approx. 6 × 8 m. In its centre some 160 sherds were found close together, which all proved to belong to a single bottle-like Michelsberg pot. No other Neolithic sherds were found. The other Neolithic elements consist of a single Late Neolithic arrowhead, two axe fragments and some macrolites, all found outside the concentration. Inside the excavation area one fragment of a feuille de gui was found. It is not clear whether this was inside or outside the concentration.
The percentage of retouched tools is probably overstated, as this seems to include the group with traces of use as well.

Meeuwen-In den Damp1[80]
In the middle of the eighties a Late Mesolithic site near Meeuwen was investigated. In all some 500 m^2 was

Site	points		burins		scrapers		backed blades		ret. blades/flakes		total	
	n	%	n	%	n	%	n	%	n	%	n	%
Merselo-Haag	25	34.7	0	0.0	11	15.3	14	19.4	22	30.6	72	100.0
Dilsen-Dilserheide	76	31.3	1	0.4	5	2.1	10	4.1	151	62.1	243	100.0
Weelde-Paardsdrank	134	25.7	0	0.0	56	10.7	21	4.0	310	59.5	521	99.9
Opglabbeek-Ruiterskuil	35	17.5	0	0.0	10	5.0	4	2.0	151	75.5	200	100.0

Table 2.26 Summary of 'clean' Late Mesolithic sites in the Netherlands and Belgium, in relation to various categories of tools.

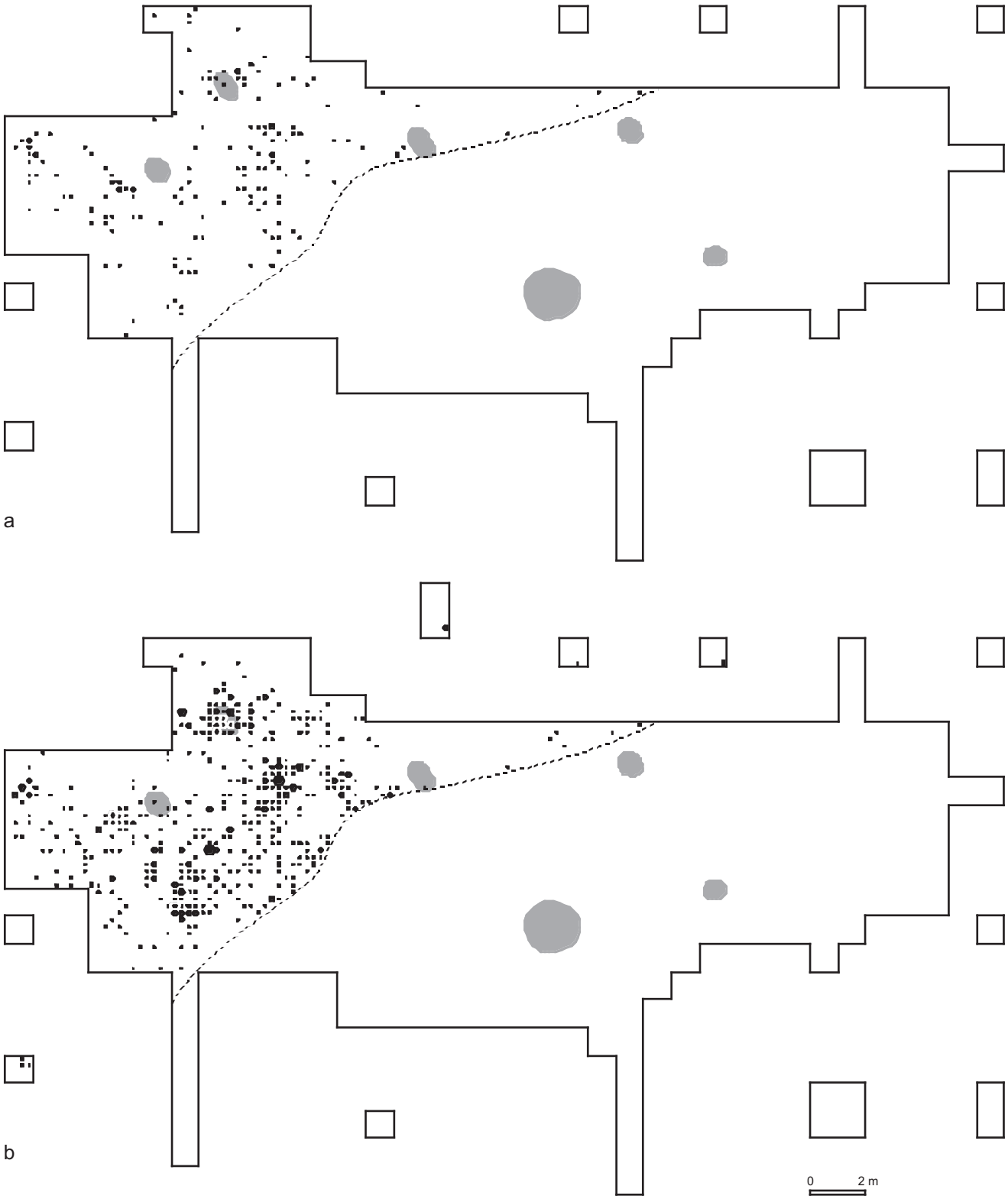

Fig. 2.74 Merselo-Haag. Early Mesolithic. a: Relative distribution of blades in the undisturbed subsoil. Maximum number of finds per 25 cm-square is 3. b: Relative distribution of flakes. Maximum number of finds per 25 cm-square is 5.

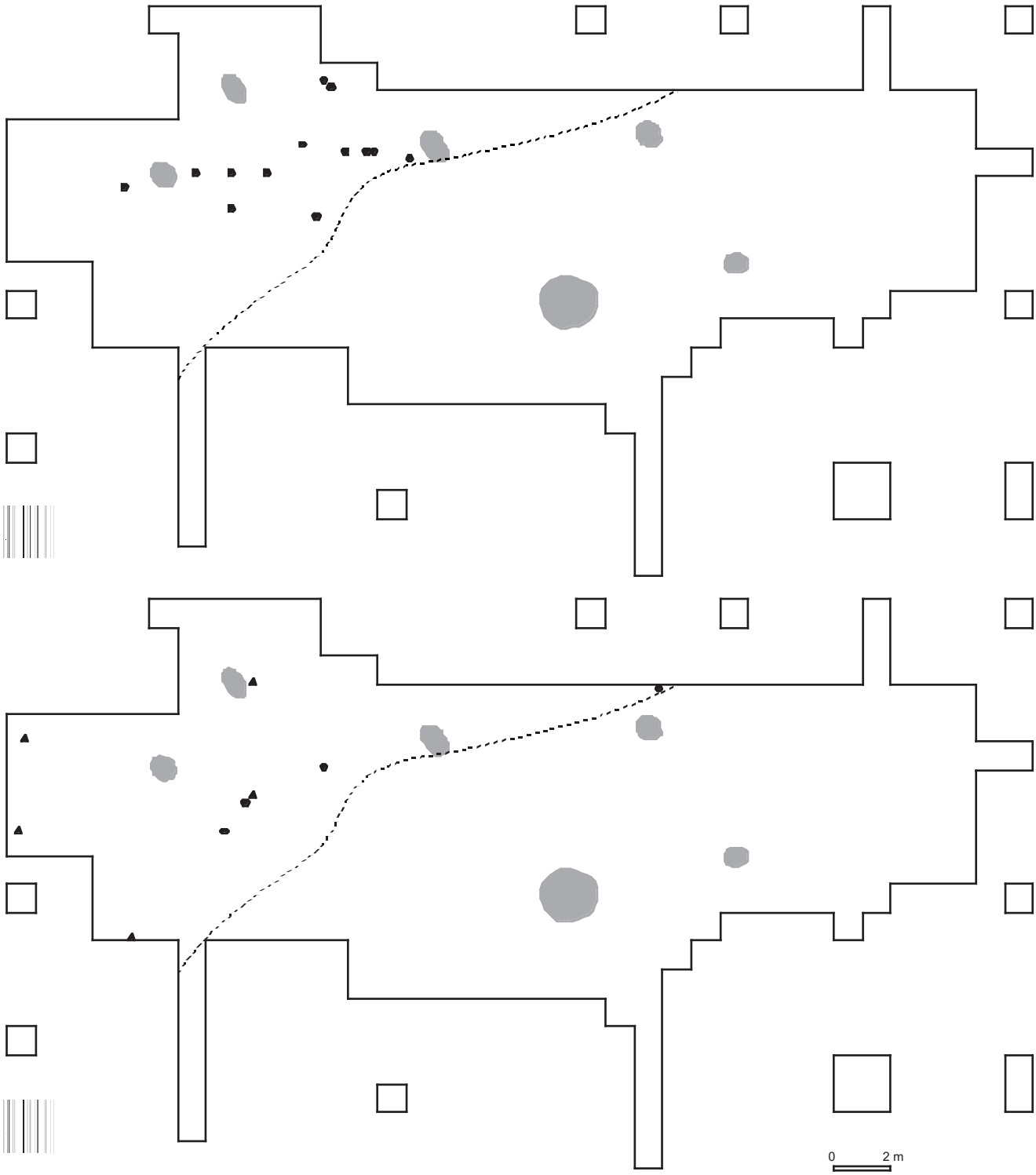

Fig. 2.75 Merselo-Haag. Early Mesolithic. a: Distribution of artefacts with traces of use in the undisturbed subsoil. b: Distribution of retouched blades (triangles) and retouched flakes (dots).

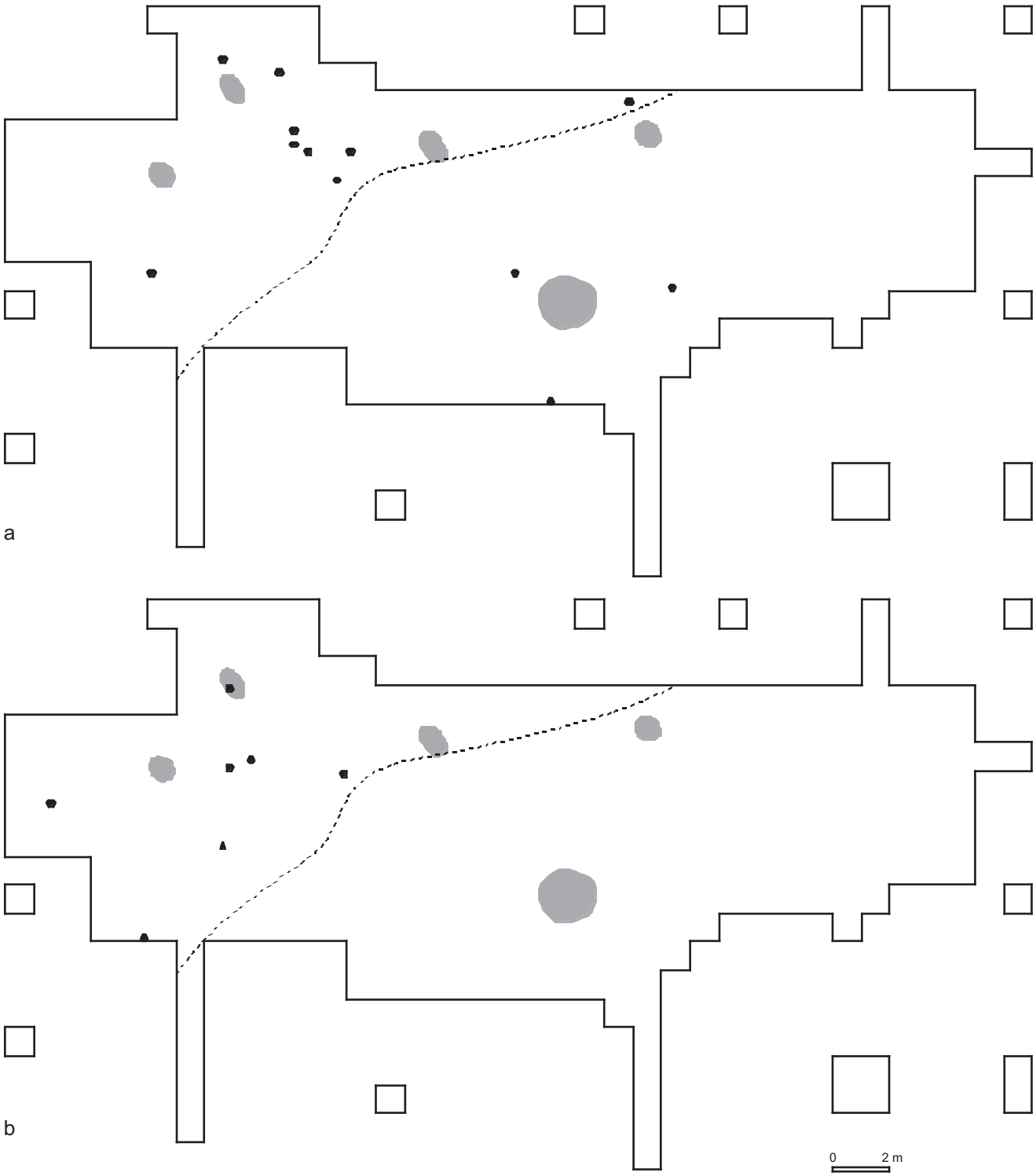

Fig. 2.76 Merselo-Haag. Early Mesolithic. a: Distribution of points in the undisturbed subsoil. b: Distribution of blade scrapers (triangles) and flake scrapers (dots).

excavated. In the excavated area two separate concentrations can be discerned, with oval shapes and dimensions of 8 by 4 metres. The points comprise some B- and C-points, one point with surface retouch and mostly trapezes. Some of these trapezes have surface retouch on the ventral side. Unfortunately data on the overall find composition are lacking.

Weelde-Paardsdrank[81]
On this site in the Kempen, three concentrations (sectors) have been excavated. In addition quite a number of artefacts have been collected on the surface[82]. The various concentrations are 40 and 15 m apart respectively. The find distribution by sector shows quite some differences.
In sector 1 an area of 24 by 6 m was excavated. This displays a distribution pattern with small clusters inside with a surface of approx. 4 m^2.
Sector 4 shows an almost identical picture within an excavated area of 15 by 6 metres. Sector 5 has a single oval to elongated concentration with a surface of approx. 20 m^2.
On the basis of the typologically significant points various moments of use may be demonstrated in two sectors, ranging from Early to Late Mesolithic. Sector 5 appears to have been visited mainly in the Late Mesolithic. Only a small number of points with surface retouch were recovered there. Two C14-datings yielded an age of 5710 ± 80 BP (Lv-934) and 6990 ± 135 BP (Lv-959).
The majority of finds (67.4%) was found in situ. This percentage does not appear to be valid for sector 5 (table 2.27). Only in the northern part some disturbance occurs. In the level where Mesolithic flint was recovered, a sherd tempered with quartz, organic material and chamotte occurs, but outside the area with most finds. This sherd is considered to be contemporaneous with the Mesolithic presence. Inside and outside the concentration two clusters of burned hazel shells were collected.
The use of raw material and processing at the site are suggestive of a preference to produce blades of Wommersom quartzite. The large number of blades with signs of preparation and the small number of cores are taken by the excavators to be indications for intensive processing of Wommersom quartzite. Among the most remarkable finds are some points that can be referred to as LBK-like. These are points that have been supplied with surface retouch on the ventral side of the base as well. Points with a straight base and points with a hollow base are present. These are considered to be a typically Mesolithic type of tool, inspired by LBK-examples, but adapted to the demands for Mesolithic microlites.
The find spread and tool composition do not allow a functional classification of the settlement. The presence of carbonized hazel shells suggests at the least a use in autumn or winter.

Opglabbeek-Ruiterskuil[83]
In this investigation a cutout from a larger settlement area appears to have been studied. The find spread continues at the boundaries of the excavation. In the level a scattering of finds can be discerned, with clusters and empty zones inside. Most finds were located close to a hearth consisting of a circle of stones. In the northeastern pit a large amount of finds was recovered as well. It is impossible to estimate the size of the site. The find spread is probably the reflection of multiple activities. These appear to have occurred mainly in the Late Mesolithic. Trapezes are predominant among the points. Two feuille de gui's have been found.

2.8.2 SYNTHESIS

The possibilities for a functional interpretation of a site with flint finds only are quite limited. Ethnographic studies have demonstrated the existence of a wide, often overlapping, range of types of settlements[84]. In many of these settlements phenomena such as multifunctionality, multiple use and internal differentiation have been documented. Phenomena that leave barely any traces, let alone could be unravelled from pieces of flint. In actual fact, only a few types of settlement may be inferred from the archaeological material, despite the large amounts of investigations conducted in this area[85]. The image we have from the past is therefore severely distorted and too general.
In the final analysis all we can do is distinguish between hunting camps and (large or small) base camps. Very rarely only do we catch a glimpse of the complex activities hidden behind a cluster with flint. An example of this is the investigation of well-preserved Early Mesolithic activity areas in Duvenseer Moor in Germany[86]. There a single hunter's place of sleep, roast sites for hazelnuts and a campfire used only once could be documented with barely any flint finds.
Another example is Waubach in Limburg. The find composition there is such that the site may be considered to have been a mining and processing location of flint[87].

	excavation		surface finds		total	
	n	%	n	%	n	%
points	47	26.3	87	25.4	134	25.7
burins	0	0.0	0	0.0	0	0.0
scrapers	23	12.8	33	9.6	56	10.7
backed blades	7	3.9	14	4.1	21	4.0
retouched blades/ flakes	102	60.0	208	60.9	310	59.5
Total	179	100.0	342	100.0	521	99.9

Table 2.27 Summary of finds from the Weelde-Paardsdrank excavation, sector 5.

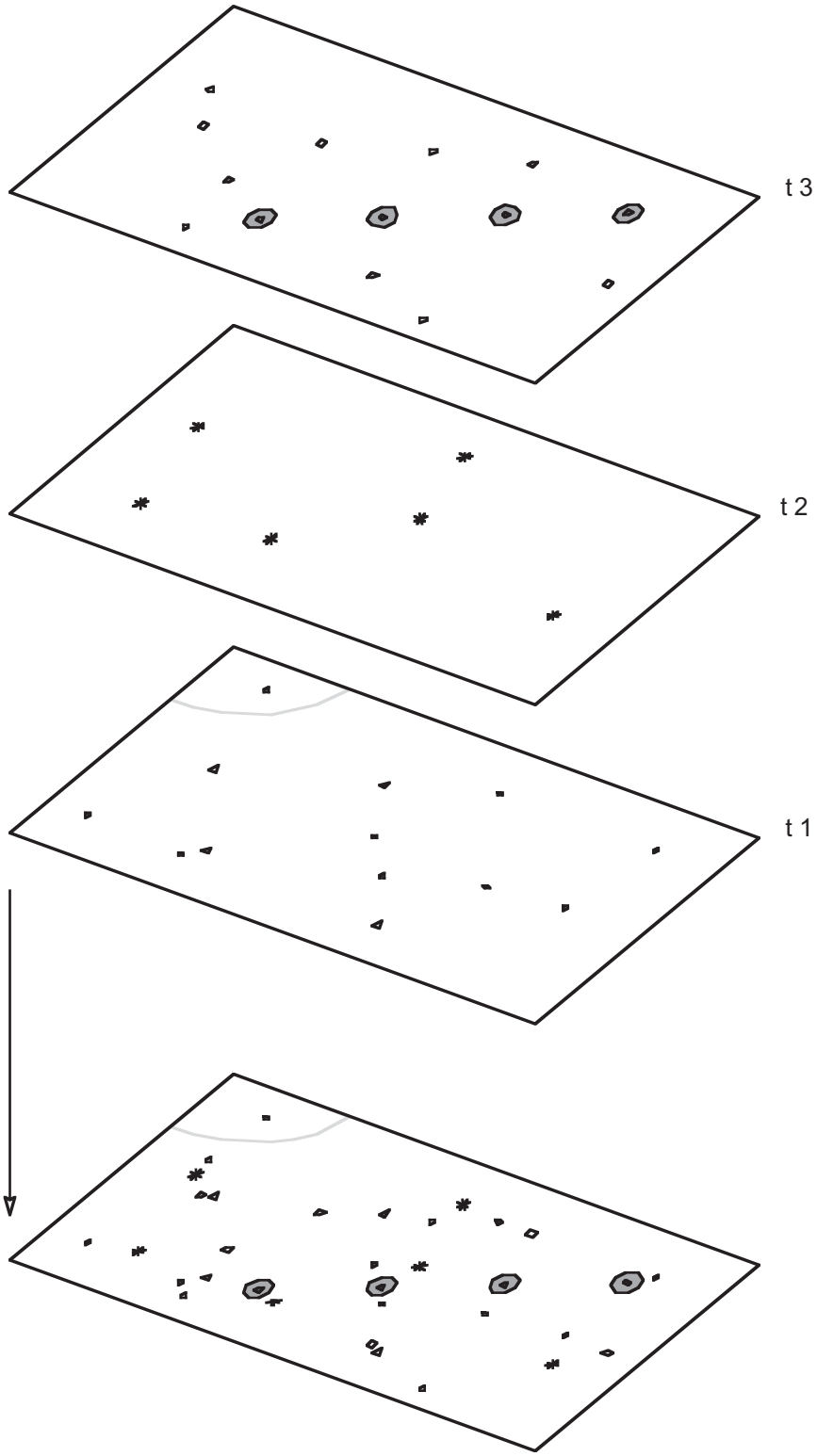

Fig. 2.77 Diagram of activities by stage and the result in the distribution pattern. t1: Early Mesolithic; t2: Middle Mesolithic; t3: Late Mesolithic.

Ratios of the various tool categories of Late Mesolithic settlements make it clear that typical hunting camps, as known from the Early Mesolithic[88], are absent in this period. Almost all tool categories are represented on each site. It appears that on these sites a wide range of activities occurred, in which hunting, as inferred from the numerous points, was strongly represented on almost all sites. An interpretation as base camp would therefore be most obvious for all these sites.
Merselo-Haag might be considered one, too, but in that case it would have been a base camp with hunting as the main activity. The size of the site and the number of finds are indications that a small group stayed here for some time, where we have a core family or extended family in mind. It does not appear that a number of those groups were present at the same time.
The similarities between the other sites in the core region and Merselo-Haag are striking, although these concern surface-gathered flint material and the size of the sites is generally not known. Specific types of sites, such as hunting camps or aggregation camps, can not be recognized. In the core region Venray in the Late Mesolithic therefore, relatively small multifunctional base camps appear to have existed that were always located on the borders of large geographical units. This forms the base for the optimal exploitation of two ecological zones; an exploitation visible in the shape of sites but which also led to an off-site deposition of material.
Data from the core region can not easily be compared to those from the macroregion, due to the fragmentary nature of the data base. A great amount of research will still have to be done on this level. But the results do match those of the research into Mesolithic settlement areas in Belgium, although the main emphasis there has been on investigation of the site. Many settlement areas are accumulations of repeated visits over time to the same terrain. Where the terrain allows, Late Mesolithic activities can often be discerned as small clusters of flint with a size comparable to the patterns in Merselo-Haag. This is also true for the tool composition. There, too, we appear to find small base camps where the emphasis of the activities may differ: in one hunting may dominate somewhat, whereas in another the domestic activities are emphasized.

notes

1 Arts & Hoogland 1987.

2 Bedburg-Königshoven (Street 1989, 1990).

3 Wansleeben & Verhart 1995, 1998.

4 Arts 1989; Newell 1973, 1975; Price 1975, 1978; Verhart & Groenendijk (in prep.).

5 Gendel 1984, 1987; Vang Petersen 1984; Verhart 1990.

6 Isarin & Van der Beek 1991; Joosten & Bakker 1987; Van Leeuwaarden 1982; Van den Munckhof 1988; Van Nispen tot Pannerden 1955.

7 Van den Toorn 1967, 75.

8 Pers. comm. J. Broertjes.

9 Rip 1982, 1983a, 1983b.

10 Harsema 1980.

11 Rip 1982, 13.

12 a.o. Verlinde 1971; Verwers 1964, 1966.

13 Verhart & Wansleeben 1991b; Wansleeben & Verhart, 1995, 1998.

14 Although this is the earliest Neolithic in the area, the term Middle Neolithic will be used, in accordance with the chronology used for the entire Meuse valley.

15 Isarin & Van der Beek 1991.

16 Van den Broek & Theunissen van Manen 1959, 4.

17 Pers. comm. J. Broertjes.

18 Joosten & Bakker 1987.

19 Joosten & Bakker 1987: 18.

20 Van Nispen tot Pannerden 1955, 2.

21 As a result of the land consolidation project Weverslo-Overloon the entire area was dug over in 1988.

22 Van Leeuwaarden, 1982.

23 Joosten & Bakker 1987; Van den Munckhof 1988.

24 Teunissen 1990.

25 We gratefully acknowledge the cooperation of Prof. dr. C.R. Janssen and dr. J.H.J. Joosten.

26 Joosten & Bakker 1987: 21.

27 Teunissen 1990.

28 The finds collected at this time are not discussed separately in this chapter, but have been included in the excavation results.

29 Bakels 1978.

30 Instances: Swalmen (Stapert 1979), Posterholt (Verhart 1995a).

31 Wansleeben & Verhart (in prep).

32 We gratefully acknowledge the permission and cooperation of Jonkheer A. de Beaufort and mr. G.-J. van Walsum.

33 Cziesla, Eickhoff, Arts & Winter 1990; Villa 1982.

34 With the exception of coversand areas covered by later sediments before there was any large-scale agriculture. Disturbances are considerably smaller there. Some recent instances of such areas under investigation are the Antwerp Waaspolders (Crombé 1994, 1996) and the Flevopolder (Hogestijn & Peeters 1996; Hogestijn, Peeters, Schnitger & Bulten 1996).

35 a.o. Crombé 1993, 1996; Lauwers & Vermeersch 1982; Van Noten 1978; Vermeersch 1976.

36 Fischer, Grønnow, Jønsson, Nielsen & Petersen 1979.

37 Arts 1989; Arts & Deeben in prep.; Newell 1973, 1975; Verhart & Groenendijk in prep.

38 For an extensive discussion see paragraph 2.7.4.

39 Arts 1989; Crombé 1993, 1996; Crombé & Van Strydonck 1994; Vermeersch 1976, 1989; Verhart & Groenendijk in prep.

40 This investigation was carried out by Dr. W.A. Casparie, BAI, Groningen. We gratefully acknowledge his cooperation.

41 Such hearths have been described very well recently in the study of the site Hoge Vaart along the planned A-27 (Hogestijn & Peeters 1996).

42 Groenendijk 1987; Groenendijk & Smit 1990.

43 The 'Research Group on Western Flint' has collected flint on various locations in Limburg, Germany and Belgium over the past years. As a result, identical type collections have been formed in Leiden, Louvain, Maastricht and Niederzier. This collection has been the frame of reference for the type designation and attributions used here.

44 The relationship between blades and flakes on a late-Mesolithic site like Weelde-Paardsdrank is around 50:50 (Huyge & Vermeersch 1982).

45 As of 01.01.1996.

46 Collins 1975; De Grooth 1987, 1994.

47 Pers. comm. dr. A. van Gijn.

48 In some instances traces of use occur on the distal end that show a marked similarity to so-called "spontaneous retouch" (Newcomer 1975). This retouch however is always slightly rounded, and these artefacts are therefore still considered to be scrapers.

49 No distinction was made between wide and narrow trapezes. Traditionally this distinction is correlated with a chronological background. The distribution of narrow and wide trapezes is similar, making chronological differences on this site not a major factor.

50 Burov 1990; Voss 1960; Lidén 1942; Lozovski 1996.

51 Becker 1945; Malmer 1968.

52 Fischer 1989; Fischer, Rasmussen & Hansen 1984.

53 Vang Petersen & Petersen 1984.

54 Arts 1989; Crombé 1994, 1996; Lanting & Mook, 1977; Newell 1973, 1975; Vermeersch, 1989.

55 Meeuwen-In den Damp (Creemers & Vermeersch 1986).

56 Price, Whallon & Chappell 1974; Price 1975, 1978.

57 Vermeersch, Lauwers & Gendel 1992.

58 Groenendijk 1993.

59 Crombé 1994.

60 Verhart, in prep.b.

61 Lanting & Mook, 1977.

62 Lanting & Mook 1977, 32.

63 Heesters & Wouters 1968.

64 Heesters 1969.

65 Leysen 1984.

66 Louwe Kooijmans 1998.

67 Hogestijn & Peeters 1996; Hogestijn, Peeters, Schnitger & Bulten 1996.

68 De Bie, Steenhoudt, Luypaert, Van Impe & Vermeersch 1991; Luypaert 1993; Luypaert, De Bie & Vermeersch 1993.

69 This is not an original hypothesis. P. M. Vermeersch has expressed this before and wanted to have the Mesolithic continue on into the Late-Neolithic. One of us (Verhart 1992) has criticised him for this, as now appears mistakenly.

70 Foley 1981a, 1981b.

71 Hut I: 8140 ± 100 (K-2174), 8370 ± 130 (K-2175); Hut II: 8030 ± 140 (K-1508), 8050 ± 140 (K-1509), 8180 ± 100 (K-2176) (Andersen, Jørgensen & Richter 1982, 77).

72 The distribution maps published about Ulkestrup are an assemblage of finds from the surface of the peat and finds washed away below the peat. In particular the washed away finds occur on the distribution maps outside the hut (pers. comm. Ole Grøn).

73 Blankholm 1987, 1991; Grøn 1992, 1994, 1995; Johansson 1990; Stapert 1994. As opposed to the view of Johansson, Blankholm and Grøn we feel there has been no hut on the site Barmose. The local conservation conditions may be described as good, yet no traces of posts have been found. Stapert (1994), too, concludes that Barmose must have been an open-air site, albeit on the basis of different arguments.

74 Bokelmann, Averdieck & Willkomm 1981.

75 Grøn 1989, 1995.

76 Blankholm 1987, 1991; Bokelmann 1977, 1986, 1989; Bokelmann, Averdieck & Willkomm 1981, 1985; Newell 1980; Grøn 1989, 1992, 1994, 1995; Grøn & Sørensen 1996, 1998; Sørensen 1984; A completely different interpretation of part of the presumed floor plans is offered by Stapert (1994).

77 Binford 1978, 1982, 1991.

78 Compare e.g. the studies by Boaz 1998; Forsberg 1985; Newell 1973; Price 1975, 1978.

79 De Bie, Steenhoudt, Luypaert, Van Impe, Vermeersch 1991; Luypaert, De Bie & Vermeersch 1993.

80 Creemers & Vermeersch 1986.

81 Huyge & Vermeersch 1982; Vermeersch 1980.

82 These have not been included in the counts.

83 Vermeersch, Munaut & Paulissen 1974.

84 Binford 1978, 1982; Forsberg 1985; Gamble & Boismier 1991.

85 Boaz 1998; Forsberg 1985; Newell 1973, 1975; Price 1978.

86 Bokelmann 1986; 1995.

87 Arts 1984. It is likely that other activities occurred on this location as well. Points are not expected on a flint mining site. Flint mine sites without any typologically dated material are almost impossible to place in time and would be barely recognizable in the field without guide artefacts.

88 Posterholt (Verhart 1995a) and Zonhoven-Molenheide-oost (Vermeersch & Creemers 1994).