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Elsloo-Koolweg Revisited

Science-based perspectives on the burials and grave goods of the Linear Bandkeramik burial ground of Elsloo-Koolweg

I.M. van Wijk and L.W.S.W. Amkreutz (eds)

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Colophon

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Science-based perspectives on the burials and grave goods of the Linear Bandkeramik burial ground of Elsloo-Koolweg

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This book presents the results of the 'Elsloo-Koolweg revisited, reinvestigating the LBK burial ground of Elsloo-Koolweg' project. The Cultural Heritage Agency of the Netherlands (Rijksdienst voor het Cultureel Erfgoed; RCE) commissioned a project, undertaken by Archaeological Research Leiden (ARCHOL) and the National Museum of Antiquities (RMO), which aims at a synthetic analysis of the burial ground of Elsloo-Koolweg using science-based techniques. The book is the result of a joint effort by the authors and although many chapters have a single author, our views, however, are shared.

This publication has greatly benefited from comments on various drafts by Dr D. Hofmann (University of Bergen) and Dr B. Smit and Dr R. Feiken (Cultural Heritage Agency of the Netherlands, Amersfoort). Dr Daniela Hofmann peer-reviewed and accepted the manuscript in terms of its scientific contents but also thoroughly copy edited the text and improved it through her critical comments and queries for clarification. We owe her many thanks. Furthermore, several German colleagues provided us with additional information about the Rhineland burial grounds: Dr Nadia Balkowski (LVR-State Service for Archaeological Heritage), Dr Erwin Czesla (Wurzel Archäologie GmbH), Frank Hartel M.A. (University of Cologne), Kristin Heller (Deutsches Dialog Institut, Frankfurt), Dr Robin Peters (LVR-Institut für Landeskunde und Regionalgeschichte, Köln) and Dr Hans-Christoph Strien (Johannes Gutenberg-Universität Mainz). Additionally, Prof. Corry Bakels (Leiden University) provided us with first-hand information about the excavations in Elsloo, at which she participated. Finally, we wish to thank Ettjen Modderman for trusting us with the inheritance of her father and providing us with private documents and a black-and-white movie.

As in all scientific fields new understanding develops by progress. That in itself means moving away from, or expanding upon previous thought. For Elsloo-Koolweg, both Modderman (1970) and Van de Velde (1979) delivered the ground-breaking works that shaped the initial thoughts on LBK funerary ritual in particular for Elsloo-Koolweg. Modderman was the meticulous researcher (although this study somewhat nuances this) finding patterns in a traditional cultural historic approach to LBK culture and funerary customs. His ideas still

prove a solid base as they stay close to the data he himself collected. Van de Velde was the first to open up our minds to the different implications of what that patterned data may mean. By adopting a number of anthropological and processual approaches he teased out new information from the cemetery, establishing a new vision that focused on identifying male and female graves and aspects of hierarchy and kinship. Today, it is easy to frame this as an all too structuralist or simple approach, which is why we want to stress and underline here that our new perspectives are based on critically approaching the enormous work he has accomplished for this burial ground. It is in a way easy for us to diversify uniformity, or to shift the accent towards the creativeness instead of the general rule, or to argue to look less for hierarchy and status and more towards ritual and the contextual aspects, but all this can't be done without the substantial work of first building a solid framework that later on may be altered or nuanced. It is true that the critical analysis of the fieldwork and decisions made at the time has yielded an altered dataset to start with, and nuances many previous assumptions. It is also true that in order to arrive at new knowledge one sometimes has to boldly use what is available and head in a new direction. This is why we here want to once more applaud the work of Piet van de Velde, for the Elsloo-Koolweg burial ground and for the LBK in general and at the same time want to dedicate this work to him.

Ivo van Wijk & Luc Amkreutz

Elsloo, grab 3

Hier lig je dan
 Pagina 46, Tafel 124 en 125
 Je hele hebben en houden in Times New Roman
 Lijntekening schaal 1:2

Het staat gedrukt
 Grab 3 ben je, alweer een halve eeuw.
 Mooie bijgaven!
 Zelf liet je minder achter: Je knoken
 enkel wat gekleurde grond op 70 cm.
 Hadden ze bijna weggeschept. En wat
 tandglazuur
 Nauwelijks genoeg voor een glimlach

Maak je niet ongerust. De lineaire bandkeramiek
 heeft voor ons geen geheimen.
 Aardewerk: versieringstype DIII.
 Niet eerder dan 5100.
 Disselbijl van amfiboliet.
 Zes pijlpunten, fijn geretoucheerd.
 Volwassen postuur, opgetrokken knieën,

linkerzijde, gezicht zuidoost.
 Duidelijk een man: jagen, vechten, hakken,
 hoeden, bouwen.
 Modelburger uit het vroege neolithicum.

De laatste weken maakten we niet mee, nee.
 De aanval. Je dode vrouw, haar laatste pot die
 ochtend. Naast je hoofd. De bijl van je
 grootvader. Bedwinger van woudreuzen.
 De pijlen die je broers in je koude hand drukten.
 De rode oker, op je lichaam gestrooid.

Het is er allemaal nog (hoor): Buitendepot,
 verdieping IV-B-17, Doos 1193

Wat? Niet oké?
 Hadden we je dan zomaar moeten laten liggen?
 Wij doen ook maar gewoon
 ons werk

Luc Amkreutz

Introduction

The Early Neolithic burial ground of Elsloo-Koolweg is the oldest burial ground in the Netherlands (5250-4950 cal BC) and belonged to the Linear Bandkeramik Culture (LBK). It was excavated by the Cultural Heritage Agency of the Netherlands and Leiden University in 1959 and 1966. Since then most of the finds have been stored at the National Museum of Antiquities (RMO) in Leiden. The burial ground consists of 63 inhumation graves and 50 cremation graves of which 36 are unambiguously identified as such, resulting in a total of 97 and potentially 113 graves. Over a third of the inhumation graves contained a body shadow and/or tooth enamel. The (social) structure of the burials at Elsloo was analysed by Dr P. van de Velde. In his study emphasis lay with the social component: allocation of graves by gender and status. Based on the analysis of, in particular, the decorated pottery in combination with the allocation of graves by gender and status, hypotheses were drawn regarding social kinship at the time of the LBK in the Netherlands. These hypotheses form the basis for our current knowledge on colonisation, hereditary succession, and the origin of LBK communities in the south of the Netherlands and beyond. Now, 60 years after its discovery, the burial ground is subjected to new research.

Aim

Within the framework of the Knowledge for Archaeology program of the Cultural Heritage Agency of the Netherlands one main aim is to build on research from the pre-Malta era. In this work one of the studies therefore focuses on re-examining the burial ground of Elsloo-Koolweg with new methods and analyses of the material remains from this burial ground. In 2021 several new and improved scientific techniques (such as AMS dating, isotope research, ancient DNA research, histological research, use-wear research) can be used to study the remains and grave goods of this burial ground. Such research forms an important addition to the typological studies carried out in the 1960s and 1970s. In addition, the LBK narrative in Limburg and surrounding regions is still expanding. The finds of the burial ground of Elsloo could, if viewed with a new perspective, contribute to this exciting narrative.

As such the question is what the Elsloo LBK burial ground may contribute to the understanding

of the LBK in the Netherlands as well as for LBK burial traditions in general. The lack of or limited preservation of bone forces this research to go beyond traditional boundaries of connecting biological sex and associated gender in grave goods. Using a holistic approach this study therefore aims to go beyond conventional subdivisions between sexes and for instance age or the division of labour.

Approach

The project was divided into two phases: Phase 1: exploratory study and Phase 2: science-based research. The exploratory study investigated the potential and quality of the available material and data and further sharpened and operationalised the research questions. The dataset is formed by the finds, samples and documentation of the Elsloo burial ground that was excavated and researched in 1959 and in 1966 but has only been partially published. In order to do so the excavation's finds, samples and documentation had to be gathered during the initial phase.

The re-examining of the Elsloo burial ground during phase 2 was initiated by using the original field notes and drawings which led to a reinterpretation of the number and type of burials. Observations regarding the layout of the burial pits in combination with the charcoal analysis provided more information about the structure of the (bottom of the) pits, whether fires burned within and if they were backfilled or stayed open for a longer period of time. Additional knowledge was gained from the physical anthropological research of the cremated human remains. From this it was possible to attribute sex and age to certain cremation graves which allowed us to make comparisons between earlier statements about sex and age. More importantly, it provided the tools to see whether choices regarding sex and age were made during the burial rite, as well as whether there were changes throughout the use of the burial ground.

The pottery analysis in combination with lipid residue analysis and the use-wear study created more insight into the condition and biographies of the grave goods before they were deposited into the grave. Combined, these studies provided the necessary data to carry out various spatial and diachronic analyses to get more grip on potential but specific burial rites.

From these studies conclusions could be drawn as to what kinds of rituals took place at the Elsloo burial ground, an educated guess of a burial “guidebook”.

Analysis: Taphonomic processes

The Elsloo burial ground was excavated during two campaigns in which different teams and excavation strategies were used. Parts of the topsoil were removed by a dragline, by hand, or a combination which resulted in numerous cremation graves being discovered. Natural processes as well as ground-disturbing activities (ploughing) disturbed many cremation graves and their find assemblages. As such, there is a considerable number of uncertain cremation graves and a lingering question whether some may have been missed altogether. Natural processes account for the bad preservation of the unburned human remains as well. Only a third of the inhumation graves contained either a body shadow and/or tooth enamel. Calcined bone remains were found in 66 graves, fourteen of which were classified as inhumation graves, suggesting that these are double – but most likely non-synchronous – burials. Or they can be considered stray finds which ended up in these inhumation graves by accident during the cutting of cremation graves or calcined bone remains previously dispersed on the former ground surface.

Analysis: Composition of the burial ground and graves

The digitisation of the original field drawings demonstrated that there are unexcavated gaps where graves are still to be expected. The inhumation graves are dispersed over the entire burial ground, while the cremation graves seem to cluster in the western part and are absent in the south-eastern part. The layout of the burial ground appears as if it was marked above ground in some way (palisade, fence, ditch, shrubs, etc.). As to the inner lay-out of the burial ground, four grave clusters have been identified previously but the current research provided no further clues towards this.

The oldest graves were probably dug during the Older or Middle LBK, not much later than when the adjacent settlement was founded. These ‘founders’ graves are found in the south-western part of the burial ground, while the youngest graves can be found in the north-

western part. There are no indications that cremation ritual continued into the last phases of use of the burial ground. The burial ground was kept in use until the Final LBK and therefore coexisted with the Elsloo LBK settlement throughout most of the latter’s existence.

The main orientation of the inhumation graves is NW-SE. The orientation of the oldest graves seems to be more E-W or NE-SW, while the youngest graves are almost all oriented NW-SE. The most common body position was crouched on the left side, which has been documented in 13 graves. Two burials seem to have been placed in a right crouched position. Only one burial seems to have been placed in an extended (supine) position. The head was most often oriented SE or NW.

Analysis: Grave goods

Grave goods were present in the fill and/or bottom of the burial pits. They were documented in 32 cremation graves and 54 inhumation graves. This means that over 76 percent of the graves were furnished with grave goods of some kind. As many of the cremation graves were disturbed by recent activities, the number of grave goods was probably higher. The total number of grave goods per grave varies from zero to a maximum of 18 objects. Most of the graves held one to four grave furnishings.

Pottery is the most frequent grave good, followed by flint arrowheads and blades, as well as adzes. In several graves multiple artefacts were deposited as part of tool sets. Most grave goods seem to have been functional and personal ornaments are nearly absent, although this may largely be due to the bad preservation conditions for organic remains. There seems to be a distinct patterning relating to the kind of grave goods with which different grave types were furnished. Querns, arrowheads and scrapers are (almost) absent in cremation graves. Also there is considerable variation in the quantitative number of grave goods present within a grave and in the type of grave good categories (pottery, stone and/or flint). The best furnished graves, in terms of numbers as well as composition, are present in the western and older part of the burial ground. Of further importance is the notion that all different combinations between various kinds and types of artefacts were present within the graves, yet some combinations seem to have been preferred.

Analysis: sex and age

The sex of the calcined bone remains of 26 cremation graves could not be determined. Among the sixteen cremation burials that could be positively identified, eleven could be classified as female and five as male. All of these were adults with ages ranging from 18+ (adult) to 60 years (mature/senile) old. Two potential juveniles were also cremated, and it is presumed that two child graves were present. There are no biological indications whatsoever towards the sex of the deceased who were buried in inhumation graves due to the absence of any organic remains apart from poorly preserved dental enamel.

The various material analyses can be combined with the results of physical anthropological research to get a better insight into which grave goods were deposited according to biological sex and age. Female graves were furnished with more pottery and adzes than male graves. Male graves yielded more ochre fragments. But all three categories are present in male and female graves. Type 1 and type 3 adzes have only been found in female graves. Other stone artefacts and blades were also absent in male graves.

Most grave goods were found in mature/senile graves (seven graves). Graves thought to belong to infants and/or children (four graves) contained some (undecorated) pottery as well as type 2 adzes. Type 1 and 3 adzes seem to have been reserved for adults (possible only females), as were most of the other artefact categories. There seems to be no difference with respect to the various grave goods for adult versus mature/senile graves. Adzes are present in female graves regardless of age. Especially young adult males seem to be furnished with adzes. The number of burial goods appears to increase with age for female graves. For male graves there seems to be no such difference. Grave goods are not restricted to a single age category and/or sex. Most important is that adzes are not restricted to age and/or sex. This implies that attributing a single type of grave good to either sex or age does not seem feasible, at least for the Elsloo-Koolweg cremation graves which is in contradiction to previous studies.

Analysis: region

The Netherlands is located on the north-western fringe of the LBK distribution. There are three

known LBK burial sites in the Netherlands, of which Elsloo is the largest and best known. The nearest Bandkeramik neighbours can be found in Belgium, in the loess-covered parts of the Hesbaya region. To the east, LBK settlements are situated in the adjacent German Rhineland. The Rhineland, and more particularly the Niederrheinische Bucht, is home to many Bandkeramik settlements and seven burial grounds where ca. 650 graves were excavated. They are situated in the direct vicinity of a settlement, apart from Aldenhoven-Niedermerz. Most of these burial grounds have been affected by soil erosion or agricultural processes which is why we believe cremation graves are almost absent there. The burial grounds date from the Oldest or Older LBK and remain in use until the final stages (Final LBK).

The shapes of the inhumation burial pits are similar for most burial grounds. It is remarkable that the pits at the sites of Arnoldsweiler-Ellebach, Aldenhoven-Niedermerz, Bergheim-Zieverich and Inden-Altdorf share a main orientation of NE-SW or ENE-WSW, while at Elsloo-Koolweg, Jüchen-Holz, Merzenich-Morschenich and the other Dutch cemetery of Maastricht-Lanakerveld the main orientation is perpendicular: NW-SE.

When comparing numbers, it seems that the graves at Aldenhoven-Niedermerz and Elsloo-Koolweg were furnished with more stone and flint tools. An overall pattern arises where, regardless of taphonomy or methodology, a choice is made regarding the type of grave goods deposited.

In the LBK region, graves with more than three grave goods are generally attributed to adults (more likely men than women), as was the case in Elsloo-Koolweg where three or more grave goods were present. But at Elsloo-Koolweg they belong to five female and three male graves. At Arnoldsweiler-Ellebach 86 percent of the age-determined "richer" graves were attributed to adults, of which six graves belong to females and ten to males. Infants (four graves) and juveniles (two graves) could incidentally receive more than three grave goods as well.

Conclusions

In reflecting on the various aspects of Elsloo-Koolweg, the Rhineland burial grounds or even on a larger scale, some general trends can be

distinguished. The first concerns the limited variety of grave goods being deposited in contrast to the vast toolkit at hand in everyday life. Repetitions and many variations within the composition of the grave good assemblage exist, but many graves are also (archaeologically) without any goods. Most of the time graves merely contain the same objects in different quantities or different compositions. Regional variability or individual preferences notwithstanding, in terms of a general burial “tradition” the selectiveness of the objects deposited – or not deposited – is overwhelmingly clear. Whether grave goods are representative of everyday life or provide a particular formalised setting in which symbolic versions of sex were presented is in our view irrelevant if these objects are seen as personal items of the deceased.

In many studies the focus lies on the deceased individual and the presumed relation of the objects to her/him. But there are many indications that the mourners played a very important role within the ritual, not only during the initial burial. This touches upon the second trend that is visible, which is the lack of pristine grave goods. Use-wear analysis at Elsloo-Koolweg, but also at Nitra and Vedrovice, showed that the deposited flint and stone tools were heavily used, which for some suggests the existence of a sexual division of labour. Pottery and ceramic objects are mostly fragmented – whether deliberately or not – and show signs of heavy use, for instance as cooking vessels or storage containers for meat. We find these objects in the same condition as those retrieved from the waste pits on settlements.

Sex does not seem to be an issue regarding the attribution of specific grave goods, and age merely contributes to the number of grave

goods deposited. Of importance is that each of the objects seems to carry a biography of its own, regardless of the deceased’s gender.

In conclusion the current study has further underlined and demonstrated the existence of patterning that does not easily relate to classical interpretations of prehistoric burial customs along lines of gender and age. Although these patterns exist, the character of the objects, the variability surrounding a common theme and wider trends observed argue in favour of a ritual that importantly reflects the larger community and its relation to the deceased. Additionally, there appears to be superregional patterning that may point to wider shared beliefs, traditions, and rituals in the larger LBK sphere. As such the Elsloo-Koolweg burial ground forms a good starting point for further research into the origins of the shared diversity that characterizes the LBK in life and death.

Future research

This study showed the importance of recreating the original excavation, assumptions and analysis, and subsequently build on the gathered data from your own ideas. The Elsloo-Koolweg burial ground has been internationally acclaimed and, hopefully, by adding this new research will be once again. We hope that this kind of research, especially the science-based research such as lipid-residue, use-wear, physical anthropological and charcoal analysis provide a baseline for future research regarding burials and burial grounds. Of importance is a holistic approach which integrates as many science-based research results as well as typological material studies as is (economically) feasible in order to arrive at a better understanding of past human behaviour.

Inleiding

In het kader van het programma Kennis voor Archeologie vanuit de Rijksdienst voor het Cultureel Erfgoed (RCE) wordt aandacht gevraagd voor de uitwerking van onderzoek uit het pre-Malta tijdperk. Het eerste doel van dit project is om datasets uit (niet uitgewerkt) veldonderzoek van voor 2007 (zogenaamde pre-Malta-onderzoeken) te bestuderen om deze oude investeringen 'te gelde te maken' in de vorm van substantiële nieuwe kennis over het verleden. Het tweede doel is om het gebruik van 'science-based' archeologische methoden en technieken in Nederland te bevorderen. Een van de onderzoeken richt zich op het oudste grafveld van Nederland, gevonden te Elsloo-Koolweg. Het vroeg-neolithische grafveld van Elsloo is de oudste begraafplaats van Nederland (5250-4950 v. Chr.) en behoort tot de Lineaire Bandkeramische Cultuur (LBK). Het grafveld werd in 1959 en 1966 opgegraven door de Rijksdienst voor het Cultureel Erfgoed en de Universiteit Leiden. Sindsdien ligt een groot deel van de vondsten in het Rijksmuseum van Oudheden (RMO) in Leiden. Het grafveld bestaat uit 63 inhumatiegraven en 50 crematiegraven waarvan 36 ondubbelzinnig als zodanig zijn geïdentificeerd. In totaal zijn er 97 graven op het grafveld aangelegd, mogelijk zelfs 113 graven. Het grafveld is uitvoerig geanalyseerd door prof. dr. Modderman. Zijn analyse van het grafveld is met name gericht geweest op de vorm van de graven en de typologische beschrijving van de bijgiften. De (sociale) structuur binnen het grafveld van Elsloo is geanalyseerd door dr. P. van de Velde. In zijn onderzoek is met name aandacht besteed aan de sociale component: toewijzing van graven naar geslacht en status. Op basis van de analyse van met name het versierde aardewerk, de gepaardheid van de graven in combinatie met de toewijzing van geslacht en status zijn hypothesen opgesteld over sociale verwantschap ten tijde van de LBK in Nederland. Deze hypothesen vormen de basis voor onze huidige kennis over kolonisatie, erfopvolging en het ontstaan van LBK-gemeenschappen in Zuid-Nederland en daarbuiten. Nu, 60 jaar na de ontdekking, wordt het grafveld aan nieuw onderzoek onderworpen.

Aanpak

Het project "Elsloo-Koolweg revisited: het bandkeramische grafveld van Elsloo-Koolweg opnieuw ontleed" is uitgevoerd in twee fasen. Tijdens fase 1 is onderzoek gedaan naar de potentie en kwaliteit van het beschikbare materiaal en de opgravingsgegevens en zijn de oorspronkelijk gestelde onderzoeksvragen nader aangescherpt en geoperationaliseerd. De dataset wordt gevormd door de vondsten, monsters en documentatie van het grafveld van Elsloo dat slechts gedeeltelijk is gepubliceerd. Hiervoor moesten in de beginfase de vondsten, monsters en documentatie van de opgraving worden verzameld. Fase 2 betrof de uitwerking en het onderzoek van de in fase 1 geselecteerde datasets. Het heronderzoek van het grafveld in fase 2 is gestart met behulp van de originele veldnotities en tekeningen, wat heeft geleid tot een herinterpretatie van het aantal en het type graven. Waarnemingen met betrekking tot de indeling van de grafkuilen in combinatie met de houtskoolanalyse gaven meer informatie over de structuur van de (bodem van de) kuilen, of er vuur in brandde en of ze weer werden opgevuld of voor een langere tijd openbleven. Aanvullende waarnemingen werden gedaan tijdens het fysisch-antropologisch onderzoek van de crematieresten. Hierdoor was het mogelijk geslacht en leeftijd toe te kennen aan bepaalde crematiegraven, waardoor we vergelijkingen konden maken met eerdere uitspraken over geslacht en leeftijd. Het bood ook de mogelijkheid om te zien of er tijdens het begrafenisritueel keuzes werden gemaakt met betrekking tot geslacht en leeftijd en of er veranderingen waren tijdens het gebruik van de begraafplaats. De aardewerkanalyse in combinatie met de lipidenresiduanalyse en het gebruikssporenonderzoek leverden inzichten op over de staat en biografie van de grafgiften vóórdat ze in het graf werden gedeponed. Gecombineerd leverden deze onderzoeken de nodige gegevens op om verschillende ruimtelijke en diachrone analyses uit te voeren en zo meer grip te krijgen op mogelijke maar specifieke begrafenisrituelen. Uit deze studies konden conclusies worden getrokken over wat voor soort rituelen er op de begraafplaats van Elsloo plaatsvonden, en kon een indicatie gegeven worden van een mogelijk begrafenis "richtlijn", gebruikt door deze vroege boeren.

Analyse: Tafonomische processen

Het grafveld van Elsloo is opgegraven tijdens twee campagnes waarbij verschillende teams en opgravingsstrategieën werden gebruikt. Delen van de bovengrond werden verwijderd door een dragline, met de hand of een combinatie van beide. Dit, samen met natuurlijke processen en grondverstoringen (ploegen) resulteerde in de ontdekking van talrijke crematiegraven. Maar het heeft ook geleid tot de conclusie dat veel crematiegraven en bijhorende inhoud (crematieresten en grafgiften) waarschijnlijk erg verstoord waren. Als zodanig is er een aanzienlijk aantal onzekere crematiegraven en een slepende vraag of sommige misschien helemaal zijn gemist. Natuurlijke processen zijn ook verantwoordelijk voor de slechte conservering van de onverbrande menselijke resten. Slechts een derde van de inhumatiegraven bevatte ofwel een lichaamsschaduw en/of tandglazuur. In 66 graven werden verbrande botresten gevonden, waarvan veertien geïdentificeerd als inhumatiegraven, wat suggereert dat dit dubbele – maar hoogstwaarschijnlijk niet-synchrone – graven zijn, of resten die per ongeluk in de inhumatiegraven zijn beland tijdens het delven van een inhumatiegraf, of gecalcineerde botresten die eerder op het voormalige loopoppervlak waren verspreid.

Analyse: Samenstelling van het grafveld en de graven

De digitalisatie van de originele veldtekeningen toonde aan dat er nog niet opgegraven delen zijn waar nog graven te verwachten zijn. De inhumatiegraven liggen verspreid over het gehele grafveld, terwijl de crematiegraven in het westelijke deel lijken te clusteren en in het zuidoosten juist lijken te ontbreken. De omvang van de begraafplaats lijkt mogelijk op de een of andere manier boven de grond te zijn gemarkeerd (palissade, hek, greppel, struiken, enz.). Met betrekking tot de indeling van het grafveld zijn eerder vier grafclusters geïdentificeerd (mogelijk gerelateerd aan verschillende sociale groepen), maar het huidige onderzoek heeft hier geen verdere aanwijzingen voor gevonden.

De oudste graven zijn waarschijnlijk gegraven tijdens de oude periode van de LBK, niet veel later dan toen de nabijgelegen nederzetting werd gesticht. Ze zijn te vinden in het zuidwestelijke deel van het grafveld, terwijl de jongste

graven in het noordwestelijke deel te vinden zijn. Er zijn geen aanwijzingen dat crematies tot in de laatste gebruiksfasen van het grafveld zijn doorgegaan. Het grafveld bleef in gebruik tot in de jongste periode van de LBK en bleef daarom gedurende het grootste deel van haar bestaan naast de bandkeramische nederzetting Elsloo bestaan.

De hoofdorïëntatie van de inhumatiegraven is NW-ZO. De oriëntatie van de oudste graven lijkt meer O-W of NO-ZW te zijn, terwijl de jongste graven bijna allemaal NW-ZO georiënteerd zijn. De meest voorkomende houding was gehurkt op de linkerzijde, wat is gedocumenteerd in dertien graven. Twee graven lijken in een gehurkte houding op de rechterzij te zijn geplaatst. Slechts één begraafing lijkt te zijn geplaatst in een gestrekte (liggende) positie. Het hoofd was meestal ZO of NW gericht.

Analyse: grafgiften

In de vulling en/of op de bodem van de grafkuilen waren bij de meeste graven grafgiften aanwezig. Ze werden gedocumenteerd in 32 crematiegraven en 54 inhumatiegraven. Dit betekent dat meer dan 76 procent van de graven vergezeld ging van een of andere grafgift. Omdat veel van de crematiegraven zijn verstoord door recente ploegactiviteiten, was het aantal grafgiften waarschijnlijk hoger. Het totaal aantal grafgiften per graf varieert van nul tot maximaal achttien voorwerpen. De meeste graven bevatten echter één tot vier bijgaven. Aardewerk is de meest voorkomende grafgift, gevolgd door vuurstenen pijlpunten en klingen, evenals dissels. In verschillende graven zijn meerdere artefacten gedeponneerd als onderdeel van gereedschapsets of als pijlbundel. De meeste grafgiften lijken functioneel te zijn geweest en persoonlijke ornamenten zijn bijna afwezig, hoewel dit grotendeels te wijten kan zijn aan de slechte bewaarcondities voor organische overblijfselen. Er lijkt een duidelijk patroon te zijn met betrekking tot het soort grafgiften dat in sommige graven terecht kwam. Maalstenen, pijlpunten en schrapers zijn (bijna) afwezig in crematiegraven. Ook is er een aanzienlijke variatie in het kwantitatieve aantal grafgiften dat binnen een graf aanwezig is en het type materiaal. De best uitgeruste graven, zowel qua aantal als qua samenstelling, bevinden zich in het westelijke en oudere deel van het grafveld. Van verder belang is het idee dat alle verschil-

lende combinaties tussen verschillende soorten en typen artefacten aanwezig waren in de graven, maar toch lijken sommige combinaties de voorkeur te hebben.

Analyse: geslacht en leeftijd

Het geslacht van de verbrande botresten kon van 26 crematiegraven niet worden vastgesteld. Van de zestien crematiegraven die wel konden worden geïdentificeerd, konden er elf worden geclassificeerd als vrouwelijk en vijf als mannelijk. Dit waren allemaal volwassenen met een leeftijd variërend van 18+ (volwassen) tot 60 jaar (volwassen/bejaard). Daarnaast zijn er twee potentiële minderjarigen gecremeerd evenals vermoedelijk twee kinderen. Er zijn geen biologische aanwijzingen voor het geslacht van de overledenen in inhumatiegraven vanwege de afwezigheid van organische resten; afgezien van het slecht bewaard gebleven tandglazuur/tandkapsel.

De verschillende materiaalanalyses zijn gecombineerd met de resultaten van het fysisch-antropologisch onderzoek om beter inzicht te krijgen in welke grafgriften in relatie tot biologisch geslacht en leeftijd zijn gedeponeerd.

Vrouwengraven waren voorzien van meer aardewerk en dissels dan mannengraven. Mannengraven kregen voornamelijk okerfragmenten. Maar alle drie deze categorieën zijn aanwezig in mannelijke én vrouwelijke graven. Type 1 en type 3 dissels zijn daarnaast alleen gevonden in vrouwengraven. Andere stenen voorwerpen en klingen waren ook afwezig in mannelijke graven.

De meeste grafgriften werden gevonden in graven van volwassenen/bejaarden (zeven graven). Graven waarvan gedacht werd dat ze toebehoorden aan baby's en/of kinderen (vier graven) bevatten wat (onversierd) aardewerk en ook type 2 dissels. Type 1 en 3 dissels lijken te zijn voorbehouden aan volwassenen (mogelijk alleen vrouwen), net als de meeste andere artefactcategorieën. Er lijkt geen verschil te zijn met betrekking tot de verschillende grafgriften voor volwassenen versus volwassen/bejaarde graven. Dissels zijn twee keer ongeacht de leeftijd aanwezig in vrouwengraven. Ook vooral jonge volwassen mannen lijken te zijn voorzien van dissels. Het aantal grafgriften lijkt voor vrouwen-graven toe te nemen met de leeftijd. Voor mannengraven lijkt dit verschil niet te bestaan. Grafgriften zijn niet beperkt tot één leeftijdsca-

gorie en geslacht. Dit geldt eveneens voor dissels waarvan meestal wordt aangenomen dat dit een mannelijke grafgrift is. Het bovenstaande impliceert dat het niet mogelijk is om één type grafgrift toe te kennen aan een bepaald biologisch geslacht of bepaalde leeftijd, althans niet voor de crematiegraven van Elsloo. Dit is in tegenspraak met eerdere studies.

Analyse: regio

Nederland ligt aan de noordwestelijke rand van het LBK-verspreidingsgebied. Er zijn drie bekende LBK-grafvelden in Nederland, waarvan Elsloo de grootste, best onderzochte en bekendste is. De dichtstbijzijnde bandkeramische burens zijn te vinden in België, in de met löss bedekte delen van de Haspengouwse regio. Hier zijn slechts enkele graven, met name in nederzettingen bekend, maar (nog) geen grafvelden. In het oosten liggen de bandkeramische nederzettingen in het aangrenzende Duitse Rijnland. Het Rijnland, en meer in het bijzonder het gebied van de Nederrijnse Bocht, herbergt vele bandkeramische nederzettingen en zeven grafvelden waar in totaal ca. 650 begravingen zijn opgegraven. Deze liggen voornamelijk in de directe nabijheid van een nederzetting, behalve het grafveld van Aldenhoven-Niedermerz. De meeste van deze grafvelden zijn aangetast door bodemerosie of landbouwactiviteiten. Het relatief lage aantal crematiegraven is vermoedelijk daaraan te danken. Oorspronkelijk zullen er (veel) meer crematiegraven aanwezig zijn geweest dan nu zijn teruggevonden. De grafvelden dateren vanaf de oudste periode van de LBK en blijven in gebruik tot de jongste fasen.

De vorm van de inhumatiegrafkuilen is vergelijkbaar voor de meeste grafvelden. Er is echter wel een grote variatie in de oriëntatie van de grafkuilen. Het is opmerkelijk dat de kuilen op de locaties van Arnoldswailer-Ellebach, Aldenhoven-Niedermerz, Bergheim-Zieverich en Ilden-Altendorf een hoofdoriëntatie delen van NO-ZW of ONO-WZW, terwijl op Elsloo-Koolweg, Jüchen-Holz, Merzenich-Morschenich en het Nederlandse grafveld Maastricht-Lanakerveld de hoofdoriëntatie daar haaks op staat: NW-ZO.

Een onderlinge vergelijking van het grafassemblage leert dat de graven bij Aldenhoven-Niedermerz en Elsloo-Koolweg meer bijgaven van stenen en vuurstenen werktuigen kenden in vergelijking met de andere bestudeerde

grafvelden. Er ontstaat op deze wijze een algemeen patroon waarbij er, ongeacht tafonomie of methodologie, een keuze is gemaakt met betrekking tot het soort grafgraven dat wordt gedeponeerd.

In de bestudeerde regio worden graven met meer dan drie grafgraven over het algemeen toegeschreven aan volwassenen (waarschijnlijk eerder mannen dan vrouwen), zoals het geval was in Elsloo-Koolweg, daar waar drie of meer grafgraven aanwezig waren. Echter, bij Elsloo-Koolweg horen die bij vijf vrouwelijke en drie mannelijke graven. Bij Arnoldsweiler-Ellebach werd zelfs 86 procent van de in leeftijd bepaalde “rijkere” graven toegeschreven aan volwassenen, waarvan zes graven voor vrouwen en tien voor mannen. Zuigelingen (vier graven) en jongeren (twee graven) bevatten soms ook meer dan drie grafgraven.

Conclusies

Terugblikkend op de verschillende aspecten van Elsloo-Koolweg, de Rijnlandse grafvelden of zelfs LBK-grafvelden op grotere schaal, kunnen enkele algemene trends worden onderscheiden. De eerste betreft de beperkte verscheidenheid aan grafgraven die worden gedeponeerd in tegenstelling tot de enorme “gereedschapskist” die in het dagelijks bandkeramische leven voorhanden was en waarvan we de resten in de afvalkuilen in de nederzettingen terugvinden. Er zijn herhalingen en vele variaties binnen de samenstelling van de grafgraven, maar veel graven zijn ook (archeologisch) zonder grafgraven. Meestal bevatten graven juist dezelfde voorwerpen in verschillende hoeveelheden of in verschillende samenstellingen. Onafhankelijk van regionale variabiliteit of individuele voorkeuren is het bestaan van een algemene begrafenis “traditie”, de selectiviteit van de gedeponeerde (of niet gedeponeerde) objecten overweldigend. Of grafgraven representatief zijn voor het dagelijks leven of een bepaalde geformaliseerde setting bieden waarin symbolische versies van geslacht werden gepresenteerd, is naar onze mening niet relevant indien deze voorwerpen niet worden gezien als persoonlijke voorwerpen van de overledene. In veel onderzoeken ligt de focus op de overledene en de veronderstelde relatie van de voorwerpen tot hem/haar. Er zijn echter veel aanwijzingen dat de rouwenden een zeer belangrijke rol speelden binnen het ritueel, niet

alleen tijdens de begrafenis of crematie. Dit raakt aan de tweede trend die zichtbaar is, namelijk het ontbreken van “nieuwe” grafgraven. Gebruikssporenanalyse toonde aan dat bij Elsloo-Koolweg, maar ook bij Nitra en Vedrovice, de gedeponeerde vuurstenen en stenen werktuigen intensief waren gebruikt. Voor sommigen suggereert dit het bestaan van een geslachtsspecifieke arbeidsverdeling. Aardewerk en keramische objecten blijken veelal – al dan niet bewust – gefragmenteerd in het graf te zijn meegegeven en vertonen sporen van intensief gebruik, bijvoorbeeld als kookgerei of opslagcontainers voor dierlijke producten. We vinden deze voorwerpen in dezelfde staat als die gevonden worden in de afvalkuilen op nederzettingen.

Het geslacht lijkt geen factor te zijn maar enkel leeftijd lijkt van invloed te zijn geweest op het aantal meegegeven grafgraven. Van belang is dat elk van de objecten een eigen biografie lijkt te hebben, ongeacht het geslacht van de overledene.

Concluderend heeft de huidige studie het bestaan van algemene patronen binnen de LBK-begravenistraditie verder onderstreept en aangetoond dat die niet gemakkelijk te relateren zijn aan klassieke interpretaties van vroeg-neolithische begrafenisgebruiken volgens geslacht en leeftijd. Hoewel deze patronen bestaan, pleiten het karakter van de objecten, de variabiliteit rondom een gemeenschappelijk begrafenisritueel en de waargenomen bredere trends voor een ritueel dat in belangrijke mate de grotere gemeenschap en haar relatie tot de overledene weerspiegelt. Bovendien lijken er bovenregionale patronen te zijn die kunnen wijzen op bredere gedeelde overtuigingen, tradities en rituelen in de grotere LBK-sfeer. Daarmee vormt de begraafplaats Elsloo-Koolweg een goed uitgangspunt voor verder onderzoek naar het ontstaan van de gedeelde diversiteit die de LBK kenmerkt in leven en dood.

Toekomstig onderzoek

Uit dit onderzoek bleek hoe belangrijk het is om de oorspronkelijke opgraving, aannames en analyses te bestuderen en vervolgens voort te bouwen op de verzamelde gegevens vanuit onze eigen ideeën. Het grafveld van Elsloo-Koolweg is internationaal bekend en hopelijk zal dit nieuwe onderzoek daaraan bijdragen. We hopen dat dit soort onderzoek, met name het fysisch weten-

schappelijk deel, zoals de lipidenresiduen-analyse, het gebruikssporenonderzoek, fysisch-antropologisch onderzoek en de houtskoolanalyses, een basis zullen vormen voor toekomstig onderzoek met betrekking tot graven en grafvelden. Van belang daarbij is een

holistische benadering die zoveel mogelijk wetenschappelijk onderbouwde onderzoeksresultaten en typologische materiaalstudies integreert als (financieel) mogelijk is om tot een beter begrip te komen van menselijk gedrag uit het verleden.

1.1 Objective

Within the framework of the Knowledge for Archaeology program of the Cultural Heritage Agency of the Netherlands (RCE), one main aim is to build on research from the pre-Malta era. The first goal of this project is to study datasets from (unprocessed) field research from before 2007 (so-called pre-Malta studies) in order to ‘monetise’ these old investments in the form of substantial new knowledge about the past. The second goal is to promote the use of science-based archaeological methods and techniques in the Netherlands. One of the studies focuses on re-examining the oldest known burial ground or cemetery¹ in the Netherlands, the collection of Early Neolithic graves (from the Linear Bandkeramik Culture (5250-4950 cal BC), from here on abbreviated as LBK) found in Elsloo-Koolweg.²

1.2 Research framework

The LBK burial ground of Elsloo is the oldest burial ground in the Netherlands.³ It was excavated by the Cultural Heritage Agency of the Netherlands (then abbreviated as ROB) in 1959 and in a second campaign in 1966 by Leiden University, both under the direction of P.J.R. Modderman. Since then, a large part of the finds has been stored in the depot of the National Museum of Antiquities (RMO) in Leiden. At the time, 113 graves, of which 47 graves were interpreted as cremation graves and 66 graves were thought to be inhumation graves, were excavated. Based on a preliminary analysis in the 1960s, it seems that the burial ground was used at the end of the LBK. It is striking that the western part has relatively more cremation graves than the eastern part of the burial ground. To date, only two other (parts of) Bandkeramik burial grounds in the Netherlands have been investigated: Geleen-Haesselderveld West (four graves)⁴ and Maastricht-Lanakerveld (thirteen graves)⁵.

The dating of the burial ground is based on typological characteristics of the decorated pottery. The published analysis of the burial ground of Elsloo focused in particular on the

shape of the graves and the typological description of the grave goods. In short, the analysis and dating of the burial ground was carried out at the time, as usual, purely on typological grounds of some of the finds (the decorated pottery) and features (grave cuts).

However, this burial ground can provide more in terms of knowledge than just burial pits and decorated pottery. It is striking that cremation remains have been found in no less than 59 graves. It was not known whether these were animal or human remains, or a combination of both. The excavators at the time indicated that in a number of cases the cremation and botanical remains (charcoal) were too fragmented to be salvaged. However, it is indicated that such remains have been collected from at least 42 graves. In addition, it turned out that fragmentary bone material and dental enamel were still present in a number of inhumation graves. Where possible, these have been preserved, sometimes using modest block-lifted samples (maximum size approx. 10x 15 cm).

The graves and their decorated pottery⁶ and adzes⁷ have been extensively published. The other grave goods, including the cremation remains⁸, tooth enamel, charcoal and other botanical residues, and the various flint and stone goods (including fragments from querns) have never been thoroughly investigated. A full, thorough analysis was not possible at the time.

In the context of a dissertation, the (social) structure of the burial ground was analysed by Van de Velde. Particular attention has been paid to the social component: allocation of graves by gender and status.⁹ Based on the analysis of, in particular, the decorated LBK pottery, Van de Velde has drawn up hypotheses regarding social kinship at the time of the LBK in the Netherlands.¹⁰ The decorated pottery and the position of the graves of the Elsloo burial ground form an important starting point in his research. These hypotheses form the basis for current knowledge on colonisation, hereditary succession, and the origin of LBK communities in the south of the Netherlands.

1.3 Aim

Van de Velde’s hypotheses may be further tested and falsified with the help of new analyses of the

¹ In this study we use both the terms burial ground and cemetery synonymously, without references to size or importance.

² Modderman 1970.

³ Modderman 1970.

⁴ Vromen 1982.

⁵ Meurkens & Van Wijk 2009.

⁶ Modderman 1970.

⁷ Bakels 1987.

⁸ Surprisingly, it turned out that a large part of the cremation remains were analysed in 2005 (Trautmann 2006) but not to a full extent.

⁹ Van de Velde 1979a.

¹⁰ Van de Velde 1979a; Van de Velde 1979b; Van de Velde 1990; Van de Velde 1997; Van de Velde 2011; Bickle & Whittle 2013.

other remains from this burial ground. In 2021 we have several new and improved analysis techniques (such as AMS dating, isotope research, ancient DNA research, histological research, use-wear research) at hand that can be used on the other grave goods and human remains of this burial ground. Such research could be an important addition to the typological studies carried out in the 1960s and 1970s (provided that the available finds material is suitable after 50 years in a depot). In addition, the LBK narrative in Limburg and surrounding regions is still expanding. The finds of the burial ground of Elsloo-Koolweg could, if viewed from a new perspective, contribute to this exciting narrative.

As such the question is what the Elsloo LBK burial ground may contribute to the understanding of the LBK in the Netherlands as well as for LBK funeral rites in general. The answer relates partially to the specific shortcomings of the site. The lack of or limited preservation of bone forces the research to go beyond traditional boundaries of connecting biological sex and associated gender in grave goods, arriving at conventional subdivisions between sexes and for instance age or the division of labour. Recent studies have demonstrated the need to move beyond simple attributions of grave goods and gender and adopt a more holistic approach.¹¹ The absence of organic remains of the deceased (only enamel and cremation remains were preserved) forces this study to focus on other aspects and to cast a wide net in doing so. At the same time, by being forced not to rely heavily on the physical anthropological aspects, the other facets of the burial ritual, ranging from site location and chronology, over the orientation and ‘morphology’ of burial to the association and intensive characterisation of grave goods, emphasises an approach that hitherto and to our opinion have been undervalued in (LBK) burial studies. It is by adopting different broad-scale views towards LBK burial and community that we learn more about these early farming societies, their identity and socio-symbolic practices. This is a trend that has been initiated amongst others by the UK-led ‘Lifeways’-project analysing the diversity in LBK lifeways across large parts of Central Europe¹², and following from this approaches that have focused more on mortuary practices in particular.¹³ From such a

multivariate perspective a more rounded, diverse and probably more accurate image of the LBK and its funerary rites may be developed. In the case of this study and the Elsloo burial ground this partially arises out of necessity as the ‘usual suspects’, the deceased, have often left nothing more than soil discolorations. While this may be interpreted as a shortcoming, this study has sought to make it a strong point. Especially because the archaeological site under investigation has been excavated decades ago and science-based methods provide new insights which were impossible at the time of excavation. Thereby we focus on a number of topics or themes that are interrelated throughout this work and will be addressed in the synthesis:

- What is the age, position and development of the Elsloo burial ground and how do the spatio-temporal aspects of the cemetery relate to the characteristics of the burials as features and their contents? Also, and in association with this, how does the observed patterning relate to the Elsloo settlement and the greater LBK occupation of Limburg?
- What trends and associations may, or may not be observed between grave goods and what light do they shed on the deceased and burial practices? And connected to this, how can the combination of a range of object- and material-specific techniques (including use-wear analysis, botanical analysis, stable-isotope research) contribute to a better understanding of the graves and ultimately LBK socio-cultural practices?
- How does the observed patterning for Elsloo relate to other LBK cemeteries in North-west Europe? And what practices may be gleaned from this approach for LBK and prehistoric funerary research in the future?

1.4 Approach and structure of this book

The basic aim of this study is to invest in analysing the Elsloo burial ground with modern standards and (scientific) techniques. In order to do so the excavation material and documentation had to be re-studied and the different selections and samples for analysis sent to labs. As this was initiated at the end of 2019 and in early 2020, the project was quite

¹¹ e.g. Bentley *et al.* 2012; Bickle 2019; Masclans *et al.* 2021, Masclans Latorre *et al.* 2020.

¹² Bickle & Whittle 2013.

¹³ e.g. Bickle 2019; Hofmann 2010.

severely hampered by the COVID pandemic. Although most of the material was taken from the RMO stores in time, some objects that were on display remained inaccessible until the last, leaving little time for more intensive study. Most delay and trouble, however, was caused by closing or lock-down of the various laboratories and facilities needed for the analysis of samples, ranging from botanical and osteological research as well as use-wear analysis on the lithics, lipid and fatty acid analysis on sherds and stable isotope analysis. While most researchers worked from home, they needed their laboratories and equipment. Most facilities and universities were inaccessible for months. Analysis had to wait, which in general caused a knock-on delay as further questions and eventual synthesis were depending on these results. Despite these setbacks everybody made an effort to hand in results as soon as possible, so despite the difficulties we wish to express our gratitude here to the members of the team. Together we believe to have added to our understanding of the Elsloo cemetery and its implications.

In order to present our results, we have

chosen a particular structure for this book. The first part (chapter 2 and 3) focuses on the LBK in the Netherlands and the general practices of burial in the Dutch Mesolithic and Neolithic with particular emphasis on LBK burials. Chapter 4 outlines the 'Elsloo Revisited' project, its strategy and methodology, while chapter 5 brings into view the site of Elsloo-Koolweg and chapter 6 the burial site in particular. The following chapters (7-11) zoom in on the different categories of material and their analysis, covering human remains and physical anthropological research, pottery and revised chronological information, stone and flint use-wear analysis, charcoal analysis and lipid and pollen analysis. Chapter 12 again zooms out and discusses the spatio-temporal characteristics of the Elsloo burial ground in relation to several of the categories of finds discussed earlier. Chapter 13 finally presents a synthesis of the various discoveries, their wider implications and suggestions for future research.

2 The Linear Bandkeramik in the Netherlands

I.M. van Wijk

2.1 Introduction

The Linearbandkeramik culture or LBK originated in Hungary in Central Europe around 5600–5500 cal BC.¹⁴ The bearers of this culture spread rapidly across most of Central and Western Europe. Bandkeramik settlements are known from near the Black Sea in eastern Romania to the Channel coast in Normandy and from the Danube to the Baltic in the Polish-German border region. In the Netherlands, the oldest known settlements date to around 5250 cal BC¹⁵ *i.e.* Modderman Ceramic phase¹⁶ Ib and onwards (Table 2.1).¹⁷ The Aldenhovener Platte and adjacent sites in Belgium were occupied around the same time.¹⁸ The settlers focused on

the fertile loess terraces of the Meuse and its tributaries, on its right bank on the Graetheide plateau between Sittard and Stein, and on its left bank around Maastricht.¹⁹ Architecture, grave assemblages, and the circulation of exotic goods are indicative of their social differentiation.²⁰ However, as yet it is still debated whether this was an egalitarian²¹ or a more stratified social organisation.²²

The first confirmed LBK finds in the Netherlands came to light in 1925 when Holwerda of the National Museum of Antiquities (RMO) in Leiden initiated excavations at Maastricht-Caberg.²³ In the following years many other such finds appeared, mostly in the Graetheide area in excavations by both amateur archaeologists and professionals. After WWII Bandkeramik research

¹⁴ Banffy & Oross 2010, 268.
¹⁵ Gronenborn 1999; 2007; Van Wijk, Amkreutz & Van de Velde 2014.
¹⁶ Modderman 1970.
¹⁷ To make chronological comparisons possible, a chronology will be used which divides the LBK, whose timing and development differed in the different regions, into five main phases: Earliest (I), Early (II), Middle (III), Late (IV) and Final (V) LBK, known as the Meier-Arendt chronology (Meier-Arendt 1966).
¹⁸ Bakels 1982; Louwe Kooijmans 2007; Claßen 2006; Balkowski & Hartmann 2015; Amkreutz 2016.
¹⁹ Van Wijk, Amkreutz & Van de Velde 2014.
²⁰ Van de Velde 1996; Hachem 2000; Bentley *et al.* 2012; Louwe Kooijmans 2017.
²¹ Van Wijk & Van de Velde 2020.
²² Bentley *et al.* 2012.
²³ Holwerda 1927; Van Wijk, Amkreutz & Van de Velde 2014.

Table 2.1 Chronologic scheme for the LBK in the Netherlands as well as neighbouring countries.

	Netherlands		Germany		France	
	Modderman (Modderman 1970)	Van de Velde (2012)	Aldenhovener Platte (Stehli 1994)	Meyer-Arendt (1966)	Blouet <i>et al.</i> 2021	Absolute dates
Oldest LBK				älteste LBK	Rubané ancien	5500 BC
Older LBK/ Flomborn	Ib	1	LW VI - IV	ältere LBK		5250 BC
Middle LBK	Ic	2				
		3	LW IV - VII	mittlere LBK		5000 BC
		4				
		5				
		6				
	Id	7	LW V - VII		Rubané moyen	
		8				
		9				
Late LBK	IIa	10	LW VIII - X	jüngere LBK		
		11				
		12				
	IIb	13	LW X - XI		Rubané Récent A	
		14				
		15				
Final LBK	IIc	16	LW XI - XIII	jüngste LBK	Rubané Récent B	4950 BC
		17				
		18				
	IIId	19	LW XIV - XVI		Rubané final	
		20				
					Rubané terminal	

Chronologies differ between the various regions. For this publication use was made of the Modderman ceramic chronology as well as the international accepted general division in phases. For further information, references of the various chronological schemes are provided.

²⁴ Modderman 1970.
²⁵ Modderman 1958-1959.
²⁶ Modderman 1970.
²⁷ Waterbolk 1958-1959.
²⁸ Van de Velde 2008.
²⁹ Van de Velde & Bakels 2002.
³⁰ Van Wijk 2002; Van Wijk & Van de Velde 2007; Porreij-Lyklema 2015; Ruijters, Ellenkamp & Tichelman 2015; Porreij-Lyklema 2017.
³¹ Brounen & Rensink 2006.

was boosted by the well-known large-scale excavations in the Graetheide area by Modderman (Elsloo²⁴, Sittard²⁵ and Stein²⁶) and Waterbolk (Geleen²⁷). These sparked off popular (amateur) interest anew as through post-war city development programmes many finds and sites became known. After that, the final decades of the past century saw only amateur

activities and excavations on a smaller scale. Interest again increased with the Leiden University rescue excavation at Geleen-Janskamperveld in 1990-1991,²⁸ and smaller campaigns at Beek-Geverikerveld²⁹ and additions to the Sittard settlement.³⁰ With the implementation of the Valetta Treaty (1999) a new phase began which was characterised by

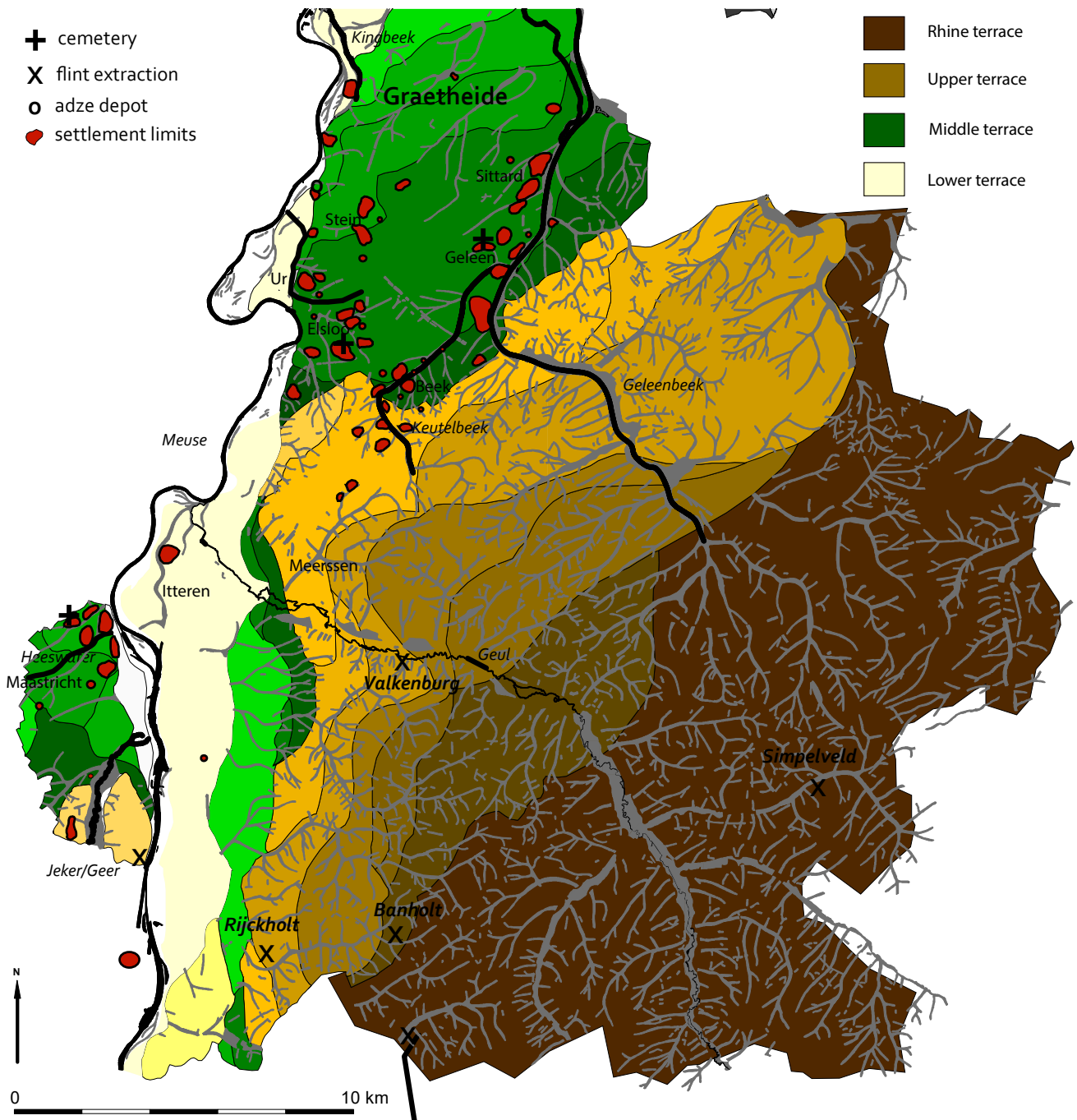


Fig. 2.1 Distribution of Bandkeramik sites. The physical and cultural landscape of the southern Netherlands (source: Van Wijk 2016b, Fig. 13.7).

many new reports of finds, test excavations and several smaller to medium-scale campaigns within Archaeological Heritage Management. With the advent of AHM (Archaeological Heritage Management) archaeology at the end of the 1990s (Valetta Treaty), the initiative for archaeological research into the LBK became more and more dependent on construction work and was limited by the financial and physical margins of building projects. Nevertheless, a number of smaller and larger scale excavations took place in those years which also led to the discovery of new sites, occasionally in rather unfamiliar locations. Interesting sites discovered in this period include two LBK sites not on loess soils in the valley of the Meuse River (Itteren-Sterkenberg³¹ and Stein-Nattenhoven³²), and sites with special features such as ditches (Beek-Beekerveld³³ and Beek-Kerkeveld³⁴). Some medium to large-scale excavations did take place as well, such as at Elsloo-Riviusstraat³⁵, Beek-Kerkeveld³⁶, Stein-Heidekampweg³⁷ and Maastricht-Cannerberg.³⁸ Over the past decades the classical material culture and settlement studies remained important. Still, accents have shifted and now also include intra-site spatial analysis, ‘exotic’ (non-LBK) pottery types such as Limburg and La Hogue, and in the future hopefully the apparently sudden demise of the LBK in these parts. However, in comparison to the large-scale projects that have been conducted in France and Germany recently, post-1970 research in Limburg is rather small-scale. The preservation of prehistoric remains in the area is hampered by the decalcification of the loess soil, while it is also the dispersed and sometimes preliminary nature of the data that hinders a more important contribution.

It is argued that the number of settlements in the Graetheide area and Maastricht cluster could simply have outgrown carrying capacity and tipped the balance of its geographical and social territory, forcing part of the occupants to move into less favourable or at least less traditional locations.³⁹ Indicative of this may be the ‘signs of stress’ witnessed at the end of the LBK, which, apart from settling in less favourable locations, also include a drop in households, the development of defensive structures (enclosures), differences in pottery decoration, increased use of local raw materials and changes in lithic procurement and distribution.⁴⁰ Eventually this leads to a sudden collapse of the LBK in Dutch

Limburg, and comparable shifts and changes in the adjacent regions.⁴¹ Also in other parts of the LBK world it is evident that its end and development into post-Danubian groups, such as Großgartach and Blicquy-Villeneuve-Saint-Germain (VSG) coincides with stress, important socio-economic changes and (ritual) violence, as at Talheim, Asparn-Schletz and Herxheim.⁴²

2.2 Bandkeramik landscape

Southern Limburg is situated where the Eifel/Ardennes mountain complex converges with the Lower Rhine and North Sea Basin area. Its current appearance has been predominantly shaped by the Meuse River. The sequence of Pleistocene glacials and interglacials, with their attendant sedimentation and erosion cycles, led to a terraced landscape. Quaternary gravel deposits of the Meuse River are found everywhere in southern Limburg on top of the Cretaceous limestone. The characteristic terraces of the Meuse River become younger from east to west toward the current bed. Smaller and larger tributaries such as the Geleenbeek, Ur and Jeker, are brooks cutting into the older terraces. During the Saalian and Weichselian glacials Southern Limburg was covered with windblown loess. This fertile soil was rich in chalk, which has meanwhile dissipated in this area to a level of 2-3 m below surface. Further geological processes have led to soil formation, while humanly induced erosion produced colluvial deposits. Major colluviation episodes took place during the Roman occupation and the Medieval period, as well as in relation to contemporary agricultural activities. These processes have locally led to severe erosion of archaeological finds and features (on the plateaus) as well as conservation under thick layers (in the valley bottoms).⁴³ The banks of streams and dry valleys, the latter often characterised by small ponds and related springs, have been important *foci* for human activity, both because of the presence of water as well as their ecological diversification; therefore, archaeological features can be expected within 500 meters of such locations.⁴⁴ Water wells provided a fresh water resource in areas where fresh water was not available at such a distance making alternative choices regarding site location possible.

³² Polman 2001; Amkreutz 2004.

³³ Brounen & Rensink 2007.

³⁴ Van de Velde, Lohof & Wijns 2009.

³⁵ Van Wijk & Porreij-Lykema 2015.

³⁶ Van Wijk & Van Hoof 2006; Van de

Velde, Lohof & Wijns 2009.

³⁷ Van Wijk, Meurkens & Porreij-Lykema

2012.

³⁸ Van Wijk 2016a.

³⁹ Bakels 1982.

⁴⁰ Amkreutz et al. 2012; Van Wijk, Amkreutz & Van de Velde 2014; Amkreutz & Van Wijk 2020.

⁴¹ Balkowski & Hartmann 2015; Amkreutz 2016.

⁴² Zeeb-Lanz & Haack 2016.

⁴³ De Moor 2006.

⁴⁴ Bakels 1982.



Fig. 2.2 Bandkeramik land use and recovering forests overlooking the valley of the Keutelbeek near the village of Beek (copyright: Mikko Kriek).

The LBK is generally associated with loess-based settlement locations. Recent discoveries have nuanced this perspective, also in Dutch Limburg.⁴⁵ Sites have been documented in river valley settings on the lower terrace of the Meuse River, where occasional flooding could be expected. Bandkeramik presence or exploitation has also been documented in the coversand area north of the loess and in the loess covered hills of eastern Limburg. Coversand and hill finds mostly concern individual or small associations of artefacts; they do not seem indicative of true (i.e., longer lasting) settlements but have not been investigated by means of large-scale excavations yet. The Odyssey project⁴⁶ has led to a more complete picture of the Early Neolithic domestic and funerary landscape in Limburg (Fig. 2.1 and Fig. 2.2).

At the time the first farmers entered and settled on the Limburg loess plateaus, these were covered with lime and oak trees in a mixed deciduous forest with little undergrowth⁴⁷, with increased density and diversity in the (river)

valleys.⁴⁸ Palynological research demonstrated that from the second half of the Atlantic onwards, cereal and *Plantago* pollen increased, initiated by the Bandkeramik *Landnam*.⁴⁹ Previously a dense forest was assumed, but currently it is accepted that open areas existed in the woods.⁵⁰ The first farmers preferred settlement on the relatively flat middle terraces of the Meuse River, such as those of the Graetheide and Caberg areas, where especially terrace edges and locations near stream valleys and dry valleys were selected.⁵¹ This can be related to the presence of different ecotones, the vicinity of water and the presence of fertile soils.⁵² Only during the later phases of the LBK did occupation of the lower and the high terraces appear. Locations in the central areas of the terraces may have been avoided, probably because of the lack of fresh water (which is only to be found at a depth of at least ten metres below the surface). These central areas were certainly suitable for agriculture, and early farmers (such as the Bandkeramik farmers) knew how to dig deep wells, so it might be the present

⁴⁵ Brounen & Ball 2002; Brounen & Rensink 2006; Amkreutz 2004; Van Wijk, Amkreutz & Van de Velde 2014.

⁴⁶ Van Wijk, Amkreutz & Van de Velde 2014.

⁴⁷ Bakels 1982; Bakels 2009.

⁴⁸ Bakels 1978; Kreuz 2008; Bakels 2009.

⁴⁹ Bakels 1978; Bakels 2009.

⁵⁰ Kreuz 2008.

⁵¹ Van Wijk & Van Hoof 2006; Van Wijk et al. 2008; Van Wijk 2016b.

⁵² Van Wijk 2009.

lack of building activities in these locations that has prevented archaeological discovery. Archaeobotanical research has concluded that the LBK plots were probably small, as indicated by the presence of typical weed species that prefer shady places. According to current opinion Bandkeramik fields were in use for a long time (no shifting cultivation) and may have been manured.⁵³ Cattle were probably herded in the river valleys as well as on the coversand areas north of the loess. After the Bandkeramik occupation it is likely that the forests recovered (Fig. 2.2).

Many of the raw materials required by the LBK settlers were available within their home range.⁵⁴ Stones could be picked up from the bed of the Meuse river, and flint could be found in the Meuse river terrace deposits or in eluvial contexts. Timber, plants, loam, and game were available in copious quantities. Streams and natural springs provided an adequate supply of fresh water. In short, excellent conditions for mixed farming and hunting existed with ample room for settlements and shifting cultivation. However, the region was also inhabited by at least some Mesolithic hunter-gatherers, with evidence found mainly on the edges of the loess plateaus or on spurs, especially along the Geul valley⁵⁵; a contested, or shared, landscape to some extent can therefore be assumed.⁵⁶ Typical LBK finds outside the LBK settlement area sometimes occur in loose association with non-Bandkeramik artefacts⁵⁷, suggesting that LBK farmers were aware of these indigenous occupants and were probably in contact with them, perhaps during exploratory and/or hunting expeditions or when herding their cattle within and beyond the loess area⁵⁸. Bandkeramik adzes⁵⁹, arrowheads⁶⁰ and decorated pottery⁶¹ have been found far outside the home range of the Bandkeramik settlers. In the middle and western parts of the Netherlands these sites are mostly in close association with Mesolithic and possible pre-pottery Early Neolithic groups.

These very favourable conditions beg the question of what the determining choices for founding the first Bandkeramik settlements were, especially since there seems to be a changing pattern in settlement location choices in the later LBK occupation of the area (Fig. 2.2). Within the southern Dutch terrace landscape, it is striking that LBK settlements are only found

within a restricted region of 15 by 20 km. It is noteworthy that looking at the physical landscape where the first settlements were founded, and which probably was for the most part a terra incognita for the first farmers – apart from some small-scale explorations – all these settlements cluster within an even smaller area. During the Flomborn phase⁶², only parts of the middle terrace (the Graetheide plateau between Sittard and Stein) and the middle terrace west of the Meuse river (the Caberg region near Maastricht) were preferred for initial settlement. It is of importance to note that both the areas left and right of the Meuse river were occupied simultaneously. The Meuse river does not seem to have played a role in settlement location.⁶³ Stream valleys like those of the Geleenbeek, Ur and Zouw played a more dominant role. Over time the number of settlements increased, mainly in the vicinity of important pioneer sites such as Elsloo⁶⁴ and Sittard⁶⁵, although some settlements were founded at greater distances, both in a northern direction (Urmond) as well as further south (Beek, Kelmond, Geverik). Increasingly, parts of the upper terrace were also settled. Also, the central area of the Graetheide plateau was occupied, as demonstrated by sites such as Geleen–Urmonderbaan and Geleen–Grasbroek close to the northern limit of the loess, and at rather large distances from open water (2 km). Expansion even reached beyond the loess, into the floodplains of the Meuse river near Stein and Itteren (lower terrace), where areas were tested and settled.⁶⁶ In the penultimate phase of the Dutch LBK, a peak was reached in the number of contemporary settlements on the Graetheide, as in the Rhineland⁶⁷, which ultimately may have led to socio-economic stress and (more) migration towards new grounds in, for example, Belgium, where most settlements date to the Younger LBK. Towards the end of the LBK most settlements were probably still inhabited in spite of the decline in numbers of settlements and houses, still suggesting a dense population on the Graetheide. Gradually that occupation came to an end; however, how and why the LBK eventually left the area, or disintegrated is still very much a mystery. This in contrast to the LBK in Germany where it was succeeded by the Großgartach culture, and in Belgium and France by the Blicquy/Villeneuve-Saint-Germain cultural groups (see §2.2). If one thing is clear

⁵³ Bogaard *et al.* 2007.

⁵⁴ Bakels 1978; Bakels 1982.

⁵⁵ De Grooth 2007 versus Vanmontfort 2008; Verhart 2000.

⁵⁶ Bender 1993; Frirdich 2005.

⁵⁷ Brounen 2014; Vanmontfort *et al.* 2010.

⁵⁸ Van de Velde 2008; Vanmontfort 2008.

⁵⁹ Verhart 2000.

⁶⁰ Louwe Kooijmans 2001.

⁶¹ Brounen & Hauzeur 2010, Fig. 2.

⁶² Before 5200 cal BC/Modderman phase 1b; Meier-Arendt 1966.

⁶³ Van Wijk 2016b.

⁶⁴ Modderman 1970.

⁶⁵ Modderman 1958/1959.

⁶⁶ Amkreutz 2006; Brounen & Rensink 2006.

⁶⁷ Balkowski & Hartmann 2015.

2.3 Bandkeramik settlements on the Graetheide

Many LBK settlements are known in the Graetheide region. The oldest known sites are located in the western part of the Graetheide. The stage was 'prepped' in 1930 by large-scale construction works for the development of a channel aimed at facilitating river transport in the rain-fed Meuse river. The digging of the Juliana channel around 1930 was a profound event for the village of Elsloo. All houses west of the church had to be demolished. This meant that new development had to be carried out elsewhere. The new road, pipeline and housing projects were a perfect opportunity for local archaeologists H. J. and G. A. J. Beckers from the neighbouring village of Beek, to make observations during these works. The area around the Koolweg was found to contain the most Bandkeramik traces.⁷⁰

Although the settlement of Elsloo-Koolweg is best known, other settlements are known and (partly) excavated at the eastern boundaries of the Graetheide plateau. In the flat central part of the Graetheide plateau, where hardly any stream valleys are present, we hardly see remains from this period. This is usually limited to some stray finds that have been picked up from the field. Other known LBK settlements in the municipality of Stein are located at Elsloo-Sanderboutlaan⁷¹, Stein-Heidekampweg⁷² and Stein-Keerenderkerkweg⁷³. Furthermore, finds are known in Elsloo-Dorpskern⁷⁴, Elsloo-Kerkhof and Elsloo-Spoorlijn (Elsloo-Catsop).⁷⁵ Traditionally, these Bandkeramik settlements are mainly found along the stream valleys on the edges of the Graetheide plateau, i.e., along the Ur, the Geleenbeek and the Keutelbeek (Fig. 2.3). Along the Geleenbeek there is a string of settlements such as Geleen-De Kluis⁷⁶, Geleen-Kermisplein, Geleen-Janskamperveld⁷⁷ and Sittard-Mgr. Claessenstraat.⁷⁸ Exceptions in terms of settlement location are the sites Stein-Haven⁷⁹, Nattenhoven-Bergerstraat⁸⁰ and Itteren-Sterkenberg.⁸¹ These sites are located on riverine clay soil on the low terrace deposited by the Meuse. The site of Stein-Haven, excavated between 1925 and 1933, is one of the earliest LBK excavations. The site consists merely of Roman

and Iron age structures. But between these features a few Bandkeramik waste pits were present. Their fills had typical LBK characteristics but due to the limited extent of the excavations no further insights can be given.

More centrally, and further away from open water, on the Graetheide plateau we still find some Bandkeramik sites such as Urmonderbaan.⁸² During a rescue excavation, several grain storage pits were found that date back to the Final LBK (phase IIc-IIId).⁸³ This site was characterised mainly by the large quantities of burned grain found in the pits.⁸⁴ It is unclear whether this site can be described as a settlement site or whether we are dealing with a special activity site where grain storage in particular played an important role. Very few post holes have been found, probably also as a result of the excavation method, in which the features were visible in an excavated road and pipe trench, making it unclear to what extent house structures were also present.

From east to west the cultural landscape in and around Elsloo and the western part of the Graetheide consists of various LBK settlements. At the foot of the terrace edge, south-west of the site Urmonderbaan, the site Urmonder Veestraat is known. This site was discovered and partly excavated by Beckers in 1937 in a water supply trench during the construction of the railway line between the Maurits coalmine and the industrial port of Stein. A total of five pits were found located a few tens of meters apart. Based on the published pottery, the site can be dated to the Late and Final LBK (phase IIc).⁸⁵ A few hundred meters north of this site, W. Hendrix also found three LBK pits during an inspection in 1989.⁸⁶ These preliminarily date to the Late and Final LBK (phase IIb-IIc). About 800 m south of these lies the LBK settlement Stein-Heidekampweg.⁸⁷ This site has been partly excavated and revealed the outlines of a settlement consisting of 14 excavated houses. It covers an estimated area of ca. 12 ha, based on observations in the direct vicinity.⁸⁸ The settlement was inhabited from the Older LBK or Flomborn phase⁸⁹ until the Late LBK⁹⁰. Early on during the excavation, it seemed as if two spatially separated habitation clusters were present: a north-western cluster and a southern cluster. The southern cluster contains at least 11 houses.

Large-scale settlement research has taken place more than 2 km from the Heidekampweg

⁷⁰ Beckers & Beckers 1940, 106.
⁷¹ Hendrix 1991; 1992.
⁷² Hendrix 1998; Van Wijk, Amkreutz & Van de Velde 2014.
⁷³ Modderman 1970.
⁷⁴ Van Wijk, Amkreutz & Van de Velde 2014.
⁷⁵ Van Wijk, Amkreutz & Van de Velde 2014.
⁷⁶ Waterbolk 1958-'59.
⁷⁷ Van de Velde 2008.
⁷⁸ Modderman 1958-'59.
⁷⁹ Van Wijk, Amkreutz & Van de Velde 2014.
⁸⁰ Amkreutz 2004.
⁸¹ Brounen & Ball 2002; Brounen & Rensink 2006.
⁸² Bakels & Rousselle 1985; Van Wijk, Amkreutz & Van de Velde 2014.
⁸³ Van Wijk, Amkreutz & Van de Velde 2014.
⁸⁴ Bakels & Rousselle 1985.
⁸⁵ Bakels 1978, 50.
⁸⁶ Van Wijk, Meurkens & Porreij-Lyklema 2012.
⁸⁷ Hendrix 1999; Van Wijk, Meurkens & Porreij-Lyklema 2012.
⁸⁸ Urmond-Hennekens; Beckers 1940, 117-118; Stein-Steinderbos; Hendrix 1998.
⁸⁹ Based on pottery and AMS-dating of cereals: 6340 +/- 50 BP (GrA-53554), 6150 +/- 35 BP (GrA-52815).
⁹⁰ 6190 +/- 35 BP (GrA-52807).

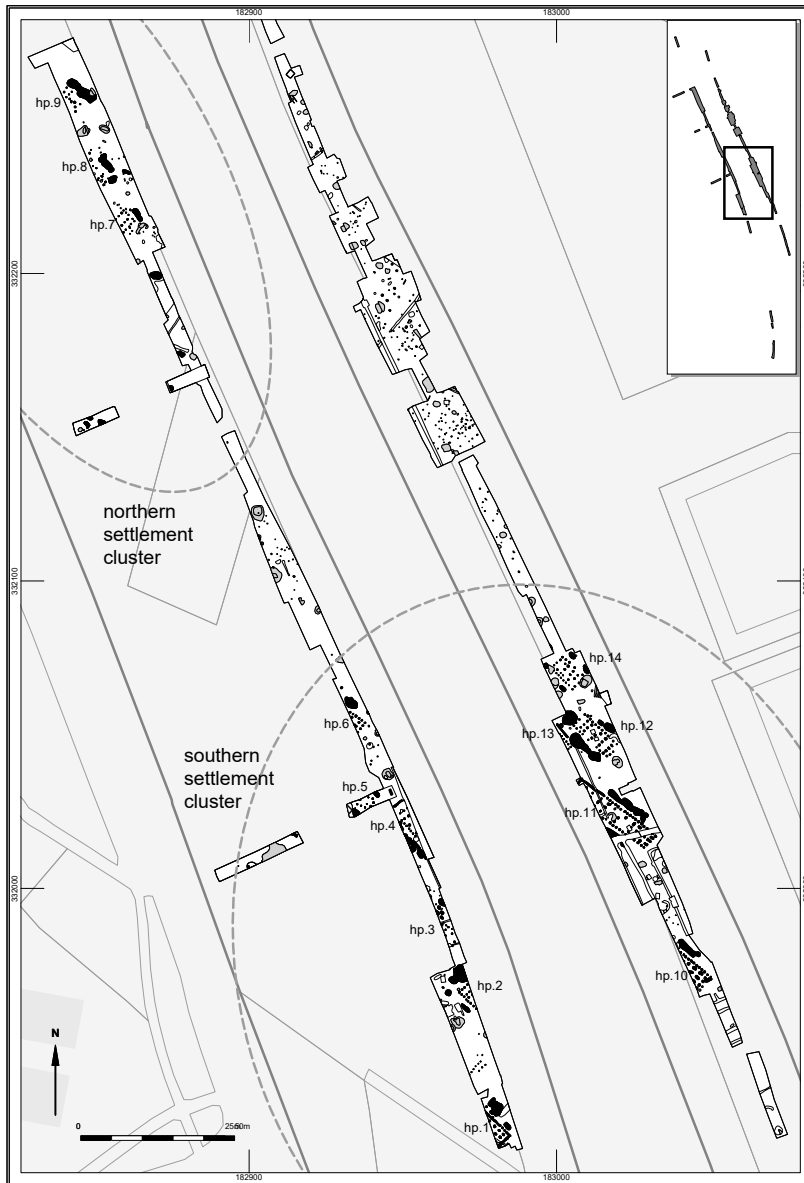


Fig. 2.4 Settlement plan of Stein-Heidekampweg. LBK features are in black, other (grey) features belong to the Iron Age settlement (source: Van Wijk *et al.* 2012, Fig. 7.1).

settlement. In the 1950s and 1960s Modderman excavated the settlement site of Stein-Keerenderkerkweg.⁹¹ This site on the edge of a former dry valley, is characterised by the good preservation of the post features. In no other LBK settlement in the Netherlands was it possible to observe so clearly and frequently that the original roof-bearing wooden posts in many cases were split, although it was also observed in a type 1a house at the settlement of Stein-Heidekampweg. At this site it was even documented that the ends of the posts in the

wall trench had been worked to a point.⁹² The fill of the post holes of type 1a houses predominantly consisted of charcoal and burned clay, as is observed at other sites, providing clear indications that these types of houses were deliberately burned.⁹³ The maximum extents of the settlement of Stein-Keerenderkerkweg at one point reached over 400 x 200 m and held over 50 houses at least. It was inhabited from phase Ic until phase IIb.

The settlement of Elsloo-Sanderboutlaan is situated more than 1.3 km south-east of Stein-Keerenderkerkweg. Due to the efforts of local archaeologists, Elsloo-Sanderboutlaan could be partially excavated in 1989-1992. A detailed analysis is still lacking, but some general publications exist.⁹⁴ This settlement covers an area of ca. 120 x 150 m and encompasses the remains of at least 20 houses which can be dated to both the Older and Final LBK. The site is located very close to the well-known settlement of Elsloo-Koolweg (55.5), separated only by a dry valley.

During the construction of a railway south of Elsloo, near the hamlet of Catsop, some LBK features were discovered in the late 1920s.⁹⁵ They were interpreted as pit dwellings and probably belong to a larger settlement dating at least to phase Ic up to phase IIb.

LBK research in this area has mainly been instigated by large infrastructural works in the villages of Elsloo and Stein in the late 1920s and early 1930s which resulted in the recognition of multiple LBK settlements in this area. The observations are however small-scale and only a few settlements have been intensively investigated. Local archaeologists rescuing whatever was possible throughout the years contributed to the extensive knowledge and through their work demonstrated the variability and extent of the Bandkeramik cultural landscape. In this context, the adze hoard of Stein-Berg aan de Maas must be mentioned.⁹⁶ At the village cemetery a hoard of seven Bandkeramik adze blades was found in 1982. The hoard consisted of four high adzes and three flat adzes. Their sizes are exceptionally large with lengths over 22 cm. The adzes are all made of amphibolite or actinolite hornblende schist.⁹⁷ The adzes were originally positioned horizontally and parallel to each other, lying on their flat sides with their sharp edges pointing to the north-east. From the composition of the hoard

⁹¹ Modderman 1970; Van Wijk, Amkreutz & Van de Velde 2014.

⁹² Van Wijk, Meurkens & Porreij-Lyklema 2012, 60.

⁹³ Van de Velde & Van Wijk 2014, 53-54; Claßen & Schmid 2019.

⁹⁴ Hendrix 1991; Hendrix 1992.

⁹⁵ Van Wijk, Amkreutz & Van de Velde 2014.

⁹⁶ Bakels & Hendrix 1999; Amkreutz & Van Wijk 2020, 97-99.

⁹⁷ Bakels 1987.

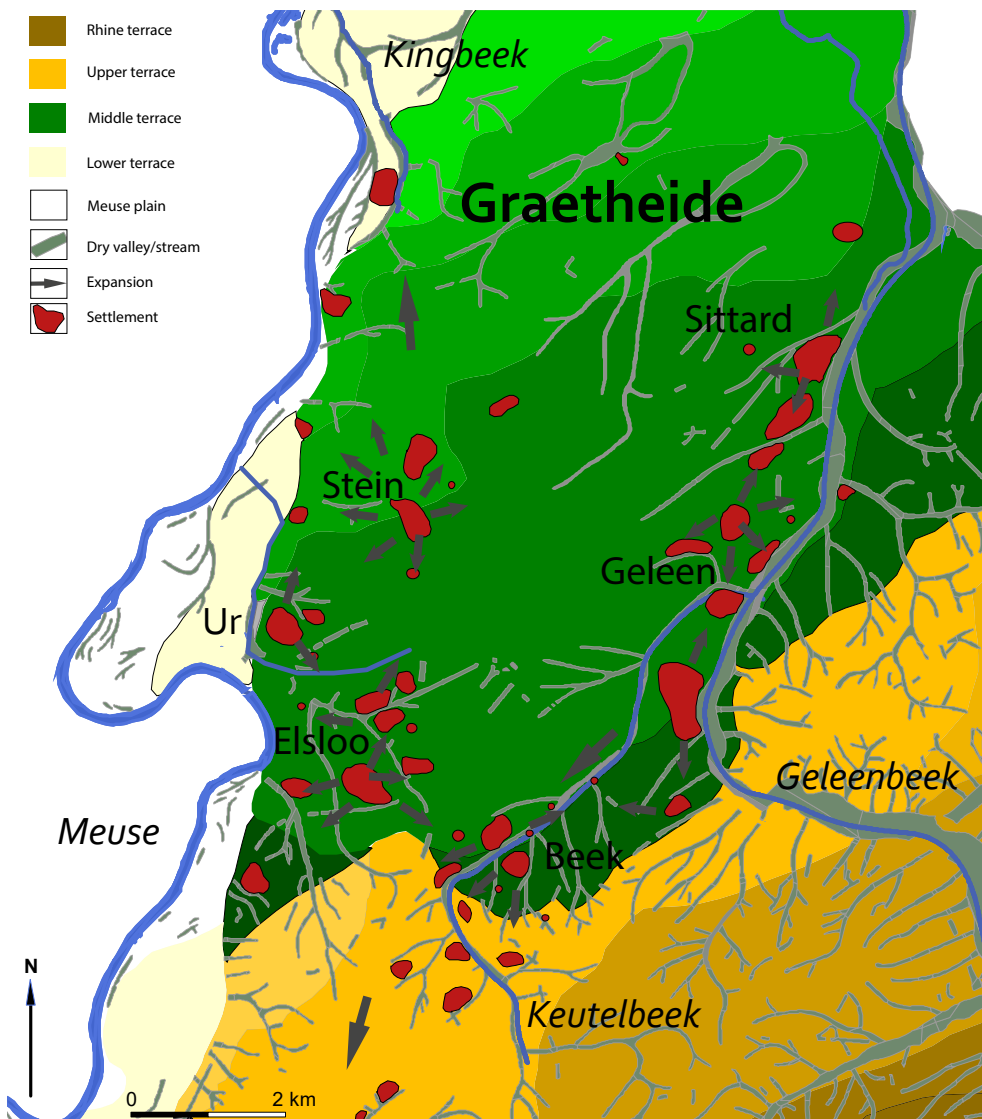


Fig. 2.5 Settlement dynamics in the Graetheide area. Estimated maximum extents of the settlements are shown in red (without assumed area for cultivated land).

and the orientation of the adzes, intentional deposition can be concluded.

The many documented sites and settlements are a clear indication that the Graetheide was densely inhabited; approximately one house or settlement per square kilometre.⁹⁸ Some remarks can be made about the settlement dynamics, although the restricted observations provide room for a finer chronology in the future. The first expansion of new hamlets was restricted to the immediate surroundings of pioneer settlements (Fig. 2.5), as we see in the Rhineland.⁹⁹ In time, new grounds were tested and eventually settled.¹⁰⁰ Locations near water-carrying streams like the Geleenbeek,

Ur, Watervalderbeek, and Keutelbeek were favourable, but also higher locations with more restricted access to water or on the contrary, lower locations subject to flooding were selected. The most obvious relation seems to be with dry water valleys which originally would have cut deeply into the landscape, differing from the loess landscape with different vegetation.¹⁰¹ Water was only periodically present when precipitation was high. It is argued that in densely inhabited regions like the Graetheide or Caberg the distance between settlements became shorter over time. As the landnam progressed, the availability of new grounds diminished steadily, but the need for

⁹⁸ Van Wijk 2016b, 342.

⁹⁹ Lüning 1982; Claßen 2012.

¹⁰⁰ Van de Velde 2008.

¹⁰¹ Van Wijk 2016b, 346-347.

social or economic distance might have remained. As settlement density grew, dry valleys seem to have functioned as social and economic borders. By marking their settlement area, Bandkeramik communities also laid claim to the landscape. The way the natural landscape

was used to create social borders follows the way in which the first farmers dominated their environment by using agriculture to fulfil their subsistence needs.¹⁰² Both are gradual processes induced by either environmental or social pressure.

¹⁰² Van Wijk 2016b, 348.

3 Burial practice in the Mesolithic and Early Neolithic

I.M. van Wijk & L.W.S.W. Amkreutz

3.1 Introduction

Archaeological remains of the LBK are predominantly excavated within settlements and mostly represent activities related to the domestic space. On the other hand, there is the funerary landscape consisting of isolated burials or concentrations of burials in a larger area named a burial ground, graveyard, or cemetery. Here, archaeological remains may be found in a more closed context (i.e., the grave) and assumptions may be made towards the sex, gender or status of the buried. Common practice shows that this proves to be as difficult as reconstructing the daily life of a group, household or an individual based on their waste strategies¹⁰³, resource procurement¹⁰⁴ or house building skills. As is the case for domestic life, burial rites are diverse and a variety of burial practices has been documented and carried out already in very early human communities.

3.2 Mesolithic burials

During the Mesolithic inhumation is the most common archaeologically recognised burial practice. Over 2000 individual burials are known in north-western Europe from as many as 250 Mesolithic, such as open-air sites, including shell middens, caves and abris¹⁰⁵, and more are to be

expected. Over 89 percent of them belong to individual graves in and near encampments, caves or even burial grounds (Table 3.1). Cremations are less known (13%) but have been found all over Europe.¹⁰⁶ Both inhumations and cremations, so-called biritual mortuary practices, are recorded at less than 10 percent of the known sites. Most of the burials are found in close vicinity or within activity zones or habitation areas, but there are also sites away from habitations. The preferred location for open-air sites was on elevated ground near rivers, lakes or the sea.¹⁰⁷ Most sites have only one or two graves, but communal grounds existed as well. There are even open-air sites and caves where over 100 graves have been discovered.¹⁰⁸ The larger part of the Mesolithic deceased is untraceable. It is suggested that they were cremated, and that cremations did largely not survive over time.¹⁰⁹ Other burial rites like simple exposure of the body out in the wild to the elements and/or scavengers, or tree burials must be considered as well and are implied by burn- and cutmarks.¹¹⁰

The evidence of Mesolithic burials in the Netherlands and adjacent areas is limited. Recent overviews point out a number of characteristics.¹¹¹ For the Early and Middle Mesolithic there are skeletal remains in the caves in the Ardennes, mainly around Namur and Dinant, indicating careful placement of the deceased. A single site, Trou al'Wesse also yielded later Mesolithic evidence. Further north

Table 3.1 Mesolithic burials: Distribution of age and sex across different burial types.

	Female		Male		Children		Indet.		Total	
	n	%	n	%	n	%	n	%	n	%
Single burial	35	2	36	2	15	1	22	1	108	7
Head/skull burials	11	1	7	0	20	1	1	0	39	2
Burials in cemetery	270	17	371	23	266	17	554	35	1461	91
Total unburned	316		414		301		577		1608	
Cremations	5	19	9	35	4	15	9	31	27	100
Total	321		423		305		586		1635	100

The percentage of the single, head/skull and cemetery burials is based on the total number of unburned individuals, n=1608. The percentage of cremations refers to the percent of the total number of cremations, n=27 (source: Trautmann 2009, table 1).

¹⁰³ Hachem 1997; Bosquet, Golitko & Salavert 2008; Bosquet 2013.

¹⁰⁴ De Grooth 2007.

¹⁰⁵ Trautmann 2006, 17; Grünberg 2016, 13.

¹⁰⁶ Trautmann 2006, 17; Grünberg 2016, 14.

¹⁰⁷ Grünberg 2016, 13.

¹⁰⁸ Conneller 2009, 148; Grünberg 2016, 13.

¹⁰⁹ Lüning 1988; Hoffmann 1978;

Trautmann 2006.

¹¹⁰ Van de Velde 1997; Grünberg 2016, 15.

¹¹¹ Amkreutz 2013; Louwe Kooijmans 2007.

burials are more frequent, comprising a small concentration of cremated remains in the middle of a flint scatter at Oirschot V and cremated human bones at Dalfsen in one of the fire pits or hearths. Cremation pits have also been documented for an Early Mesolithic site in the Rotterdam area (Rotterdam-Beverwaard). These are to date the oldest burials in the Netherlands. It is interesting that these are all cremations, as they appear to be otherwise rare in Northwest Europe for this period. For the Late or Final Mesolithic there is more evidence. This includes formal burials of humans and dogs at Hardinxveld, as well as scattered human remains amongst domestic refuse, possibly relating to body exposure or other treatments. Both burn- and cutmarks have been noted. At the slightly

later site of Hardinxveld-De Bruin there is evidence for an extended burial and a seated burial, and the latter position is also assumed for a number of Late Mesolithic graves at Marienberg where only the body position could be observed because of the presence of body shadows, but no skeletal remains were preserved.¹¹² The extended burials also continue in the Neolithic Swifterbant tradition as does the 'informal treatment' of human remains, while increasingly flexed burials occur in the Hazendonk group. Cremation is again a feature of the Vlaardingeng culture and the Stein group in Limburg.

The conditions of archaeological preservation and recovery prove to be crucial for our ability to study human remains. For well-

¹¹² Verlinde & Newell 2006; Louwe Kooijmans 2013; Verlinde & Newell 2013.

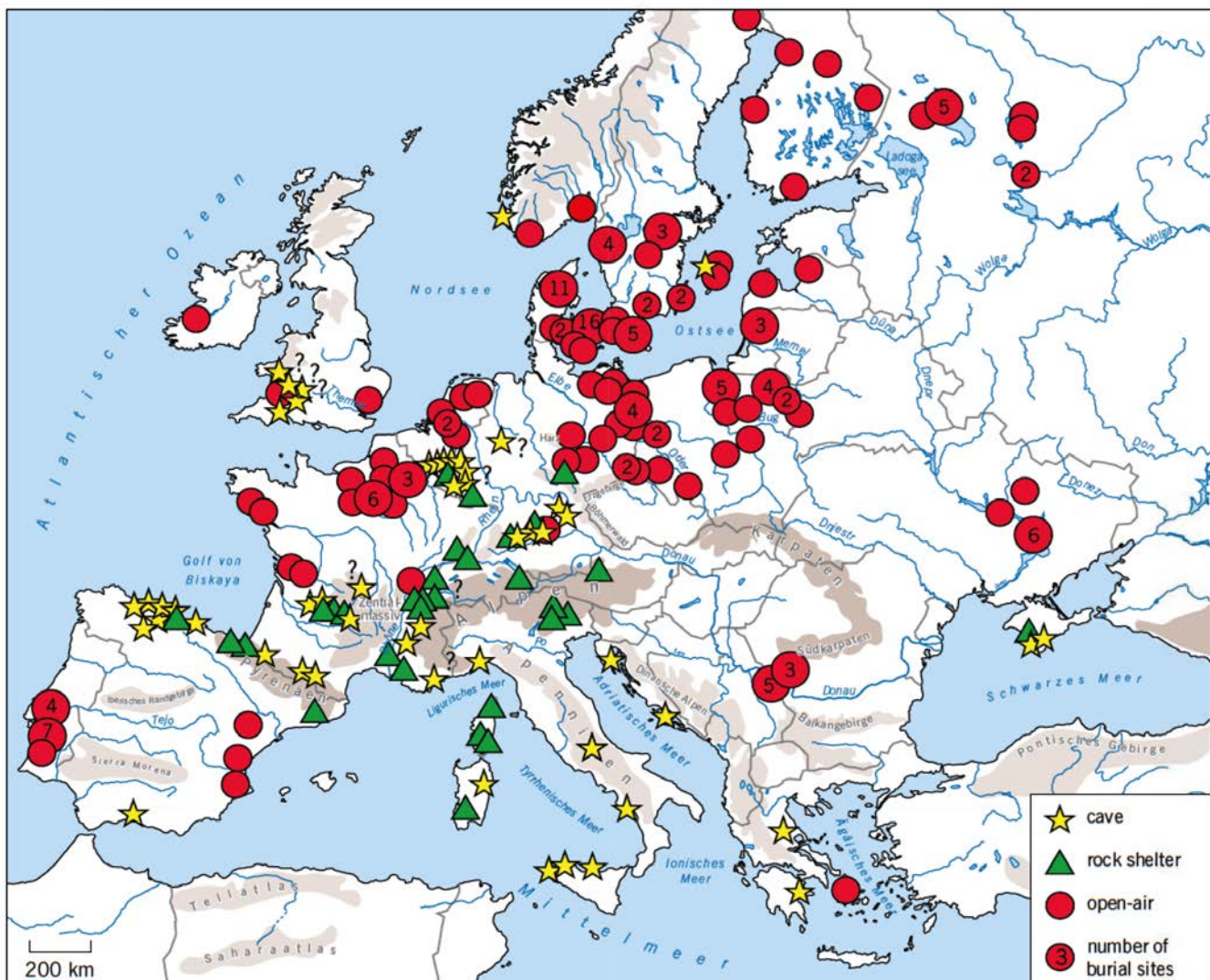


Fig. 3.1 Mesolithic burial sites in Europe. Larger circles indicate several adjacent open-air funeral places (source: Grünberg 2016, Fig. 1.).

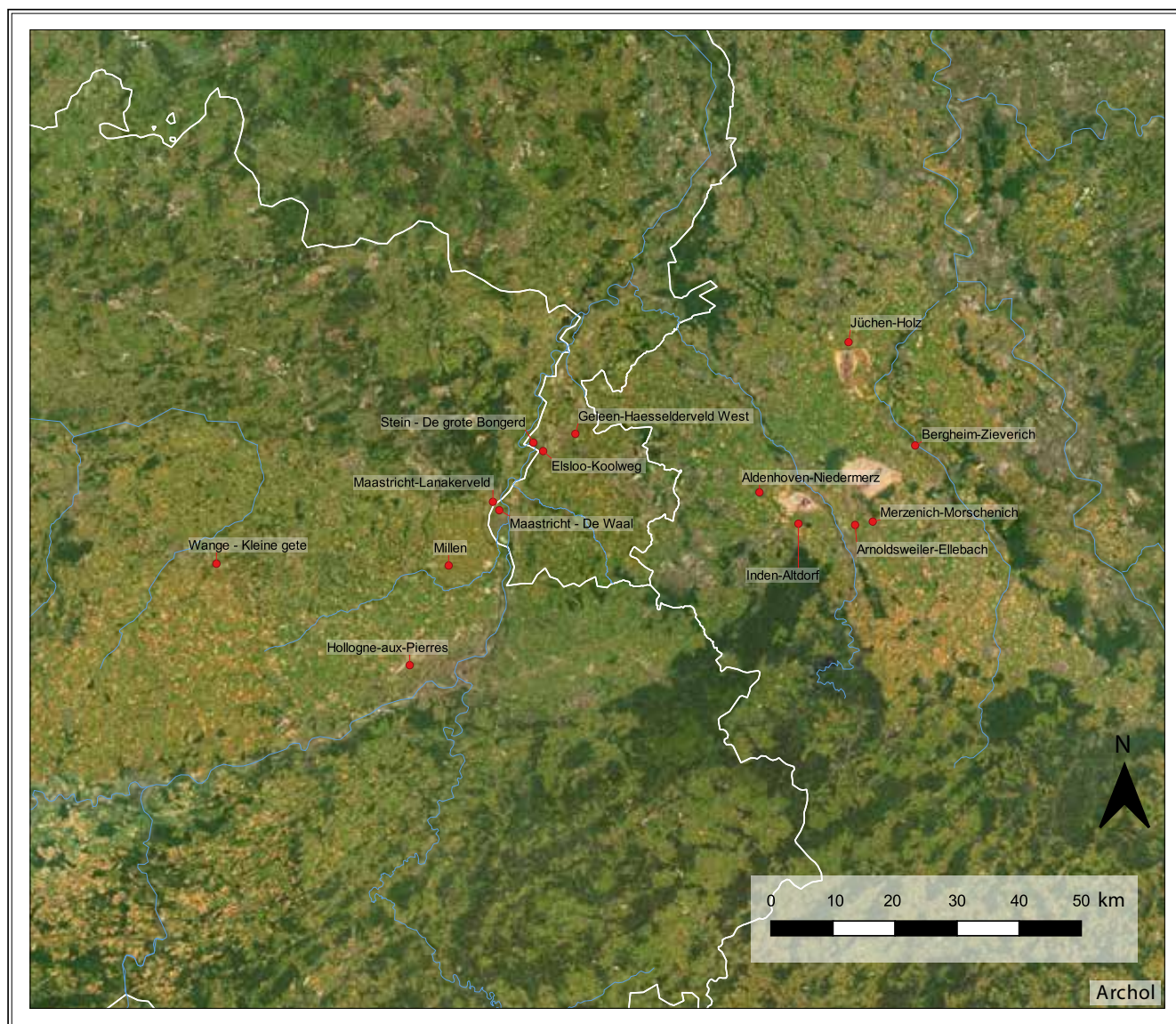


Fig. 3.2 Distribution of Bandkeramik burial sites in the Rhine-Meuse area

preserved Mesolithic burials there seems to be a great variation in the orientation and positioning of the body, the types and number of burial goods as well as the structure of the grave.¹¹³ This variation is also documented with respect to burial goods such as tools, weapons, jewellery, animal bones and shells or even the furnishing of the grave with red pigments and rocks. Both sexes and all age groups have been documented, ranging from preterm infants to seniors. Overall elderly people, the most senior, seem to be lacking and infant graves are underrepresented, as infant mortality is believed to be high.¹¹⁴ All in all, these heterogeneous burial rites paint a diverse picture which makes it difficult to make statements about social differentiation regarding age, sex, social status or manner of death of the deceased individual. Regional patterns have been recognised, but there still is a high degree of individuality with respect to the location and construction of the graves, as well as to the treatment of the dead.¹¹⁵ Even at one site burial

practices may differ and could be representative for changing burial rites through time or differences between specific groups that each used the burial site in their own way according to their own specific rituals. This provides a sharp contrast to the LBK, which is the first culture with large cemeteries and more or less regular burial practices in North-west Europe.

3.3 LBK burials

Bandkeramik burial grounds are characterised by varying concentrations of single graves which are placed closely together with almost no or little intercutting. The latter is an indication that the graves were marked in one way or the other. To date there are as many as 4215 burials known of which 3190 burials from 73 known burial grounds (see Table 3.3 for a selection).¹¹⁶ As far as can be reconstructed the burial ground of

¹¹³ Grünberg 2016, 199.

¹¹⁴ Grünberg 2016, 17.

¹¹⁵ Grünberg 2016, 20.

¹¹⁶ Trautman 2007, 12; with recent additions as known to the authors.

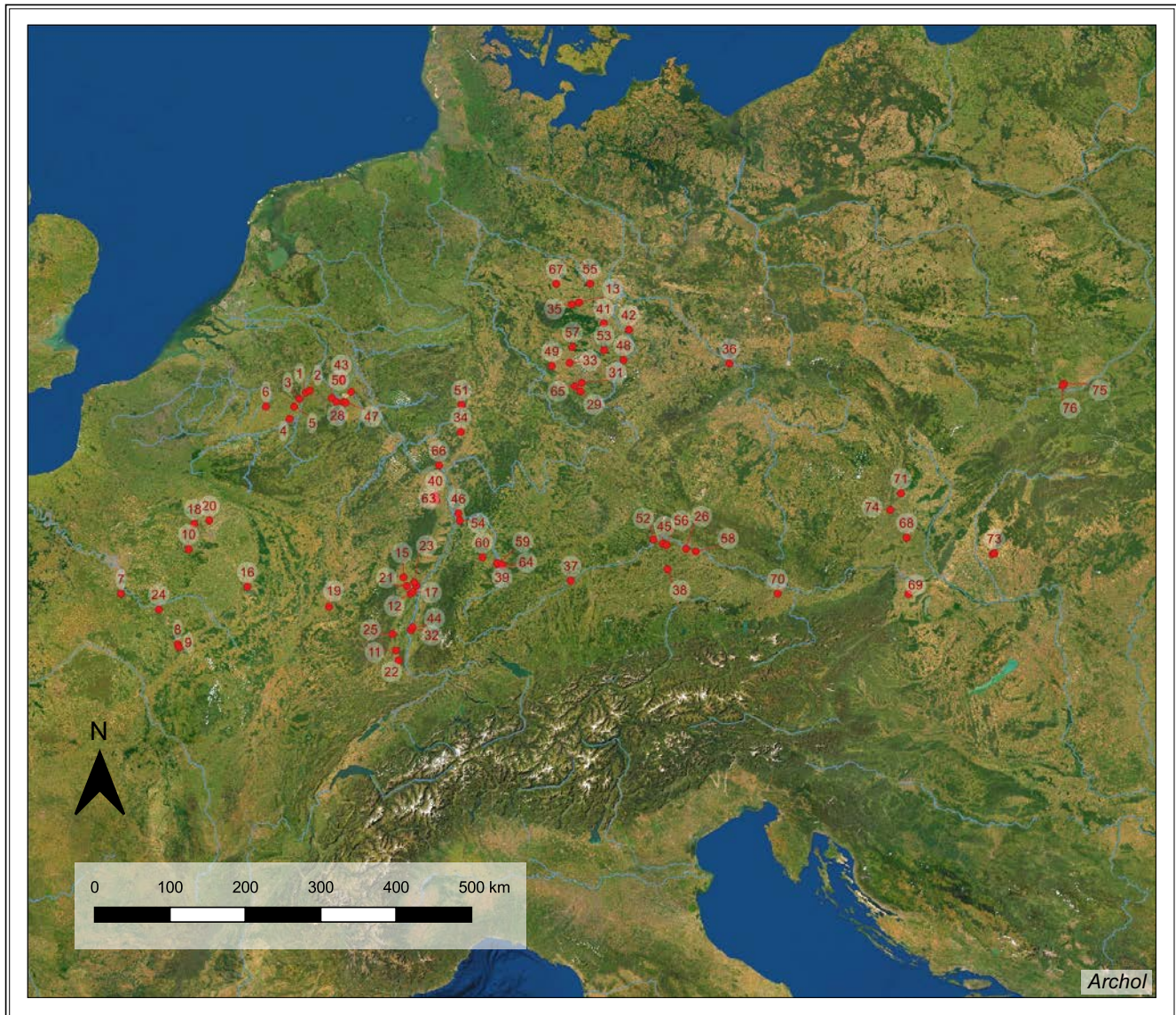


Fig. 3.3 Known European LBK burial sites.

Flomborn¹⁷⁷ was the first to be excavated in 1901-1903, while Vedrovice¹⁷⁸ is the oldest LBK cemetery to date.

Up to now 76 LBK burial grounds are known throughout Central Europe (Table 3.3).¹⁷⁹ They hold the remnants of at least 3600 LBK people¹²⁰, and more are still to be published or excavated. Most of them are buried in large burial grounds. But the LBK burial practice also demonstrates distinct diversity not least if we look at the location where people are buried. People were also buried inside settlements²¹, close to houses, in the long pits of houses, or in other settlement pits.¹²² Sometimes they were peacefully buried in the ditches or enclosures surrounding settlements but there are also sites where corpses with clear signs of violence were thrown into a ditch. Only recently so-called massacre sites¹²³ like Talheim, Wiederstedt, Herxheim and Schöneck have come more into view, showing a different kind of burial rite, albeit distinctly different amongst themselves as well. Disarticulated human remains

have also been found at settlements, enclosure sites and caves.¹²⁴

The majority of LBK burial grounds date to the Middle and Late LBK. From the Oldest LBK, only few are known like Flomborn¹²⁵; but the Czech burial ground of Vedrovice is the oldest known so far.¹²⁶ The burial grounds were in use for 100 - 400 years, with between 5 and over 300 inhumations and cremations taking place. There is no obvious precedent in indigenous Mesolithic practice in central Europe.¹²⁷ It is unclear if each settlement had its own burial ground or if a single burial ground was shared by many regional settlements. Still, a large number of settlements seem to be without a burial ground, or they have not been found (yet). Fig. 3.3 shows the distribution of LBK burial sites in Europe. Noteworthy is the absence so far of cemeteries in the Paris basin, Hungary, Poland and parts of central Germany; locations where LBK settlements are found.¹²⁸

¹⁷⁷ Jeunesse 1997, 13.

¹⁷⁸ Podborský 2002.

¹⁷⁹ Settlement burials not included or only if they are concentrated.

¹²⁰ Jeunesse 1997; Jeunesse 2003; Trautmann 2006; Bickle & Whittle 2013, 17.

¹²¹ Veit 1996; Nieszery 1995; Gerling 2009.

¹²² The settlement burials are not included in the total number of 76 burial grounds.

¹²³ Link 2014; Meyer *et al.* 2015; Zeeb-Lanz & Haack 2016.

¹²⁴ Hamilton *et al.* 2013, 45.

¹²⁵ Richter 1969; Jeunesse 1997.

¹²⁶ Pettitt & Hedges 2008; Zvelebil & Pettitt 2008; Zvelebil, Lukes & Pettitt 2010.

¹²⁷ Jeunesse 2009.

¹²⁸ Bickle & Whittle 2013, 17.

3.3.1 Bandkeramik burial grounds in the Netherlands

Traces of Bandkeramik settlements and burial grounds are only known from Limburg, the southernmost province of the Netherlands, from an area of ca. 200 km². Stone and flint tools have a larger distribution and are found as far as the Dutch North Sea coast in the west, and predominantly north of the riverine area, over 100 kilometres from the core habitation area.¹²⁹ The settlement and burial ground of the site Elsloo-Koolweg is internationally best known because of Modderman's house and pottery typology, which were internationally acclaimed.¹³⁰ But since the 1970s no large burial ground excavations were carried out although more are known to have existed. In our research area (Fig. 3.2), the Rhine-Meuse region (German Rhineland, Belgium, Luxemburg and the Netherlands), ten burial grounds have been

discovered, of which seven were found in the Rhineland and three in the Netherlands. Confirmed burial grounds in the Netherlands are up to now known from the aforementioned site of Elsloo-Koolweg but also from Geleen-Haesselderveld West and more recently Maastricht-Lanakerveld.

The earliest indication of a potential burial site is known from the site Maastricht-De Waal, a gravel and loam quarry just north of the city of Maastricht.¹³¹ In December 1927 workers of the quarry found the skeletal remains of a human in a crouched position at a depth of 3.5-4 m; no grave goods were discovered.¹³² The remains were inspected on site by the director of the Natural History Museum of Maastricht. He interpreted the skeletal remains as being 'modern', probably belonging to a soldier who died during one of the historical sieges of Maastricht. However, the crouched position and depth below the decalcified loess might be an indication that he was wrong. Crouched positions are not known from any soldier or other historic graves, as

¹²⁹ Louwe Kooijmans 2001.

¹³⁰ Modderman 1970.

¹³¹ Van Wijk, Amkreutz & Van de Velde 2014, 180.

¹³² Correspondence archives National Museum of Antiquities: Goossens to Holwerda dated 3-12-1927 and Goossens to Holwerda dated 11-12-1927.

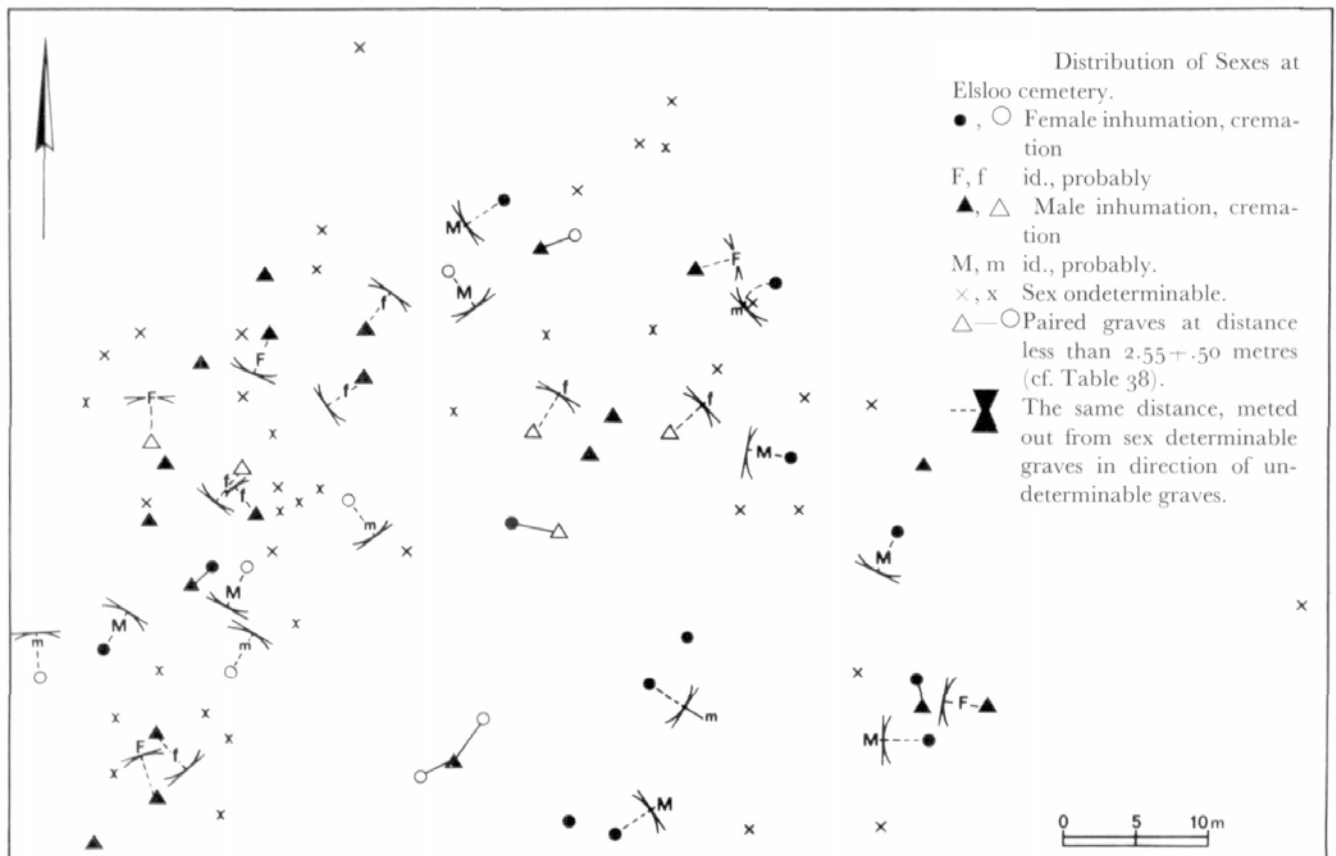


Fig. 3.4 Distribution of sexed genders at Elsloo cemetery (source: Van de Velde 1979, Fig. 27).

Christian regulations demanded an extended position. A prehistoric, or even Neolithic burial seems possible. Interestingly, in 1988 during rescue excavations of a LBK settlement, at more or less the same spot as the skeletal remains were found, local archaeologist H. Vromen claimed to have found a grave, without any knowledge of the previous discoveries there.¹³³ The feature with straight walls and a flat bottom measured 200 x 130 cm and was only a few centimetres deep. The excavators claimed to have seen a body shadow, but no grave goods were observed. Both sightings unfortunately cannot be re-examined; the skeletal remains from 1927 are lost and photographs of the 1988 grave unfortunately give no further clues whether a corpse shadow was present or not.

Another possible claim of a burial ground was known to and mentioned by Modderman.¹³⁴ During rescue excavations in 1932 by local archaeologist and general practitioner Beckers LBK pits were found just south of the village of Stein at a site called 'Grote Bongerd'.¹³⁵ One of the pits, with dimensions of 120 x 120 cm, was only preserved 40 cm deep in the gravel bed, but yielded two almost complete pots, one undecorated with lugs and one decorated.¹³⁶ In around the same area but in 1948, another local archaeologist, Father Munsters, again found an almost complete undecorated pot.¹³⁷ Are these also indications of a burial ground?

In Belgium (Hollogne-aux-Pierres¹³⁸, Millen¹³⁹ and potentially Wangen-Kleine Gete¹⁴⁰) only

settlement graves similar to the Paris basin have been discovered.¹⁴¹ A brief overview of these burial sites, apart from the Belgian and Luxembourgian sites, is presented in Appendices I (the Netherlands) and II (Rhineland).

3.3.2 Characteristics

LBK cemeteries are characterised by different concentrations of single graves. Since they are usually positioned a little apart from one another and rarely intercut, a lasting marking of graves is often assumed. The greatest number of burials are found in burial grounds of varying size ranging from small grave groups of 5–10 graves up to very large burial grounds with more than 200 graves. The LBK mortuary practice is biritual but shows great diversity (Table 3.3). The most dominant form of burial is inhumation, and to a lesser extent cremation. But there are burial grounds known, mostly from the central parts of the Bandkeramik territory (Poland, Czechia, and eastern parts of Germany) where cremation is the dominant practice.¹⁴² Several cases are also known where disarticulated remains or supernumerary bones have been found in grave pits in cemeteries. Completely empty graves or cenotaphs have also been documented.¹⁴³ They are indicative of a multi-stage funeral rite¹⁴⁴ in which the bones of the deceased were secondarily removed or scattered or where graves have been

¹³³ Van Wijk, Amkreutz & Van de Velde 2014, 204.

¹³⁴ Modderman 1970, 78.

¹³⁵ Beckers & Beckers 1940, 50–51.

¹³⁶ *Hutkom* [Wohngrube or dwelling pit] 18,

Beckers & Beckers 1940, 51.

¹³⁷ Modderman 1970, 78.

¹³⁸ Thisse-Derouette & Thisse 1952;

Trautmann 2009, 42.

¹³⁹ Lodewijckx 1990.

¹⁴⁰ Lodewijckx 1981, 27.

¹⁴¹ Jeunesse 1997.

¹⁴² i.e. Modniczka (Czekaj-Zastawny & Przybyła 2012), Kralice na Hane, Stephansposching (Schmoltz 1984), the central part of Aiterhofen-Odmühle (Nieszery 1995), Arnstadt (Trautmann 2006) and the southern part of Wandersleben (Trautmann 2006): personal comment H.-C. Strien.

¹⁴³ Lenneis 2010; Hamilton *et al.* 2013, 45.

¹⁴⁴ Nieszery 1995, 23–5; Gerling 2009.

Table 3.2 Mortuary practices in the LBK (source: Nieszery 1995, Fig. 5).

Cemetery	Settlement	Cave/Ritual place	Mass grave
Inhumations	inhumation in pit	desecrated corpses	burial of crime or murder victims
Cremations	inhumation in a settlement pit	human sacrifices	
	inhumation in a house		
Empty graves/pits	inhumation in a trench	ritual cannibalism	
Double burials	multiple or collective burials		
Bi-ritual double burials	partial burials		
	bone or cranial deposits		
Partial burials	secondary or delayed burials		
Delayed burials	cremations		
	partial cremation		
Secondary burials			
Cremations with body burials			

deliberately looted during an inter-community conflict.¹⁴⁵

The demographic spread of the burial grounds includes men, women, and children. While men and women occur in more or less equal numbers, children tend to be underrepresented in burial grounds, despite a high child mortality. The 'normal' position of the dead is crouched, more often on the left than the right side. Positions such as lying extended on the back are quite rare.¹⁴⁶ Graves usually have a dominant orientation that ranges from SE-NW to E-W (with the head to the E/SE).¹⁴⁷ Opposed grave orientations are also very common, and although they may be limited to specific areas of cemeteries in some cases, they often appear intermingled with the more common type.

Finally, there is the treatments of the deceased within the context of a settlement or burial ground where differences in practice can be observed.¹⁴⁸ As mentioned above the dominant orientation ranges from SE-NW to E-W with many variations between and within burial grounds. But among settlement graves the variability is even greater. While the left crouched position is dominant in burial grounds, there is more variation in settlement graves regarding irregular body positions.¹⁴⁹ Besides the body position, graves in burial grounds (70%) tend to be more likely to be furnished than settlement graves (50%). The most "richest" graves are mostly reserved for males, while in cemetery graves females and males have the same chance of being deposited in an unfurnished grave.¹⁵⁰ If any grave goods are present, they are more common in burial ground graves than they are in settlement graves. For instance, polished stone tools occur roughly twice as frequently in burial grounds than in settlements, and mostly in male graves (50%). This also holds true for flint artefacts, which are more frequent in burial grounds (25% of furnished graves vs 8% at settlement graves).¹⁵¹ Pottery is present in roughly half of all furnished graves in both contexts, but broken pottery (sherds) only seems to occur in burial grounds or labelled as waste in the grave fill of settlement burials.¹⁵² This ritual might be linked to the deliberate fragmentation of pots¹⁵³ or an indication that the graves were left open after the initial burial.¹⁵⁴ In conclusion, grave good assemblages are more varied in burial grounds than in settlement graves.

3.3.3 Inhumations

Early excavations of LBK burials like Elsloo¹⁵⁵, Flomborn¹⁵⁶, Niedermerz¹⁵⁷ and Nitra¹⁵⁸ have defined our understanding for the 'normal' or classical LBK burial rite, especially for inhumations. Typically, the deceased were buried alone in oval to rectangular graves, 1.40 to 1.45 m long and 0.60 m wide.¹⁵⁹ They were buried between 0.60 and 1 m (but up to 2 m) below the present-day surface.¹⁶⁰ The typical placement of the deceased was in a crouched position, on their left hand side, with the head oriented approximately towards the east or south-east.¹⁶¹ The body was slightly bent forward with the arms and legs flexed and the hands underneath the chin or head. Assumptions towards the meaning of this position vary from imitating a foetal position, a sleeping baby or individual, or even an indication that the individuals were tied up to prevent them from rising from the grave. But only 37 percent of inhumations conform to this picture.¹⁶² Crouched positions on the right frequently occur, as do crouched positions lying on the back; for the latter it is uncertain whether this is due to intentional positioning or the result of the body settling in the grave. Also, extended burials either on the stomach or on the back have been recorded. And these variations in body positions or orientation of the head can occur within the same burial grounds or in the same region.

Nevertheless, broader regional and chronological patterns have been documented.¹⁶³ Jeunesse distinguishes two different traditions between the western and eastern parts of LBK territory. In the West (Tradition I; Paris basin and Haute Alsace), graves and bodies were mainly oriented to the east, crouched on their left sides; and frequently covered with powdered ochre. Grave goods consisted merely of ornaments in the form of shells, and especially *Spondylus*, while pots and lithics were relatively less common. In the East (Tradition II; Basse-Alsace, the Rhineland, Central and Southern Germany, including Bavaria) the left crouched burials are again common, but more oriented to the west. Ochre-powdered graves are less frequent and instead are more often accompanied by fragments or lumps of ochre. The range of grave goods is larger and dominated by lithics,

¹⁴⁵ Farruggia 2002.

¹⁴⁶ Jeunesse 1997; Lenneis 2010, 161; Bickle & Whittle 2013, 17.

¹⁴⁷ Jeunesse 1996; Jeunesse 1997.

¹⁴⁸ Hedges et al. 2013, 376.

¹⁴⁹ Veit 1996, 184; Hedges et al. 2013, 376.

¹⁵⁰ It must however be emphasized that organic burial goods are mostly undetected or preserved.

¹⁵¹ Hedges et al., 374.

¹⁵² Hedges et al., 374; Peters & Balkowski 2020.

¹⁵³ Modderman 1988; Nieszery 1995; Hofmann 2010; Peters & Balkowski 2020.

¹⁵⁴ Bonnabel, Paresys & Thomasausen 2003; Thevenet 2004; 2009; Hofmann 2010.

¹⁵⁵ Modderman 1970.

¹⁵⁶ Richter 1968.

¹⁵⁷ Ihmig 1971; Dohrn-Ihmig 1983.

¹⁵⁸ Pavúk 1972.

¹⁵⁹ Trautmann 2006.

¹⁶⁰ Hartel 2011.

¹⁶¹ Jeunesse 1997; Trautmann 2006; Bickle & Whittle 2013.

¹⁶² Hamilton et al. 2013, 43.

¹⁶³ Jeunesse 1995; 1996; 1997; 2003; 2009.

		Total burials	Total body burials	Adult	Juvenile	Children	Female	Male	Indet.	Total cremations	Adult	Juvenile	Children	Female	Male	Indet.
36	Dresden-Nickern	5	5						5							
37	Dillingen-Steinheim	25	25						25							
38	Essenbach-Ammerbreite	29	29	17	3	9	7	6								
39	Fellbach-Oeffingen	142	109	53	5	30	14	17	21	33	23	7	3	4	3	
40	Flomborn	85	85	25		7	11	10	53							
41	Grossorner	5	5	5			1	4								
13	Halberstadt	43	42	27		13										
42	Halle-Trotha	5	5	4			3	1	1							
27	Inden-Altendorf	120	118						118	2						2
43	Jüchen-Holz	59	58						58	1						1
44	Königschaffhausen	7	7	3				1	4							
45	Mangolding	12	12	8			1	7	4							
46	Mannheim-Sckenheim	?														
47	Merzenich	280	260						260	19						19
48	Naumburg	6	6	2			1	1	4							
49	Niederdorla	13	10						10	3						2
50	Niedermerz	113	102	17	12	2	63	42	71	11	11			6	5	
51	Oberweimar	?														
52	Regensburg-Kumpfmuehl	17	10	6		1				2	1		2			
53	Rossleben	5	5	2	1		1	1	2							
54	Schwetzingen	229	214	130	18	63	61	47	3	15	10	2	1	4	2	2
55	Seehausen	5	5	3		2	1	2								
56	Sengkofen	31	31	1	2	1	1		27							
57	Sondershausen	47	47	31	2	11	17	16	3							
58	Stephansposching	41	10						10	31						31
59	Stuttgart-Mühlhausen	182	181	118		54	58	60	9	1	1					
60	Vaihingen a.d. Enz	120	120	19	3	18	10	12	80							
61	Viesenhaeser Hof I	29	29	28		1	14	14	1							
62	Viesenhaeser Hof II	25	25	24	1		12	13								
63	Wachenheim	20	20						20							
64	Waiblingen	5	5						5							
65	Wandersleben	352	222	122	22	78	73	49		120	65	15	14	16	8	26
66	Wiesbaden-Biebrich	18	18						18							
67	Wittmar	16	16	10	3	3	7	3								
Austria																
68	Kleinhadersdorf	70	70	10	1	9	2	3	50							
69	Mitterndorf	26	25	20	1	2	9	7								
70	Rutzing/Haid	24	24	16	2	6	8	8								
Czech Republic																
71	Brno	?														
72	Mlynarce	20	20						20							
73	Nitra	83	75	46		22	22	24	7	8						8
74	Vedrovice	102	27	61	8	17	41	21	16							
Poland																
75	Giebultowie	2	2						2							
76	Modlnicka 2	39								36	21		1	1	5	30
		3606	3020	1222	112	444	543	502	1082	434	212	53	21	56	43	143

Data added, after: Peschel 1992, Nieszery 1995, Veit 1996, Trautmann 2009 and Lifeways database Bickle & Whittle 2013 with personal additions made by D. Hofmann.

3.3.4 Cremations

Apart from inhumation, cremating the deceased takes up a significant proportion (ca. 10% of the burial record)¹⁶⁴ of the LBK burial ritual as over 350 cremation graves have been published or are known so far.¹⁶⁵ Their number is probably larger, as cremation graves tend to be in very shallow pits in the topsoil, which makes them more vulnerable for post-depositional processes like modern agricultural activities or erosion. It is even recorded that cremation graves were not recognised or recovered during excavation of the burial ground.¹⁶⁶ But modern-day excavators know of the possibility of encountering cremation graves when excavating a LBK burial ground and techniques have improved to carefully remove the topsoil by machine. This has not led to a sudden increase of the number of discovered cremation graves in general.

In the LBK, cremations were not commonly placed into ceramic vessels, which would have helped preserve them similarly to cremations from other cultures. The burial pits were usually very shallow and still within the topsoil layers. But still, cremations remain the second most common burial form within the LBK. It is still shrouded in mystery as to why and on what bases the deceased were either buried or cremated; or treated in yet other ways like dismemberment.

It is striking that the average degree of fragmentation is 'very small'.¹⁶⁷ This can be caused by the degree of burning, the treatment of the material after the cremation process and/or post-depositional processes affecting the bones after deposition in the soil. The cremated remains are believed to have initially been deposited rather 'unprotected'; without any cover such as a ceramic container or an organic vessel. But sometimes cremations are found next to, inside or covered by a ceramic bowl, like in Arnstadt or Wandersleben. The question remains if ceramic sherds found together with the cremations originally served as container for these burned remains. It is noteworthy that very small fragments such as teeth, phalanges and bones of the wrist are present within the graves, which suggests that that these cremations were collected from the pyre with great care since these small pieces could easily be overlooked.

Regarding the demographic distribution according to the sexes, there seems to be a nearly even distribution between males and females as well as for adults and sub-adults: sex and age were not discriminating factors for cremation.¹⁶⁸ The average age of the cremated lies between the age of 20 and 40. This corresponds well with the average life expectancy of LBK individuals.¹⁶⁹

3.3.5 Cenotaphs and/or empty graves

A last grave category which deserves mentioning is 'empty graves', pits in the form of graves, but with no skeletons, or only few remains. These empty graves in burial grounds seem to concentrate in regions like Lower Austria/Moravia and Bavaria but seem to be nearly absent in other regions.¹⁷⁰ Some of these graves contain various types of finds varying from no finds at all (53%) to only ceramic sherds (45%) or stone tools (10%). It is assumed that the buried bodies were disinterred, leaving no human remains behind beside grave goods, if any. What happened after the bodies were unearthed remains uncertain. But many sites concern burial grounds located in the decalcified loess zones with poor preservation conditions for any organic materials. Thus, empty pits are often found, which can nevertheless be considered graves due to the presence of stones or ceramic grave goods.

A distinction must be made between cenotaphs or empty graves. The former are represented by a burial pit in which no human remains are deposited, but grave goods are placed in an intentional position to symbolise the grave of the absent deceased. In empty graves, in contrast, human remains are almost completely absent and grave goods seem to be misplaced or disturbed from their original position.¹⁷¹

Especially the completely empty graves, without human remains or grave goods are noteworthy as to the reason why. If a corpse was present, it should have been removed before it could leave any archaeological trace, which means that the time between the burial and the exhumation was relatively short. And what happened with the body afterwards?

¹⁶⁴ Hamilton et al. 2013, 45.

¹⁶⁵ Trautman 2007.

¹⁶⁶ Hoffmann 1978; Dohrn-Ihmig 1983; Trautmann 2006.

¹⁶⁷ Trautmann 2006, 166.

¹⁶⁸ Trautmann 2006, 169.

¹⁶⁹ Trautmann 2006, 174.

¹⁷⁰ Lenneis 2010, 161.

¹⁷¹ Lenneis 2010, 162.

3.3.6 Treatment of the body

One of the many challenges in disentangling the LBK burial rite is that various aspects are blurred by poor preservation of the skeletal remains in many burial grounds. But as more burial grounds with bone preservation are being (re) published, several general aspects have become clear, as described above. In general, the deceased were inhumed individually and as a whole predominantly in a crouched position -either left or right sided- and sometimes in an extended position. The degree to which a body is crouched varies and is indicative that some may have been tied or wrapped,¹⁷² manipulated after burial,¹⁷³ or even removed entirely.¹⁷⁴ There are plenty of examples where parts of the body have been removed during or after burial¹⁷⁵ or parts added to another grave.¹⁷⁶ This may also be the case for grave goods if identical rites are considered.¹⁷⁷

3.3.7 Grave goods

Grave goods or grave furnishings are aspects of the burial rite which often seem an integral part of graves. Most of the time the deceased were buried with grave goods. At least half of the known graves seem to have been furnished with some kind of -preserved- grave goods; if organic remains could be detected everywhere the percentage would probably be higher. Grave goods were placed mostly around the head or the waist; sometimes on a step or shelf cut into the grave side.¹⁷⁸ A wide variety of grave goods are known to have been used throughout the LBK territory (Fig. 3.5)¹⁷⁹: adzes, axes, perforated maceheads (*masses perforées*), arrowheads, blades, other flint artefacts, querns or grinding stones and other stone equipment; ochre in the form of powder and nodules; whole pots (decorated and plain) and sherds; *Spondylus* (from the Adriatic or Aegean) beads, armrings, pendants, perforated shell halves and buckles; small terrestrial, river and marine shells other than *Spondylus* (from the Mediterranean, the Adriatic, the Atlantic and various rivers); occasionally perforated deer teeth, and some animal bones presumably originally in the form

of joints of meat¹⁸⁰. The combination of human and animal bone is a strong indication for food offerings for the deceased. Yet, they are rare in the LBK and if so, more associated with 'rich' graves.¹⁸¹ Grave goods of organic materials must be considered as well although hardly found due to poor preservation: milk products, beeswax or honey, textiles, hides, wooden artefacts, items made with vegetal fibres, flowers, plants, and even body fluids are known from ethnology. At Arnoldsweiler-Ellebach two charred wooden plates were found, one of which holding a human jaw.¹⁸²

When attributing grave goods to a grave, a division must be made between grave goods in the (upper) grave fills and the objects positioned on and next to the deceased on the bottom of the grave. Finds in the upper fill are usually more fragmented and can be either regarded as settlement debris, remnants of activities on the burial ground or as intentional gifts left by mourners in commemoration of the deceased.¹⁸³ For the burial ground of Arnoldsweiler, sherds in the fill are interpreted as deliberate grave goods whereas stone finds were not.¹⁸⁴ Settlement grave fills lacked any of these items, indicating their purposeful deposition elsewhere.

The list of grave goods is extensive, but the assemblage of different grave goods placed together in a single grave is always restricted to kinds of goods. Despite the shortcomings, grave goods, in association with patterning by age and sex, have been a principal focus of LBK mortuary studies.¹⁸⁵ In general, it can be stated that adults' graves are furnished with more grave goods than children's, with some important exceptions, and in some instances at least, for men to have more things than women.¹⁸⁶ As to the division of the different categories, males tend to be furnished with adzes, arrowheads, beads, arm rings and buckles. Females were generally more often accompanied by pottery and other ornaments. But there is, again, a lot of variability which makes it almost impossible to classify graves to age and sex based on a typological description of grave goods alone. One of the main problems is that cemeteries have been studied as a whole while individual choices and or contingent circumstances are passed over.¹⁸⁷ This has led to some (gender-based hierarchies and values, e.g. assumptions that women and children were of lower status than men.¹⁸⁸ Grave goods were assumed to be

¹⁷² Kahlke 1954, 121; Fischer 1956, 218; Jeunesse 1997; Lenneis 2010, 164.

¹⁷³ Boes 2006; Jeunesse 2003; Bickle & Whittle 2013.

¹⁷⁴ Lenneis 2010; Gerling 2012, 27.

¹⁷⁵ Boes 2006; Gerling 2006; Gerling 2012; Lefranc & Boes 2009; Bickle & Whittle 2013.

¹⁷⁶ Ungerath 2014; Peters 2018.

¹⁷⁷ Thevenet 2004; Bickle & Whittle 2013; Hofmann 2020a.

¹⁷⁸ Peters 2019.

¹⁷⁹ Jeunesse 1997; Bickle & Whittle 2013.

¹⁸⁰ Nieszery, 1995; Kahlke, 1954; Arbogast 2013.

¹⁸¹ Arbogast 2013.

¹⁸² Grave 3354: Czesla & Ibeling 2014, 141; Peters 2018, 313.

¹⁸³ Van de Velde 1979; Whittle 1988;

Hofmann 2020a.

¹⁸⁴ Peters & Balkowski 2020.

¹⁸⁵ Modderman 1970; Richter 1968; Pavúk 1972; Van de Velde 1979; Dohrn-Ihmig 1983; Jeunesse 1997; Budja 2010; Bickle & Whittle 2013.

¹⁸⁶ Jeunesse 1997; Bickle & Whittle 2013, 19.

¹⁸⁷ Bickle & Whittle 2013, 19.

¹⁸⁸ Jeunesse 1997; Hofmann 2010; Van de Velde 2011; Bickle 2019.



Fig. 3.5 Typical LBK grave goods (source: Köln-Lindenthal, Roemisch Germanisches Museum).

representative of the buried individuals' former belongings, gifts from mourners, equipment for the afterlife, or as symbolic representation of the activities related to the identity of the deceased. As such, they are subject to political or ideological manipulation by mourners.¹⁸⁹ It remains to be determined if sex-based variation in grave goods represents daily life tasks. While grave goods do not accurately reflect the deceased's identity in a one-to-one relationship, they do provide valuable insight into the role of material culture in identity creation.

Recent studies¹⁹⁰ regarding multi-proxy comparisons of grave goods with analyses of stone tool technology and use-wear may provide new insights into the sex-based division of grave goods¹⁹¹ and the subject of gender.¹⁹² This is in contrast to interpretations focusing on how sexed-based differences were being symbolically represented in funerary assemblages, including those related to labour. The site of Vedrovice¹⁹³ (Moravia, Czech Republic), which is the oldest LBK cemetery to date, proved to be a perfect

testing ground because of its well-preserved and sexed human remains and organic grave goods, and intensive studies on the material culture.¹⁹⁴ Masclans *et al.*¹⁹⁵ showed that male graves were associated with stone tools which related to hunting activities, interpersonal violence, butchering, woodwork, bone tools and only very infrequently to harvesting. The female graves proved to be more difficult and have no statistical associations for any kind of grave good in particular, although association with pottery vessels and *Spondylus* ornaments seems to be more apparent. If, and this applied especially for senile/mature women, they were buried with typical male tools such as adzes or blades they were used for hide/leather working and soft indeterminate (maybe organic) tissues.¹⁹⁶ This is an indication that there might have been a sexual division of labour.

¹⁸⁹ Van Gennep 1906; Van der Velde 1979; Jeunesse 1997; Bickle & Whittle 2013; Masclans *et al.* 2021, 2.

¹⁹⁰ Masclans *et al.* 2020; Masclans *et al.* 2021.

¹⁹¹ Jeunesse 1997; Hofmann *et al.* 2013, 243.

¹⁹² Nordholz 2015; Müller-Scheeßel 2019; Masclans *et al.* 2021.

¹⁹³ Podborský 2002.

¹⁹⁴ Masclans *et al.* 2021.

¹⁹⁵ Masclans *et al.* 2020; Masclans *et al.* 2021.

¹⁹⁶ Masclans *et al.* 2021, 33.

4 The Elsloo-Koolweg Revisited project: exploratory phase

I.M. van Wijk

4.1 Introduction

Within the framework of the Knowledge for Archaeology program of the Cultural Heritage Agency of the Netherlands (RCE), the project ‘Elsloo-Koolweg revisited, re-examining the Linear Bandkeramik burial ground of Elsloo-Koolweg’ was started. The basic aim was to invest in analysing the Elsloo LBK burial ground with modern standards and techniques.

The dataset is formed by the finds, samples and documentation of the Elsloo burial ground that was excavated and researched in 1959 and in 1966 but had only partially been analysed and published. In order to do so the excavation’s finds, samples and documentation had to be gathered during the initial exploratory phase. The first task was to find out whether the finds and samples –after being stored for over 50 years– were still there and if so, in what condition. It was unclear what the exact quality, suitability and availability of the intended dataset was. In addition, it was uncertain which *science-based* methods and techniques could actually be used. Therefore, the project was divided into two phases. During the exploratory phase, research into the potential and quality of the available material and data was undertaken and research questions were drafted, edited and operationalized. The outcome of the first phase is

presented in this chapter. During phase 2, the analysis and research of the datasets selected in phase 1 took place in which the research questions mentioned in the research proposal (final product phase 1) were answered. In Phase 2, the science-based research is carried out. This is reported in chapters 7-11.

4.2 Organisation

The project ‘Elsloo-Koolweg revisited, re-examining the Linear Bandkeramik burial ground of Elsloo-Koolweg’ was a collaboration of various researchers of different institutes. The core of the research team consisted of I.M. (Ivo) van Wijk (ARCHOL) and L.W.S.W. (Luc) Amkreutz (National Museum of Antiquities).

The research team has worked closely with the National Museum of Antiquities as the administrator/owner of the finds and samples, but also with the original excavators, the Faculty of Archaeology of Leiden University, who also curates the paper archive of the excavation. In addition, some research involving the settlement and/or burial ground (pottery typology, flint, stone analysis) had already been carried out and partly published by specialists from the Faculty of Archaeology (P. van de Velde: pottery, C.C. Bakels: botanical remains and adzes, A. Verbaas: querns, A. van Gijn: use-wear analysis).

Table 4.1 Research method and contributing partners.

Method	LAB/specialist
Physical anthropological research	ADC/Steffen Baetsen
AMS-dating	
cremation	Centre for Isotopes Research (CIO), Groningen
charcoal	Centre for Isotopes Research (CIO), Groningen
lipids	Bristol Radiocarbon Accelerator Mass Spectrometry Facility (BRAMS)/Mélanie Roffet-Salque and Charlie Maule
Charcoal analysis	Cambium Archaeology/Jelte van der Laan
Use-wear analysis stone and flint tools	Faculty of Archaeology Leiden University/Annemieke Verbaas and Annelou van Gijn
Pollen analysis	Archol/Yvonne van Amerongen
Lipids pottery	Organic Geochemistry Unit, University of Bristol/Mélanie Roffet-Salque and Charlie Maule
Pottery analysis	Archol/Ivo van Wijk and Piet van de Velde
Analysis, elaboration, synthesis	Archol/Ivo van Wijk and RMO/Luc Amkreutz

4.3 Research rationale

The National Research agenda Archaeology (NOaA 2.0) was developed to provide a research framework for the most important national research questions within archaeology.¹⁹⁷ These questions provide insight into the opportunities that lie ahead for developing knowledge (see §4.7). The 'Elsloo-Koolweg revisited' project complies with and contributes to research questions that are of importance to Dutch archaeology.

The Early Neolithic LBK burial ground from Elsloo was excavated and examined in 1959 by Modderman for the Cultural Heritage Agency (ROB) and later in 1966 for the University of Leiden. The dataset, consisting of finds, samples and documentation, was only partially investigated and published by Modderman in 1970.¹⁹⁸ In the last decades, new research methods, in particular improved analysis techniques (such as AMS dating, isotope research, ancient DNA research, histological research, use-wear analysis) were developed that can be used to gain more insight into the Elsloo cemetery and in particular the burial ritual. Such research (provided that the available find material is of good quality) could be an important addition to the typological studies carried out in the 1960s and 1970s.

4.4 Research strategy

The project was divided into two phases: Phase 1: exploratory study and Phase 2: conducting science-based research. The implementation of Phase 2 depended on the results of Phase 1. The exploratory study investigated the potential and quality of the available material and the data and further sharpened and operationalised the research questions (see §4.7). For Phase 1 of the investigation, the following work took place:

- Inventory of excavation records and original documents and photos;
- Inventory of finds and cross-comparison of find inventory;
- Inventory of deposited finds and samples and cross-comparison with published find inventory;

- Digitising field drawings and cross-comparison with published drawings.

4.5 Phase 1: Digitising the site plan

During the first phase of the project all available earlier excavation data was collected. This concerned, firstly, the original field and section drawings, drawings and photographs of objects, drawings covering the cadastral situation at the time and manually crafted outline drawings. The field drawings of the campaign from 1958 and 1966 were available in digital form in the archives of the Faculty of Archaeology in Leiden.¹⁹⁹

Upon viewing the drawings, it became clear that at the time the non-grave features had not been assigned any numbers and only the graves were provided with a grave number; which also served as the find number. It should be noted that the graves which had been excavated in 1958 (initially numbered 1 to 20) had been renumbered (92 to 113). In addition, two graves were later added after publication (graves 108 and 111).

Another problem was that the field drawings of 1966 are almost an 'artist's impression' of the excavated area where graves and other features were not clearly outlined (Fig. 4.1). An attempt has been made to copy the various features as faithfully as possible. The publication drawing²⁰⁰ was used as a reference.

After the inventory, the digitisation of the field drawings was carried out using Mapinfo as a GIS tool. The scans were loaded into this program and manually 'redrawn'. The field drawings were assigned to local coordinates. A track number has been assigned to all features. In addition to digitisation, other visible information from the field drawings, such as find numbers and height measurements, were marked as point locations. After digitising the field drawings, all individual files were joined together into one total overview and placed as well as possible within the Dutch National coordinate system. Finally, the excavated features were attributed to the different burial structures. The relationship between features and structures is further established in a Microsoft Access database.

¹⁹⁷ <https://noaa.cultureelerfgoed.nl/#/search>.

¹⁹⁸ Modderman 1970.

¹⁹⁹ With many thanks to M. Wansleebein.

²⁰⁰ Modderman 1970, Tafel 118.

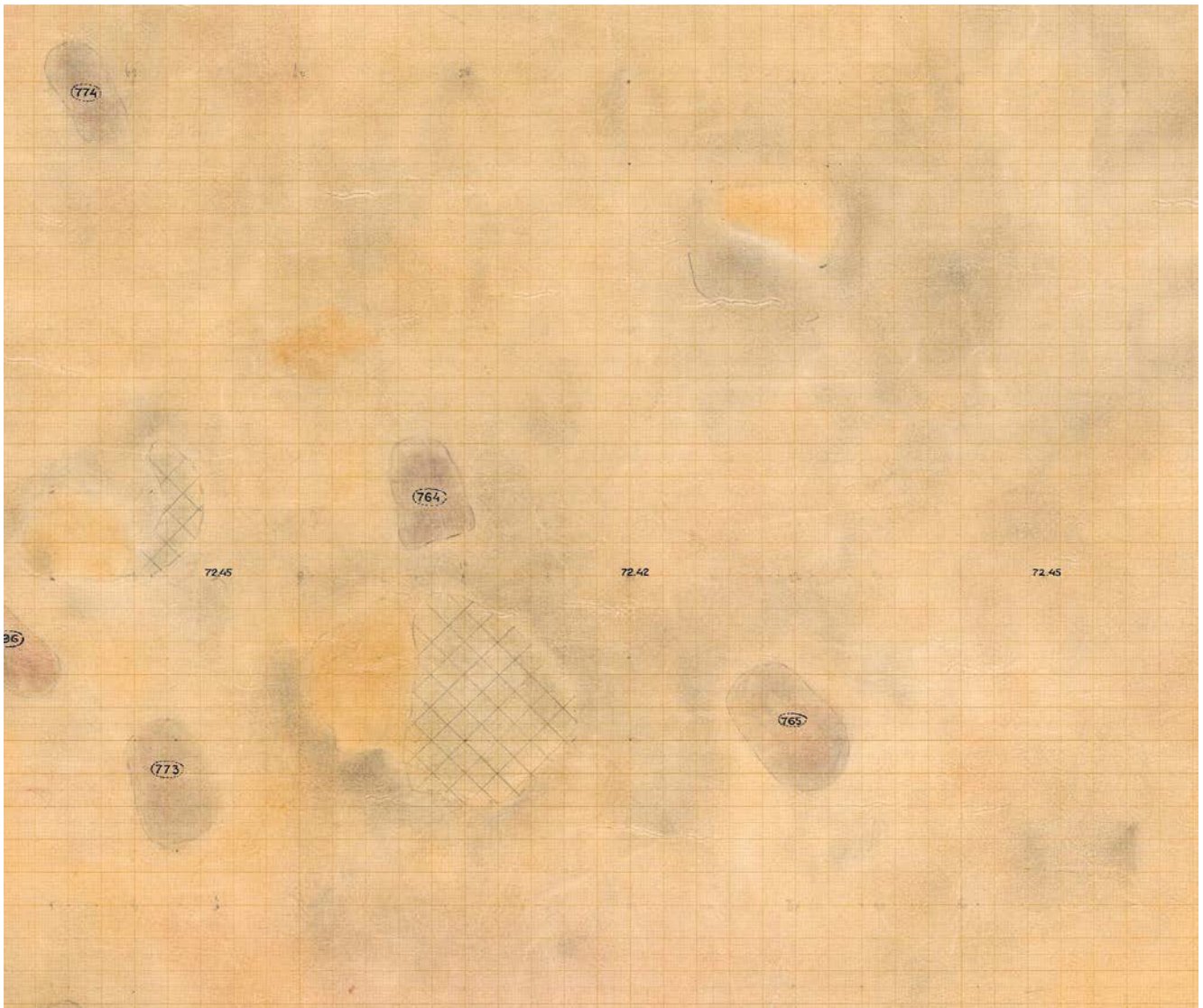


Fig. 4.1 Example of the 1966 field drawings showing graves 76 (find number 774), 86 (find number 764), 87 (find number 765) and 89 (find number 773).

4.6 Phase 1: Find processing

The inventory of the finds from the burial ground began with the study of the 1970 publication by Modderman, the excavation reports written by his students and daily field journals. The aim was to gain more insight into find conditions as well as to draw up a list of finds and a list of find numbers. The latter was important since the finds of the various excavations (both settlement and burial ground) in Elsloo were jointly filed with the RMO. The list of generated find numbers has been used to find out which finds should be present at the depot

of the National Museum of Antiquities (RMO). Some finds, however, are (long-term) loans located at the Limburgs Museum in Venlo, the Museum for Burial Culture in Stein and the Open-Air Museum in Arnhem. In addition, the RMO of course has finds in its own permanent display.

All available finds and samples which were not on loan or on permanent display at the RMO were retrieved in their original packaging (Fig. 4.2) and all finds were categorised by material category, number, and weight. The contents of the RMO's and other museum display cases were then reviewed and checked with the find list. Eventually, a list of finds was generated that indicates exactly how many and what kind of

Table 4.2 Changes in inventory list in relation to publication.

Grave	Category	Remarks
1	pottery, adze, blade, arrowhead, core, red ochre	Long-term loan the Museum for Burial Culture in Stein
5	1 ceramic vessel	Long-term loan the Limburg Museum in Venlo
18	1 adze	Lost according to publication but is present in RMO collection
21	1 adze	Long-term loan the Limburg Museum in Venlo
26	1 adze	Stolen during excavation
36	charcoal and cremation	Not mentioned in publication, mentioned in field reports, not present in RMO collection
42	2 flakes (flint)	Missing from RMO collection
47	1 spindle whorl	Not mentioned in publication, mentioned in field reports, not present in RMO collection
59	1 adze	Missing from RMO collection
63	ceramic sherds	Missing from RMO collection
63	2 blades	Not mentioned in publication but in field notes
66	1 stone	Not mentioned in publication but present in RMO collection
67	1 ceramic vessel	Missing from RMO collection
67	blade, arrowhead	Missing from RMO collection
70	ceramic sherds + 1 flake	Missing from RMO collection
72	1 adze	Not mentioned in publication but in inventory list RMO, but is missing in RMO collection
85	1 adze	Long-term loan the Limburg Museum in Venlo
86	1 piece of red ochre	Not mentioned in publication but present in RMO collection
87	1 ceramic vessel	Missing from RMO collection
89	1 piece of red ochre	Long-term loan Museum Schippersbeurs Elsloo
93	pottery, adze and quern	Long-term loan the Museum for Burial Culture in Stein
96	1 ceramic vessel	Long-term loan Open Air Museum in Arnhem
97	1 ceramic vessel	Long-term loan the Museum for Burial Culture in Stein
100	2 ceramic vessels, sherds, arrowhead, adze	Long-term loan the Limburg Museum in Venlo
101	1 adze	Not mentioned in publication but in inventory list RMO, but is missing in RMO collection
106	pottery, adze, quern, blade, arrowhead and flakes	Long-term loan Long-term loan Museum Schippersbeurs Elsloo, absent in RMO inventory list, container sample present at RMO, 2 blades missing
110	cremation	Missing from RMO collection
115	cremation and 1 flake	Not mentioned in publication, mentioned in field reports, not present in RMO collection

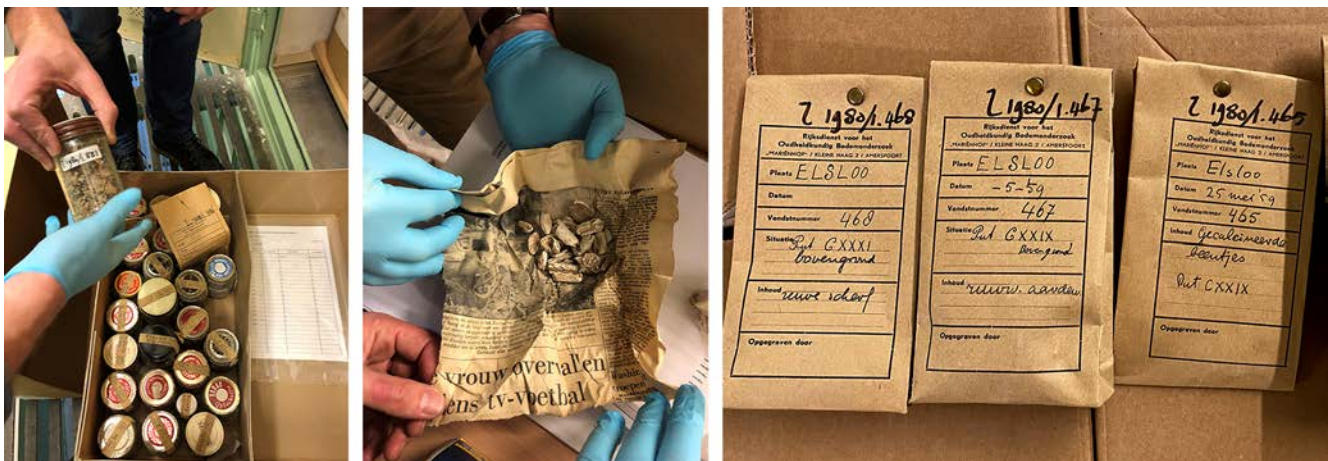


Fig. 4.2 Examples of the original packaging of finds, calcined bones and soil samples (from left to right: instant coffee pots, newspapers and paper bags).

finds were made and which of them were available for further research (see Appendix I). The finds on display have not been extensively analysed, as they could only be viewed.

The inventory and the comparison between the actual finds that are present and the finds as listed in Modderman's publication, the field inventory or daily reports yielded some interesting divergences. For example, for some graves the number of finds differs. Some finds are not mentioned in the publication but carry the same find number as a grave. In several cases finds were absent (these are shown in red in Appendix 1), and in some cases we have also recovered missing finds (see Table 4.2). The contents of a total of ten graves are no longer complete and eight graves are spread over several museum collections.

4.7 Phase 1: Evaluation

The first steps in the process were aimed at data management (digitising field drawings and find processing) to ensure a solid framework. The next step was to assess the potential of the find material, carried out by the material specialists involved. Most finds have been stored in a depot for over 50 years or are on public display at various museums, and their state of preservation for additional research was unknown. Based on the inventory, the bone and charcoal samples were evaluated by a specialist to assess their research potential. In addition, various specialists discussed the potential of the samples taken at the time for lipid residue analyses of pottery, botanical (pollen and macro-residue) research, as well as the potential for aDNA and isotope research on bones.

The evaluations of the various material specialists with regard to the pottery, burned bone use-wear botany and charcoal shows that the finds are suitable for the above-mentioned research methods. Initially, it also seems that this applied to the residue analyses of pottery, all the more so since the finds are not stored in plastic zip bags –which might cause contamination– but in cardboard bags.

4.7.1 Pottery

For the purpose of pottery analysis and to assess the potential for lipid residue analysis, a total of 1309 sherds were viewed. In total, pottery was found in 54 graves. In addition, five more features contained remains of pottery. Most of the earthenware is fragmented, but nevertheless 40 (almost) complete pots are present within the assemblage. The majority of these almost complete or restored vessels are on display in various museums and were not directly available for microscopic (specialist) research.²⁰¹

During the analysis, the preservation of the pottery was examined in particular to determine if sherds within the graves had been subject to post-depositional processes before or after they were deposited into a grave. At a later stage, attention was also paid to their function within the burial ritual.

Further investigations have been made towards the chronological value of the decorated pottery and hence towards the chronological distribution of the various graves. The decorated pottery typology following Modderman provides a relative chronology which enables us to make a distinction between the earliest and youngest graves. But reservations towards the use of the typology must be made, as most graves contain (parts of) only one decorated vessel which may or may not be distinctive enough to use. The same might be considered regarding the provenance and previous users of the pottery. A series of samples for ¹⁴C dating have been selected to gain further information about chronology. Multiple samples were taken from calcined bone, charcoal or lipids extracted from pottery, preferably from the same grave.

4.7.2 Lipids

A selection of sherds was designated for lipid residue analyses during the pottery analysis. Sherds with the highest potential for the presence of archaeological lipids were selected: upper wall fragments and rim sherds, as well as sherds with visual signs of charred food residues. A total of 38 sherds from 23 graves and another feature were selected for further analysis.

²⁰¹ In a number of cases, sherds from these vessels have been kept separate because, for example, they could not be fitted with the partly reconstructed pots. Most vessels have been reconstructed with the use of plaster.

4.7.3 Bone material

The valuation encompassed 56 find numbers from 52 different features. All finds were assessed for suitability for research into physical characteristics, human/animal distinction, sampling for isotope analyses, aDNA research and ¹⁴C dating. The assessment varied between impossible (--) and very possible (++) . In eight cases, an assessment was only partially possible because the fragments were lifted in a block, i.e. including surrounding sediment. However, it has been assessed whether it was useful to prepare the blocks with the aim of examining the variables as indicated above.

In total, 35 find numbers yielded potential for further research. The rest of the material was either too fragmented or too few in order to make statements about physical characteristics or any other variables. The block lifts showed potential but also had an esthetical value for the museum. A choice was made to examine the smaller block lifts which were thought to be not useful for aDNA and isotope research. The quality of tooth enamel and/or teeth was visually poor. Many teeth in the block lifts were fragmented by shrinking and drying out of the surrounding sediment.

4.7.4 Charcoal

A total of 38 samples containing charcoal were examined. The samples were scanned using a stereo microscope at a maximum magnification of 25x. It was examined whether the samples contained charcoal and, if that was the case, it was examined to what extent characteristics were present that could contribute to an analytical examination and/or a ¹⁴C/AMS dating.

In order to arrive at a sound comparison, preferably at least 100 fragments were viewed per sample. In addition, it was noted whether there appeared to be variation in the types of wood due to anthropogenic selection or patterned landscape exploitation.

With regard to the ¹⁴C dating, the remains were examined for the presence of branch or twig wood. This is to avoid the risk of the "old wood" effect that occurs when heartwood is

dated. That is why the type of wood was also identified; wood species with an irregular pore structure generally live less long than wood forming circular pores, which can reduce the risk of inaccurate dating. Additionally, some samples from the settlement were viewed and analysed.

4.7.5 Flint/stone

A selection was made of all available artefacts. The accessibility of the artefacts –some were stored in museum presentations– as well as budget determined the number of objects to be analysed. The following aspects were taken into consideration when selecting the artefacts which were to be examined:

- Preservation of the material: Given the experience with previously analysed LBK material, it was expected that the finds are predominantly well preserved, and all would be eligible for analysis. If this is not the case, the poorly preserved finds would not be analysed;
- Full set of grave goods available: Some of the finds have been lost or included in museum exhibitions and are therefore not or less available. In the first place, the finds from graves of which the whole assemblage is accessible were selected for analysis. However, if it should prove to be possible to also investigate finds that were on display exhibition, we would try to do so as much as possible;
- Analyses by other specialists: Assuming that the other specialists involved in this project would also have to make selections concerning which material to analyse, we coordinated the selections with them to ensure that as far as possible finds from the same graves would be studied.

It is customary, when analysing artefacts, to study the entire surface of each piece for traces of manufacture, use and reworking. The biography of the objects is especially important. For the adzes, it is then enough to analyse the whole object with low magnification, and the cutting edge and traces of the shaft with high magnification. A detailed technological description had already been carried out at an earlier stage by C.C. Bakels. The other objects

were examined microscopically. As far as the chunks of ochre were concerned, we examined to what extent an extensive study using a stereomicroscope would provide value, for example in relation to other stone tools such as grinding stones. There was no destructive (chemical) analysis of the ochre to determine the origin of the material.

4.7.6 Additional soil samples

During the excavation, a number of samples were taken from graves. Unfortunately, the reasons for this could not be traced in a number of cases, except if they are charcoal samples or block lifts of teeth. However, two reasons for sampling, derived from, among other things, the daily reports, reports and final publication emerged:

- Container samples: This concerns the contents of seven pots which, presumably because the pot fell apart during salvage, are almost completely preserved. In one case, even clear food crusts were observed on the sample. In consultation with the RMO, it was necessary to assess to what extent these samples can be examined without losing the aesthetic value of the pot. Small samples were taken from the bottom of the preserved blocks, using an apple corer. These samples were then available for lipid residue analyses as well as pollen research. Despite the fact that pollen is usually poorly or not preserved in the decalcified loess, in the case of these largely closed containers the situation seemed promising.
- Fill samples: Modderman mentions that the bottom of several burial pits may have been covered with a scattering of ochre, ash or twigs. In a number of cases there is also a “fatty” layer at the base of the burial pit. According to Modderman, the latter had a natural origin. We wanted to further study these samples (a total of 13) by chemical (in) organic analysis, to determine the origin of the sampled material.

4.8 Research questions

The Elsloo burial ground was extensively studied and published in comparison with other research

available at that time, mostly because it was one of the first burial grounds to be excavated and published.²⁰² Newly discovered LBK burial grounds have since been published and have changed ideas and opinions regarding the material culture and burial practice, as well as the view on social implications. This already gave rise to some general questions (§1.3). For the Elsloo project a number of research questions have been formulated which are addressed in the various contributions within this publication.

1. What are the characteristics and contexts of the burial rites in early prehistory? (NoaA 2.0 question 9)
2. What is the nature and context of variation and change in the burial system? (NoaA 2.0 question 45)
3. What is the nature and background of regional and chronological differentiation in population decline, population increase and population composition? (NoaA 2.0 question 58)
4. How many cremation graves have been found and what is the most plausible number of individuals buried in the burial ground? Have any graves been found in which the remains of several individuals are present?
5. What is the nature of the cremation remains (human, animal or a combination)? And in the case of animal remains, what do these (species, age, composition) consist of?
6. What is the total weight of each cremation and what does this say about the completeness of the buried individual (excluding the weight of any animal bone)?
7. What is the distribution of bone material by skeletal category and what can be said about the completeness of the individual on this basis?
8. What is the degree of fragmentation of the cremations? What relationship exists between the degree of fragmentation and the completeness of the individual?
9. What is the gender and age of each buried individual?
10. Based on the results of the (isotope) analyses, what can be said about the burial ritual (e.g. position of the body on the pyre, homogeneity of burning process, temperature, deposition of the burned bone material)?

²⁰² Modderman 1970; Van de Velde 1979.

11. What can be said about the distribution of cremations in the burial ground in relation to age and/or gender?
12. How many individuals exhibit regional, interregional, or long-distance mobility during their lifetime based on the ratio of $^{86}\text{Sr}/^{87}\text{Sr}$ and the concentrations of strontium in the samples?
13. What is the association of the $^{86}\text{Sr}/^{87}\text{Sr}$ ratio and the concentrations of strontium with sex, age, and/or pathology?
14. What connection exists between individual mobility and the place in the burial ground?
15. What information does the research on dental enamel provide?
16. Are there pathological abnormalities to be identified and what do they say about living conditions, health or activities?
17. What part of the population was cremated?
18. Are there any other indications (besides strontium) as to the origin of the deceased?
19. What is the dating of the graves?
20. In what state were (organic and inorganic) grave goods deposited (e.g. new or used), what was their purpose?
21. Which types of wood were used for the cremations and which parts were used? What diachronic image emerges from the study? Does the charcoal research provide information about the landscape around the burial ground and if so, in what way and how does this match the other data about the prehistoric landscape?
22. What indicators signal a (ritual) selection of the botanical material? Are there indications for botanical grave goods or the use of flowers/plants in the burial ritual? If so, what kind of plants are these and what significance do they have?
23. How should the (large) concentrations of charcoal/fire residues in the burial ground be interpreted? What is their character and spatial distribution? Are these burned residues from graves with little bone material or remains of the pyre?
24. How can the burial ritual be reconstructed on the basis of the remains found, what variation and developments occur in a diachronic sense?
25. What finds from the burials show evidence of burning, what patterns occur and how can they be interpreted?
26. Have (chemical) traces of food been found in the ceramics? Are these traces of food different to food preparation in settlement contexts (e.g. in (grave) containers)? Can this be demonstrated with lipid residue analyses of pottery and what information about food processing emerges from this?
27. Is there differentiation in burial rites between the individuals based on the biography of the grave goods? How do these individual differences relate to each other?
28. How do the results of the use-wear analyses relate to the interpretations of the burial ground as presented by Piet van de Velde in his dissertation and other publications?

I.M. van Wijk

5.1 Introduction

The village of Elsloo is located near the river Maas (Meuse), a meandering river which played –and still plays– an important role in the daily lives of the Elsloo community. Around 1900, the small village of Elsloo consisted of less than 150

houses, mostly farmsteads (Fig. 5.2, left). During the summer these were mostly temporarily abandoned, and families left for Germany to work as clay diggers for the brick factories. The development of the coal mines created a growing demand for labour which ended the summer migration. The flourishing coal industry at the start of the twentieth century changed the natural landscape, not only because of the

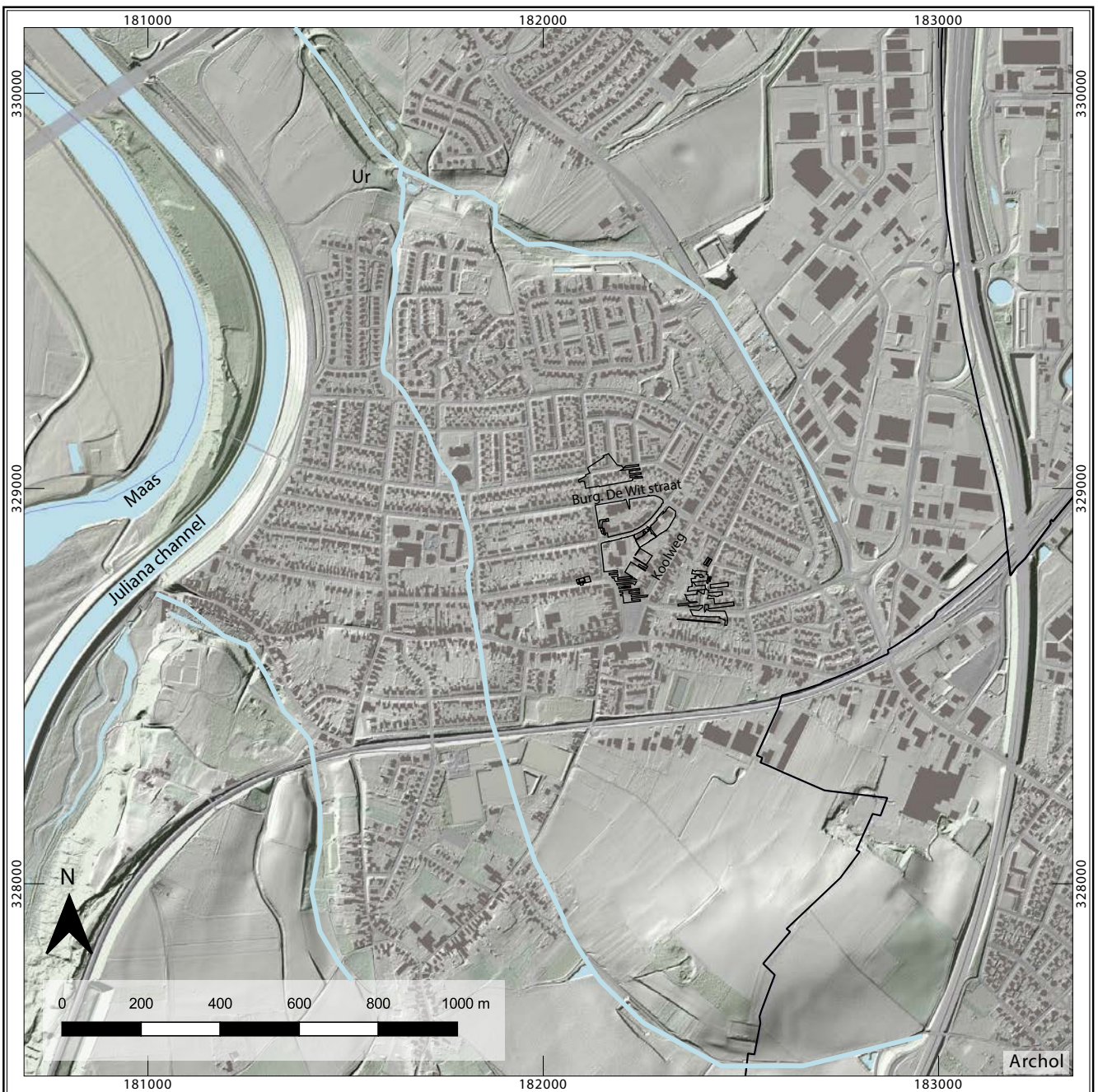


Fig. 5.1 Topographical map of Elsloo and its surrounding landscape.

collieries themselves and in particular their waste hills, but also due to the need for accessible transport routes: roads were improved, and railway tracks cut in straight lines through the landscape.²⁰³

The river Maas was the natural highway to the north, but the water level was fluctuating and not reliable. To secure a constant water flow the river was canalised during the 1920s and 1930s. The Juliana channel was dug straight through the old village of Elsloo and almost a third of the houses had to be demolished to make sufficient space (Fig. 5.2, right). Aside from the impact this had on the population, it also meant that new roads and houses needed to be built.²⁰⁴

These building activities provided ample opportunities for local archaeologist and general practitioner H.J. Beckers and his son to make investigations at various construction sites. Due to his efforts multiple archaeological finds and sites have been discovered.²⁰⁵ Various excavations of predominantly Iron Age, Roman and Medieval sites took place, sometimes in

collaboration with the National Museum of Antiquities.²⁰⁶ Inspired by the Köln-Lindenthal excavation, Beckers even recognised many Bandkeramik findspots. Some of them were located and excavated in 1935 along the Koolweg.²⁰⁷ New finds were subsequently made after Beckers' death in 1950 by Father A.A. Munsters. These finds triggered the State Service for Archaeological Investigations in the Netherlands to start a trial excavation. Ultimately, this also led to the discovery of the Bandkeramik settlement and burial ground of Elsloo.

The excavations in Elsloo are to date the largest in the Netherlands, uncovering an LBK settlement which spans an area of over 17 ha and a burial ground which covers an area of 96 by 64 metres and comprises a total of 113 graves (Fig. 6.1). The burial ground of Elsloo-Koolweg was discovered in 1959 during the initial rescue excavations of the LBK settlement.²⁰⁸ The western part of the burial ground was excavated later on, in 1966. The large LBK settlement is located only 50 metres to the south.

²⁰³ Modderman 1975, 260

²⁰⁴ Modderman 1975, 262.

²⁰⁵ Beckers & Beckers 1940.

²⁰⁶ Van Wijk, Amkreutz & Van de Velde 2014.

²⁰⁷ Beckers & Beckers 1940, 103-111.

²⁰⁸ Modderman 1970, 2.

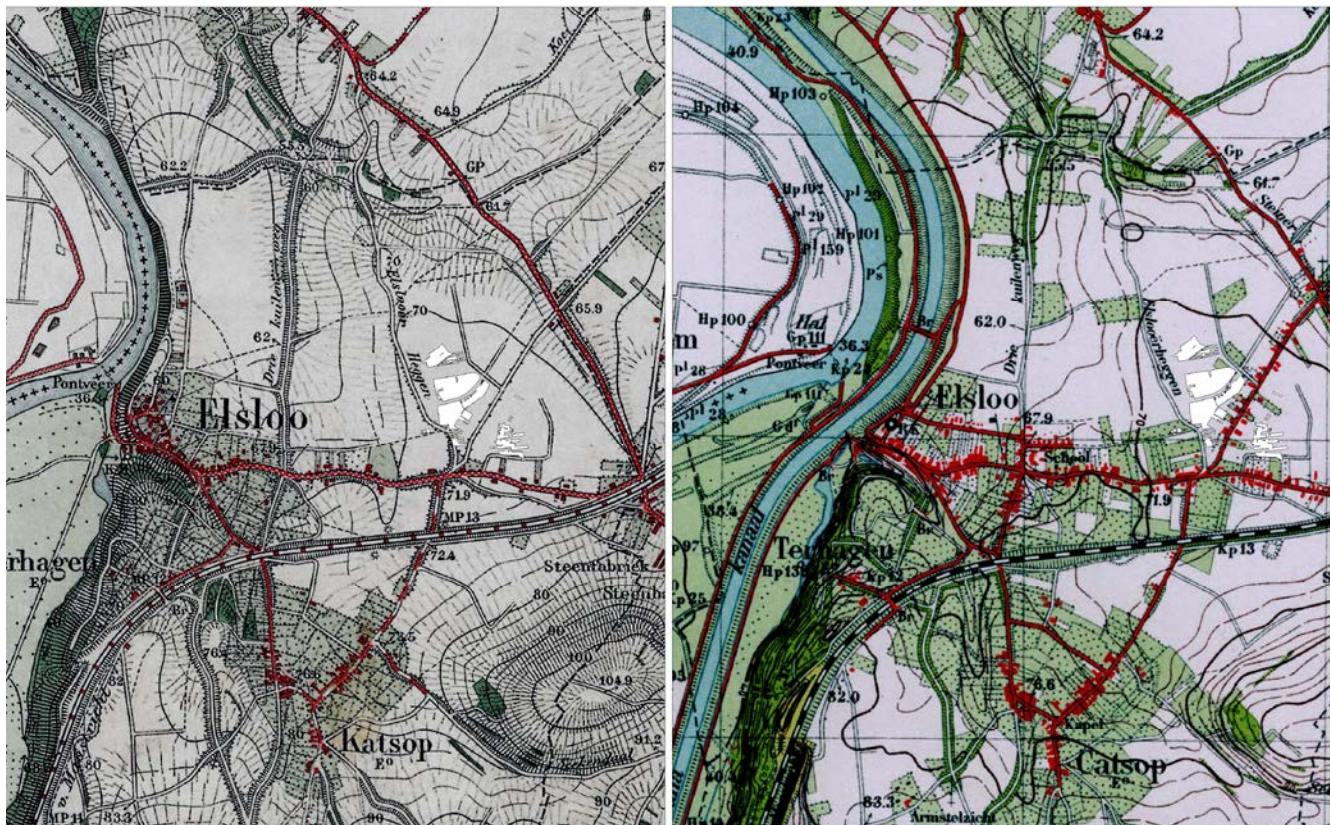


Fig. 5.2 Topographical map of Elsloo in 1925 (left) and 1949 (right) after the canalisation works were completed.

5.2 Landscape

The site is located west of the village of Elsloo on a rather flat plateau called the ‘Elslooër Hegge’ (Fig. 5.2).²⁰⁹ The plateau is part of a river terrace (Caberg-1) formed by the Meuse River during the Middle Pleistocene (Fig. 2.1). These grasslands have never, or hardly ever been worked for any agricultural activities apart from haying. The lands are located on one of the loess-covered terraces of the former Meuse. This terrace level has become strongly dissected over time by streams and the formation of dry valleys. The terrain over which the LBK settlement and the burial ground extend shows only slight differences in height. Near the research area there is a dry valley system: due north and east the terrain clearly slopes down. The site (Fig. 5.1) is bordered on the eastern and western edge by two dry valleys that both drain north of the settlement into the Ur. Modderman has already indicated that the possibility must certainly be considered that these dry valleys were partly water carrying but would also have served as a clear demarcation from nearby settlements. Especially for the western dry valley, there is strong evidence that it carried water at least several times a year for longer periods of time.²¹⁰ The southern extent of the settlement has not yet been located and due to the absence of natural boundaries — the terrain just slightly slopes in a southern direction — seems to carry on.

For a proper overview of the landscape and the soil at the research location, soil profiles were documented during the most recent excavations.²¹¹ No profiles were documented during the excavation of the burial ground, although some general remarks were made about the geographical setting and soil formation.²¹² With the soil profiles of the last excavations, the degree of preservation of the archaeological site could be assessed. The topsoil is a plough layer, which consists of either a single colluvium or a mix of colluvium and a reworked A horizon of the former *radebrik* soil or brick earth. Below the colluvium layer a well-developed Bt horizon is present. The original surface is no longer present, but its disruption has been so minor that it has hardly affected the Bt horizon. Therefore, the visibility and preservation of the features was reasonably

good, any find layers would be incorporated in the colluvium or topsoil, or have disappeared due to erosion downslope. However, the gentle slope on the terrain makes it plausible that slope processes have resulted in sedimentation rather than erosion. The gentle slope is also responsible for the relatively limited amount of colluvium, especially compared to slope locations in dry or river valleys, where layers of colluvium accumulate to several meters.

5.3 The first campaigns (1950-1967)

The State Service for Archaeological Investigations in the Netherlands (now the RCE) dug the first test pit in 1950.²¹³ It was dug to test whether the area was suitable for carrying out a large-scale (Bandkeramik) settlement excavation. Since the results were very encouraging, in January 1958 the first of several major excavation campaigns (partly also emergency excavations prior to house building) began, led by P.J.R. Modderman. The excavations of a plot some two hectares large started on January 28th 1958. The excavations lasted until June 28th, after which another plot of land, which was soon to be built on, was investigated from September 1st to September 27th. The excavations began again in 1959, on January 26th. After a three-week interruption due to a frost period, the investigation continued until July 10th 1959. In 1963 new excavations of the settlement were carried out from October 7th until December 13th.

The excavations lasted until 1967, after which the excavations were published in 1970. During these excavations, an important part of the settlement and the associated burial ground was uncovered and documented. In total, almost three and a half hectares of the Bandkeramik settlement were excavated. At first this was done entirely by hand, but over time it turned out that the use of a mechanical excavator (dragline) for stripping the topsoil was very useful. An exception was made in 1959 for the burial ground, which already yielded the first finds immediately below the topsoil. Here the upper layer was also removed with the spade. But in 1966, for economic reasons, the excavator was called to help again when the rest of the burial ground was examined.

²⁰⁹ Modderman 1958-1959, 3.

²¹⁰ Modderman 1970, 5.

²¹¹ Van Wijk & Porreij-Lyklema 2015, 51-54.

²¹² Modderman 1970, 4-6.

²¹³ Modderman 1950.

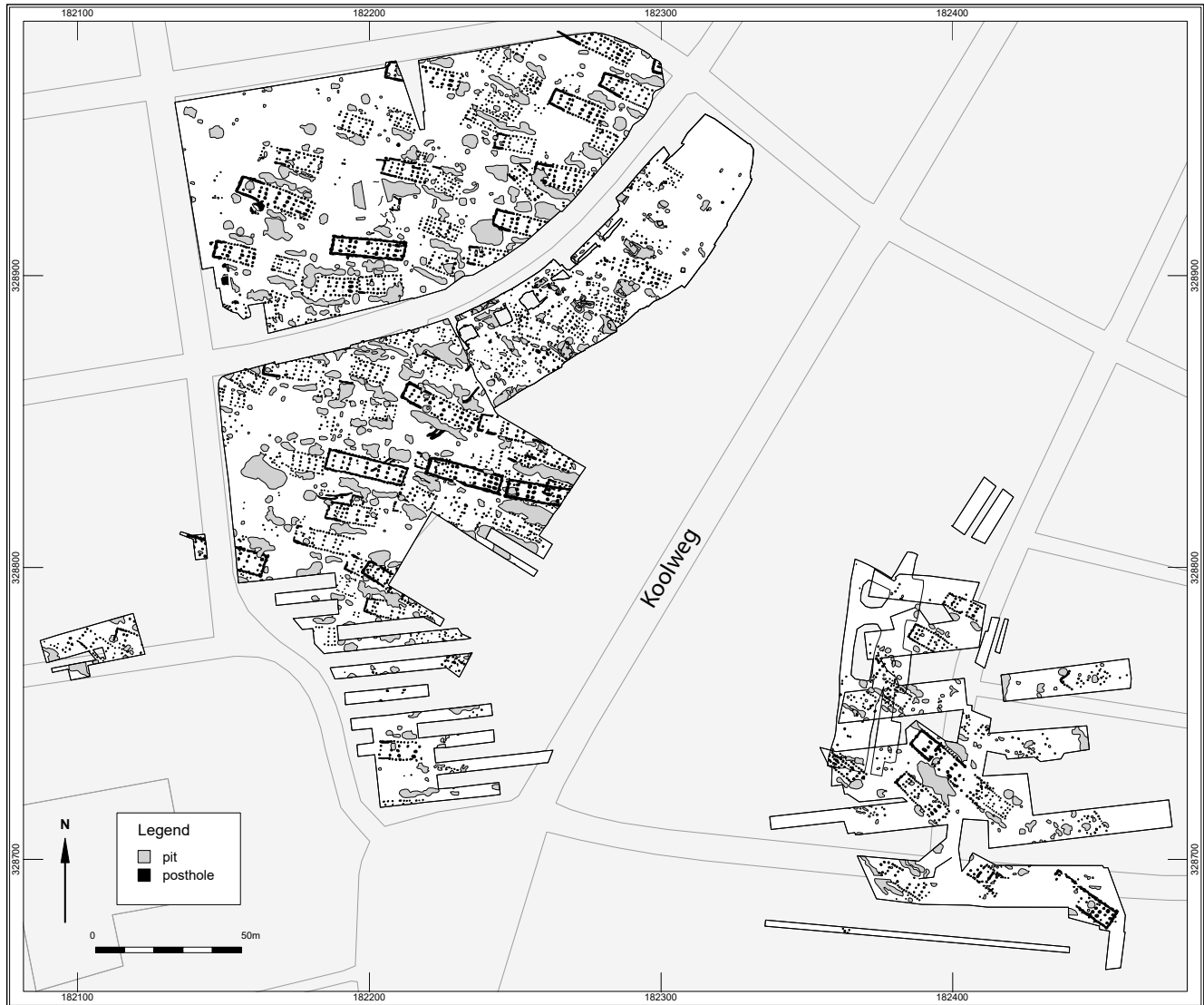


Fig. 5.3 Overview of the LBK settlement of Elsloo-Koolweg (source: Van Wijk & Porreij-Lyklema 2015, Fig. 14.1).

5.4 Recent campaigns (1988-2015)

After Modderman's excavation campaigns, it remained quiet in Elsloo for quite some time. Modderman had then started excavating the settlement site of Stein-Keerenderkerkweg and in addition, the post-excavation research had to be carried out. In 1970 the publication of the excavations of Elsloo and Stein followed. The former excavation site was almost completely built over, so that there were no new opportunities for archaeological research. It was only when a school (the St. Jozefschool) at the Bandkeramiekersstraat expanded that those

parts of the settlement could again be documented in 1988 (Fig. 5.4). In 2002 another archaeological intervention was carried out directly south of this school.²¹⁴ During both investigations, the features already excavated by Modderman were re-excavated and only a few new settlement traces were added to the overall picture, including the north-western part of a previously partially excavated house structure (house 44). The archaeobotanical research carried out during the last intervention is particularly interesting. At the time that Modderman excavated in Elsloo, collecting of prehistoric plant remains was not yet part of the usual procedure. In the area of Stein and Elsloo, the first LBK soil samples were not taken until

²¹⁴ Van Wijk 2002.



Fig. 5.4 Reconstruction of an LBK type 1b house on the playground of the St. Jozefschool.

1989, during the excavation of the site situated at Sanderboutlaan.²¹⁵ The grounds of the school offered a second chance.²¹⁶ In addition to a number of burned apple kernels and a core (*Malus sylvestris*), a large quantity of Lamb's quarters (*Chenopodium album*) seeds in combination with wild buckwheat (*Fallopia convolvulus*) was found, probably the remains of an accidentally burned meal.²¹⁷

During Modderman's excavations, not all postholes and pits were completely excavated. For example, deep pits were only examined slightly below the layer with the most finds, due to the time pressure and limited capacity characteristic of an emergency excavation: *"Es war nicht überall möglich, tiefe Schnitte durch Abfallgruben und Pfostengruben zu legen. Dort, wo noch gebaut werden sollte, wurde es unterlassen. Wohl wurde immer versucht, möglichst viele Funde aus den Abfallgruben zu sammeln, aber dabei wurden keine Schnitte gezeichnet."*²¹⁸

The fact that such pits can accommodate interesting find complexes has been shown by the archaeological intervention on the site of the former school.²¹⁹ Even when a site is completely built over, archaeological features can be preserved beneath the modern-day foundations and backyards. In 2006, 2012 and 2015 three campaigns were carried out which uncovered

new parts of the settlement, adding 0,7 hectares to the already excavated total area.²²⁰ In total 114 houses have been excavated of which 14 during the last three campaigns. They add to the already existing picture of the Elsloo settlement, not only by numbers but also by gaining more insight into the methods used by Modderman and the site's analytical pitfalls.

During these last three campaigns we could more or less complete the outlines of six previously yet partially excavated structures (houses 35, 79, 80, 83, 84 and 87). Fourteen houses could be added to the record: five type 1b houses, four or five type 2 houses, and three or four type 3 houses. Three structures could not be determined.

The structures are almost all flanked by longitudinal pits and in two cases by a so-called *Außengraben*. These are ditches that are located outside the wall posts of the house, presumably to support the heavy roof construction through sloping posts in the ditch. Based on the pottery analysis, an attempt was made to attribute the houses to different ceramic phases (Fig. 5-5). This proved to be a very difficult job as the high density of posts and pits is accompanied by many track ruts. Because postholes intersect, finds of different habitation phases mixed. This significantly complicates the dating of the pits based on the decorated pottery. Moreover, the most find-rich fills are usually located at the top

²¹⁵ Hendrix 1991.

²¹⁶ Bakels, in Van Wijk 2002, 19-22.

²¹⁷ Bakels, in Van Wijk 2002, 19-22.

²¹⁸ Modderman 1970, 3.

²¹⁹ From Van Wijk 2002, during the intervention a pit was excavated that was only partially cut during the excavation by Modderman. By continuing the cross section, the pit turned out to have a different shape and function than had been assumed by Modderman.

²²⁰ Van Wijk & Porreij-Lykema 2015.

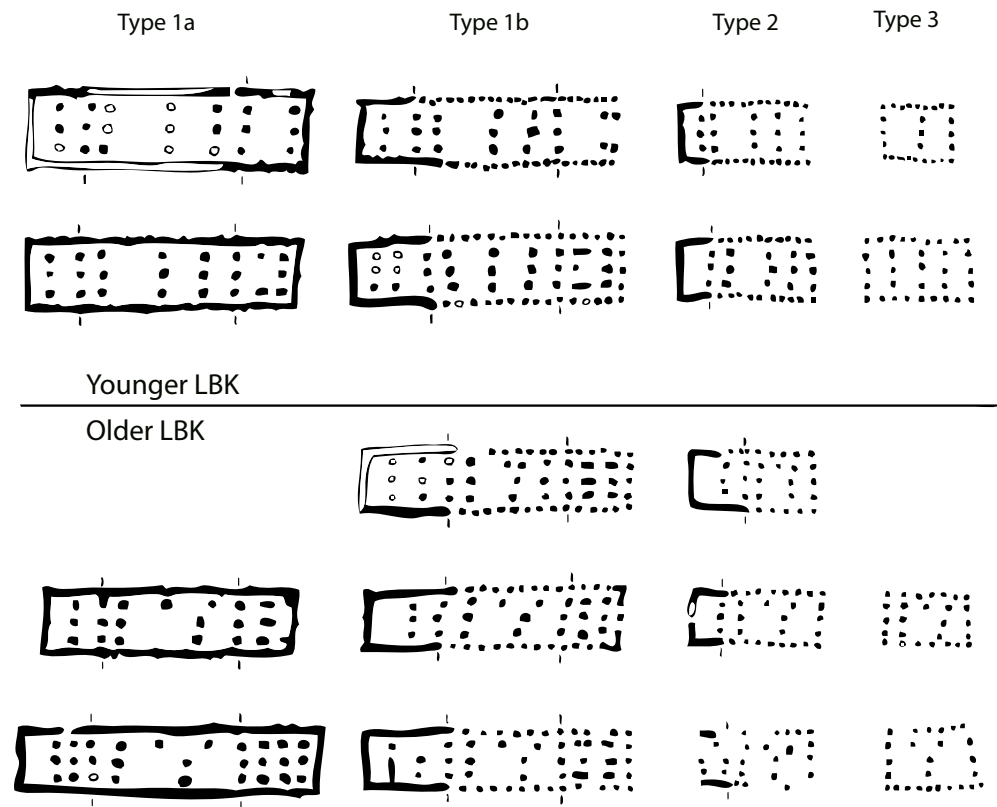


Fig. 5.5 The LBK house typology as drawn up by Modderman (source: Modderman 1970, abb.12).

of the pits, precisely the level at which the different pits cannot be distinguished. This must be considered for all analyses which have been carried out at an intra-site level for Elsloo-Koolweg, especially in the densest parts of the settlement.

Apart from the houses, a few features stand out. These are two pit complexes of silo pits dug close to each other, which are an indication of special activity zones that were not used for habitation but exclusively for the storage of crops. In addition, a number of ditch (parts) have been found that are partly in line with the already known ditches recorded during Modderman's research. These are isolated ditches which may have marked boundaries of a yard or fields; indications that the settlement was enclosed like in Sittard-Mgr. Claessenstraat are missing.²²¹ In any case, it is clear that the ditches had no defensive function given their low depth.²²² They may have been flanked by a palisade, as was the case in Sittard, but there are no signs of that. The settlement of Sittard clearly seems to be divided into different settlement clusters that are separated by ditches. In Geleen,

on the other hand, there seems to be a division of the entire settlement site and this compartmentalisation does not take place.²²³ In addition, we also know the *Erdwerke* that were found in Beek-Kerkeveld²²⁴ and Beek-Beekerveld.²²⁵ Thus, there seems to be a large variation in different types and functions of ditches that occur within or around LBK settlements.

Finally, two pits require attention: pit 152 and pit 246. Both appear to have been long pits belonging to House 96. Pit 152 (175 x 360 x 80 cm) had several fills of burned daub and charcoal.²²⁶ These are probably remains of a fireplace or kiln which have been deposited into this pit together with the usual domestic waste like pottery, flint and stone. Pit 246 contained several layers of burned daub and charcoal as well, but the bottom of the pit consisted of a layer of burned pebbles. At the base an isolated large stone, covered with ochre, was found which later became covered with soil and refuse; it is interpreted as a possible ritual deposition.²²⁷ Here also, the pit was used as a fireplace or remnants of an oven were deposited. In both pits the charcoal was very much fragmented, more than

²²¹ Modderman 1958-1959, 75; Van de Velde & Van Wijk in prep.

²²² Van de Velde 2008, Fig. 15-2.

²²³ Van de Velde 2008.

²²⁴ Van de Velde, Lohof & Wijns 2009.

²²⁵ Brounen & Rensink 2007.

²²⁶ Van Wijk & Porreij-Lyklema 2015, 67-68.

²²⁷ Amkreutz & Van Wijk 2020, 93-94.



Fig. 5.6 Additions to the LBK settlement for the campaigns 2006-2015 (source: Van Wijk & Porreij-Lyklema 2015, Fig. 7.1).

was recognised at first glance, because of the ash-induced potassium-rich alkaline burial conditions. The presence of ash also caused extensive dispersion and redeposition of clay within the soil profile, filling pores, cracks and cavities.²²⁸ Noteworthy is the presence of (small) unburned bone fragments in some samples. In the Dutch decalcified loess bone does not preserve, hence the body shadows in the graves are the only remnants apart from tooth enamel and a few bovine teeth. The relatively largest amount of bone fragments was found in the deeper layers of the pits, whereas no bone fragments were observed in the shallower layers. Bone readily degrades in burial environments that are not lime-buffered and oxygenated. One possible explanation is that the soil pH has been affected by ash addition –causing alkalinity– and has recovered only slowly.²²⁹

5.5 The settlement

The excavations in Elsloo revealed the outlines of the largest Bandkeramik settlement in the

Netherlands to date, consisting of 114 house structures (Fig. 5.3), an expected third of the total number of houses which once were erected. Most houses (Table 5.1) have a wall trench (type 1 houses), of which seven had a trench surrounding the entire structure (type 1a). These house types concentrated in the central part of the settlement but have been found also in the southern and western part. Due to the large number of excavated houses, it is quite possible to generalise and draw conclusions through comparison. Due to the additional campaigns more insight has been gained into the variability of house types and distribution of houses. The differences in house construction, especially comprising changes of the middle part, where roof-bearing posts were originally positioned in a symmetrical Y-setting that later on gradually changed into a row of three posts, formed one of the chronological markers for Modderman. In combination with the development of the pottery decoration a chronology of the settlement was proposed.²³⁰ Additions to Modderman's research, including a reclassification of the pottery according to the method of Van de Velde, makes it possible to

²²⁸ Huisman et al. 2012.

²²⁹ Huisman et al. 2012, 1000-1001.

²³⁰ Modderman 1970, Tafel 175-176.

draw up a finer chronological scheme for the settlement. It should be noted that this does not fully correspond to Modderman's original scheme in our pottery analysis, since our analyses are a derivative of this. This was clearly visible for the houses dated by Modderman and additions which overlapped or provided more decorated sherds. In general, the dates matched fairly well, but especially in the youngest phases of the settlement (ceramic phase IIc-IIId), our datings usually came out a little older. Therefore, for the graphical representation of the phasing of the settlement, it was decided to depict the house places for both dated phases. This does not result in any significant differences for the final image (Fig. 5.7; Table 5.2), but nuances this. It should be remembered, however, that as a starting point for the houses in a LBK settlement, those with adjacent pits should be seen as a unit: the place of residence.

It became clear that the settlement was already founded in the Flomborn phase (Older LBK).²³¹ The first phase (phase Ib) of the settlement is characterised by the felling or burning of the primeval forest, after which the first houses are built. A total of six to seven houses were built during this phase (within the excavated parts of the settlement): three or four type 1b houses, two or three type 2 houses and two type 3 houses. These initially concentrated in the

north-eastern part of the excavated area of the settlement. The distance between the different houses or house spaces is 25-35 m.

A further phase (phase Ic) in the development of the settlement shows that approximately the same area is inhabited and that it expands in a north and south-west direction. The number of houses is also increasing at this stage, but it should be borne in mind that houses built in phase 1b may have been in use during the subsequent phase. During this phase there are about five type 1b houses, four type 2 and two type 3 houses as well as one type 1a house in the settlement. The distance between the house spaces remains approximately the same. The area in use increases as a result of the further expansion of the settlement. During phase Id the settlement continues within the same acreage. A total of 11 new houses developed in this phase. These 'new' houses are mainly concentrated in the north-eastern part. In this phase, a silo pit complex was also put to use (probably already during phase Ic).

In phase IIa the settlement seems to extend more in a (north) west direction and the first traces are also visible south of the Koolweg. At least nine house spaces are present during this occupation phase. The number of type 2 houses seems to be decreasing at this stage, but the high proportion of unknown house types may give a distorted picture.

²³¹ Van Wijk & Porreij-Lyklema 2015, 187-193.

Table 5.1 Number of house types in selected (larger) Dutch LBK villages.

Site	Type 1a	Type 1 (a,b,c)	Type 2 (b,c)	Type 3	Type unknown	N	% Excavated area of extents settlement
Graetheide							
Elsloo-Koolweg	7	32	24	18	40	114	40%
Geleen-De Kluis	1	5	0	0	2	7	10%
Geleen-Janskamperveld	5	20	16	14	19	69	40%
Sittard-Mgr. Claessenstraat	2	13	16	5	30	64	35%
Stein-Heidekampweg	1	5	1	1	7	14	20%
Stein-Keerenderkerkweg	8	15	5	4	26	50	30%
Hesbaye							
Maastricht-Cannerberg	0	0	10	4	14	28	35%
Maastricht-Klinkers	0	1	0	0	6	7	10%
Maastricht-Lanakerveld	1	2	0	0	8	10	5%

Type 1a houses are differentiated from all variations of type 1, type 2 and type 3 houses. 'Unknown' houses are house structures which for various reasons cannot be classified. 'Percentage excavated' refers to the assumed total extent of the former LBK settlement (source: Van Wijk & Van de Velde 2020, Table 1).

Table 5.2 Houses and house types per habitation phase.

Phase	House type					
	1a	1b	2	3	unknown	total
Ib	-	3	2	2	2	9
Ic	1	5	4	2	4	16
Id	1	8	6	3	6	24
IIa		11	3	3	6	23
IIb	1	12	2	2	5	22
IIc	2	11	1	-	5	19
IIId	3	8	5	-	3	19

Source: Van Wijk & Porreij-Lyklema 2015, Table 14.1

The south-eastern expansion of the settlement also seems to continue in the next phase (phase IIb). Gradually, the north-eastern part of the settlement is abandoned, and the habitation moves towards the south-east. The number of type 1b houses remains highest compared to other types. This is also the case during phase IIc when the settlement is further expanded in a south and south-westerly direction. Noteworthy is the occurrence of two 1a houses as well as the absence of type 3 houses. Two type 1b houses have a small extension on the northern side which has not been observed in other houses in other phases. This may allow us to trace a sequence of homesteads settled by the same residents or family, where a new house was built in a new location and in roughly the same architectural style. This remains speculative for the time being. The southern silo pit complex is also in use during this and the previous phase. It is now fairly isolated in the settlement, more than 40 m from the nearest house.²³²

In the last habitation phase (phase IIId) hardly anything remains of the northern part of the settlement. This has moved almost entirely to the south and consists of at least nine houses. During this phase, relatively most type 1a houses appear to have been in use. The proportion of type 1b houses declines slightly in favour of type 2 houses. Type 3 houses are again completely missing. After this phase, the settlement is abandoned.

The habitation initially appears to have started in the north-western part of the area and has moved in a north-westerly, western and ultimately southeast direction over time. One

can thus speak of a constantly migrating settlement within a certain area; the distance between the different houses and their yards remains roughly the same throughout all phases, which suggests an idea of demarcation of a place of residence or house yard²³³ according to the *Hofplatz* model.²³⁴ This is also observed for the settlement of Maastricht-Cannerberg.²³⁵ Type 3 houses no longer appear to occur in the recent stages of habitation. Most of the house places belong to settlement phases Id-IIb with possibly 11-24 houses per habitation phase. Despite the distance between the different houses and their yards during a habitation phase, almost the entire area is in use or inhabited at some time. It remains unclear to what extent the ditches found during the various excavations are related to the different stages of habitation. If they are considered a boundary of the settlement, this seems possible for the last stages of habitation (phase IIc-IIId) based on the distribution of the house yards.

Contrary to Modderman's findings, it has indeed been shown for the settlement of Elsloo-Koolweg that grain storage pits were present. These sometimes cluster in larger pit complexes. In addition to isolated silo pits, certain parts of the settlement were apparently reserved for certain activities such as grain storage or domestic waste deposition.²³⁶ The discovery of one or more pits containing furnace waste; i.e. pits in which large concentrations of burned loam and charcoal (layers) and burned stones have been found, may also be seen in this light.

The excavations yielded a lot of find material. However, most pits were not

²³² Modderman 1958-1959, Abb. 9.

²³³ Modderman 1970, 209.

²³⁴ Kuper *et al.* 1974; Boelicke 1982; Claßen 2006; Zimmermann 2012.

²³⁵ Van Wijk 2016a.

²³⁶ Van Wijk 2016a.

Table 5.3 Total number and variation of different material categories present within the settlement of Elsloo-Koolweg.

Material type	Artefact	N
Flint	arrowheads	74
	scrapers	593
	blades	1574
	cores	72
Stone	adzes	53
	querns	326
	ochre	39
Various	spindle whorl	1

completely excavated due to time restrictions.²³⁷ An integrated overview of all the finds is lacking although much effort was expended on – especially the decorated– pottery in relation to the chronological studies. Based on the find list an effort was made during this project to at least provide an overview of all the different find categories present within the settlement. The finds from all different campaigns, in as far as they could be tracked down, are presented in Table 5.3. Flint tools were abundant, especially blades and to a lesser extent scrapers. Not too many cores have been found in relation to the number of scrapers and blades. Both adzes and arrowheads are present in large numbers, but presumably there must have been more originally, as these are tools that are mostly used

–and lost– outside the domestic area. Still, two refitting fragments of the same adze were found ca. 40 m apart in the pits belonging to houses 37 and 48. Quern stones have been found mostly as large fragments, but still broken and discarded. A spindle whorl²³⁸ was found in one of the many waste pits, as was a polished flint adze.²³⁹

A final aspect is provided by the results of the raw material analysis carried out by M.E.Th. de Grooth. The raw material spectrum of Elsloo-J. Riviusstraat is extremely uniform; it confirms the picture that was sketched for Elsloo-Koolweg at the time. From a broader perspective, this monotony is remarkable. Although Geleen-Janskamperveld (from the earliest phase of the Limburg LBK) shows a similar picture, in almost all Dutch settlements the flint spectrum varies from settlement to settlement, from generation to generation and from place of residence to place of residence.²⁴⁰ For Elsloo, however, the continuous almost exclusive use of Banholt flint is characteristic, also during the youngest phases of the LBK. In terms of artefacts, the assemblage offers an image familiar for Bandkeramik settlements. The considerable amount of processing waste (flakes and splinters) makes it clear that flint processing largely took place on the house yard.

The extensive analysis of the distribution of features, site chronology, and raw materials carried out for the settlement of Elsloo-Koolweg provides a solid base for comparison with the Elsloo burial ground (Chapter 12).

²³⁷ Modderman 1970, 3.

²³⁸ Find number 290.

²³⁹ Find number 217.

²⁴⁰ De Grooth 2014.

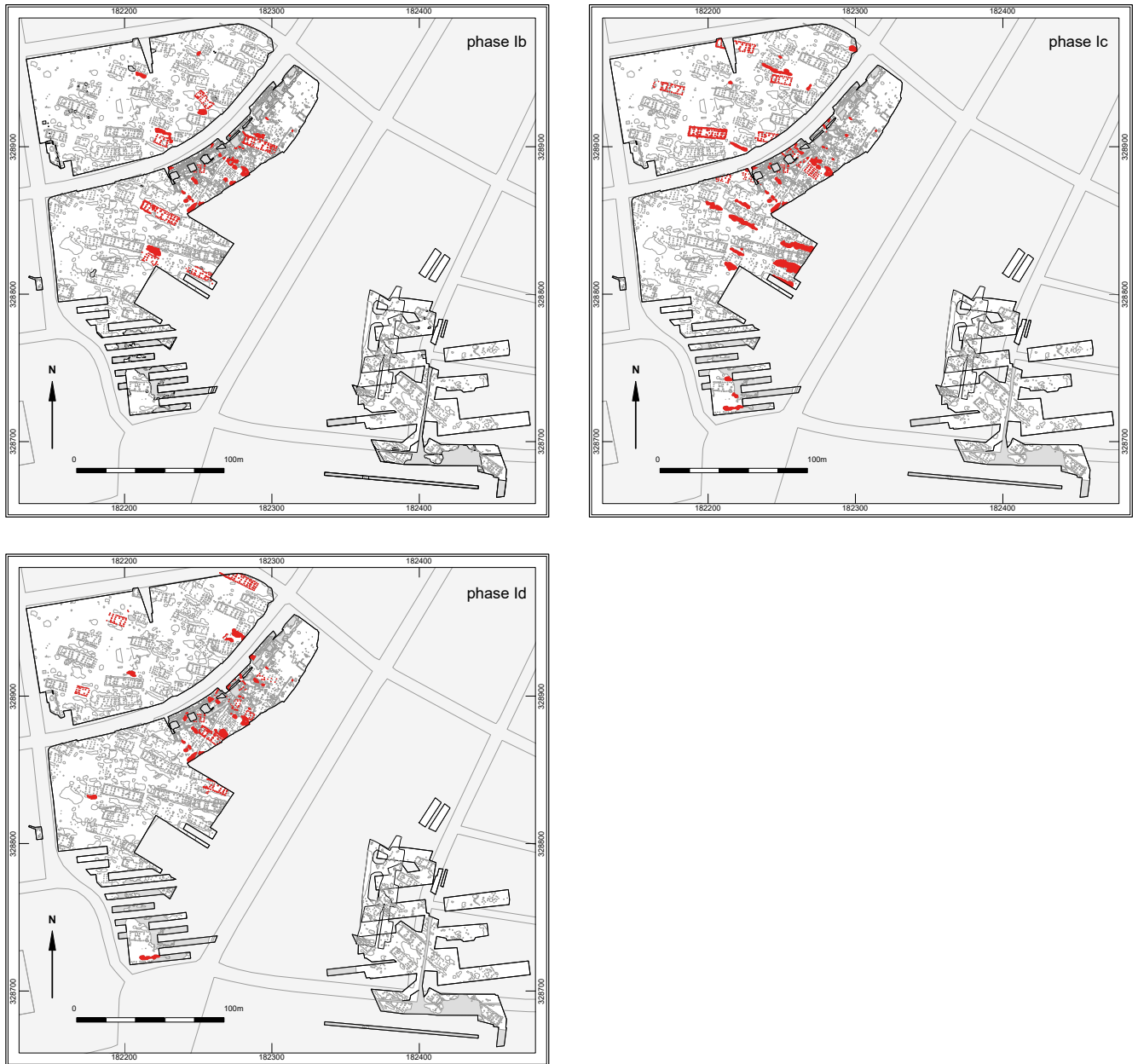


Fig. 5.7 Habitation phases of Elsloo-Koolweg. Structures of a designated phase are marked in red (source: Van Wijk & Porreij-Lyklema 2015, Fig. 14.2 and 14.3).



Fig. 5.7 B

I.M. van Wijk

6.1 Introduction

The excavations of the Bandkeramik settlement started on January 28th 1958 and lasted –with intervals– until 1967. On May 12th 1959 the burial ground was discovered. Hired workers were told that a complete vessel would mark a potential grave and during test trenching to search for the outer limits of the settlement, a complete vessel was found.²⁴¹ The last two months of the excavations in Elsloo that year were entirely devoted to the investigation of this burial ground. In total 16 inhumation graves were excavated in an area of ca. 37 by 100 m (ca. 1800 m²), surprisingly also three cremation graves were found or recognised.²⁴² The excavations and especially the burial ground gained much (international) press attention and local visitors, and a swift continuation of the investigations seemed advisable. But still, it was seven years before the other part of the burial ground could be excavated. Problems with ownership of the remaining terrain and finances

prevented a rapid continuation of the excavation. Further housing development plans urged the need for further research. From March 14th to May 6th in 1966, the remaining part of the burial ground was excavated by the Institute for Prehistory at Leiden University (IPL) with the help of 4–6 students and a dragline and four hired workers from the ‘Koninklijke Heide Maatschappij’. The excavations were arranged in close co-operation with local authorities and the inhabitants of Elsloo, leaving a lasting impression (Fig. 6.2). Unfortunately, this was not always on a positive note, as the dig provided a welcome attraction for vandalising school kids nearby.²⁴³

The excavations of the burial ground and its results were extensively published by Modderman and provide a solid overview of the site and its findings.²⁴⁴ During the explanatory phase of our project, additional information came to light. This chapter focusses on combining this new data with Modderman’s original publication as well as the study by Van de Velde.²⁴⁵

²⁴¹ Modderman 1975, 276; the vessel belonged to grave 97.

²⁴² The excavators of 1966 were under the impression that no cremation graves were found during the 1959 excavation, although it was clear that calcined bone remains were present. The discovery of cremation graves right at the start of the 1966 campaign led the researchers to believe that Iron Age cremation graves were present next to the LBK inhumation graves, a notion that soon changed.

²⁴³ The field reports mention the intentional breaking of an adze, spilling of black ink on the field drawings and the frequent removal of measuring pins. On the other hand, villagers brought their own finds to the excavation for evaluation.

²⁴⁴ Modderman 1970.

²⁴⁵ Van de Velde 1979.

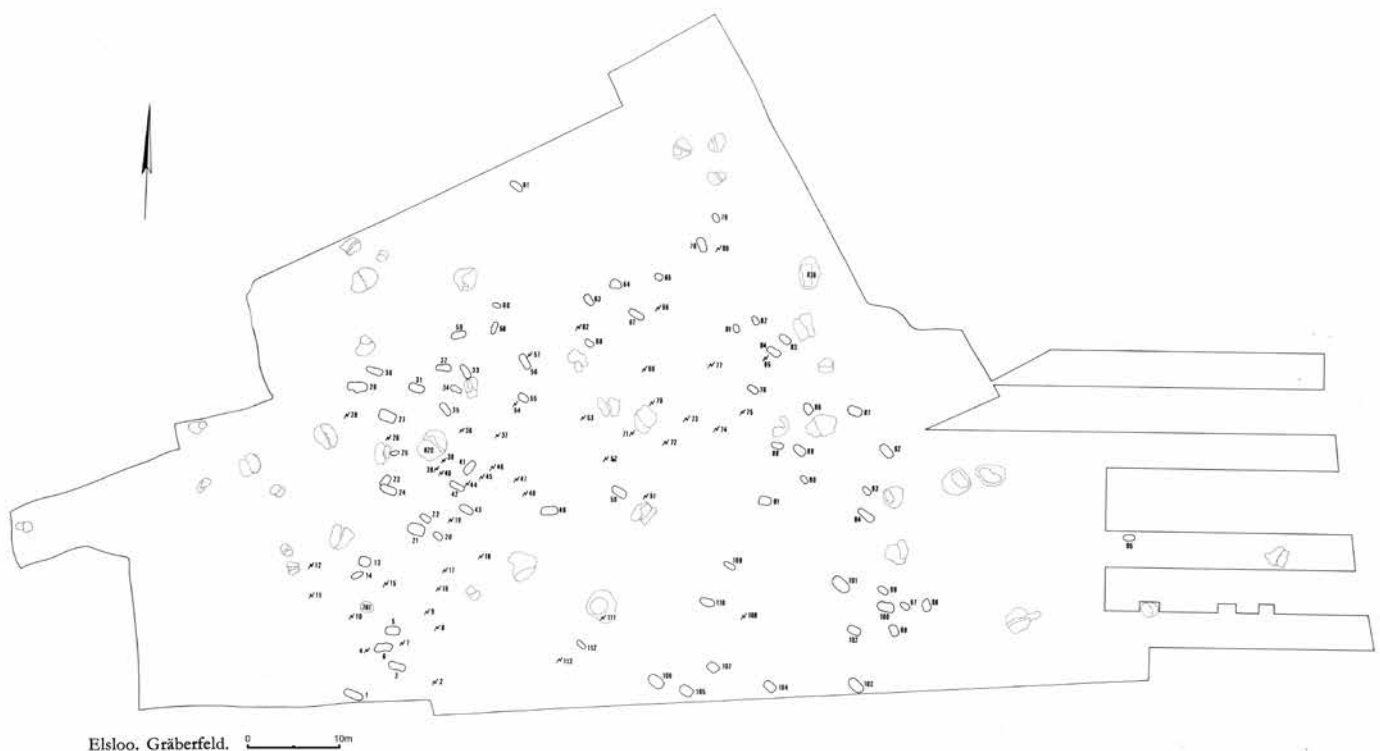


Fig. 6.1 Overview of the LBK burial ground of Elsloo-Koolweg as excavated by Modderman (source: Modderman 1970, tafel 118).

6.2 Excavations of the LBK burial ground of Elsloo-Koolweg

During this campaign almost 100 inhumation and, surprisingly, cremation graves were excavated in an area of ca. 48 by 98 m (ca. 4000 m²). In total 113 graves were found covering an area of 6150 m². The total number of graves was probably larger, as the southernmost part of the grounds have not been excavated and some cremation graves might have been ploughed up as indicated by interments of calcined bones which were always found at a shallow depth.²⁴⁶ The cemetery is almost completely excavated and there is good reason to believe that at that time the boundaries of this burial ground were established in a northern, western and eastern direction. Observations made during road construction in 1967 did not reveal a single trace of burials. The southern boundary must lie in a

45 m wide untouched strip, where today the Burgemeester de Wittstraat with its houses and gardens is located.²⁴⁷

The scientific value of these stone age burials was apparent to many and offered a lot of potential. It is impressive how many new techniques were tested at the excavation. Numerous block lifts of finds and human remains were undertaken. Fishing rods and even a fire department truck was used to make aerial photographs. The 1959 campaign was filmed in black and white by Mrs Modderman and edited by Modderman himself.²⁴⁸ Various soil samples were taken by various institutes to examine different types of grave fills. Ultraviolet photography was used to test, with no positive result, if body shadows could be distinguished. Even soil lacquer peels were made of some of the body shadows. These techniques all had different outcomes, some questionable, but an effort was made to maximise the documentation of information.

²⁴⁶ Van de Velde 1979, 84.

²⁴⁷ Modderman 1970, 65. This road was already constructed before excavations took place.

²⁴⁸ The film was never shown to a broader public and remained within the family archives for decades.



Fig. 6.2 Photcollage of curious visitors, Father Munsters with a nun, villagers and school kids visiting the sites and getting a tour by Modderman.



Fig. 6.3 The use of the dragline for removing the topsoil.



Fig. 6.4 Overview of the excavation in 1966.

The initial excavations were assisted by the help of a mechanical dragline (Fig. 6.3) to remove the topsoil. It was one of the first times that a dragline was introduced on an archaeological excavation. Although reservations were voiced about the brute force such a machine brought to these kinds of delicate archaeological excavations, the benefits were decisive, especially for opening up grounds to excavate the large settlement. Initially the complete topsoil (ca. 35 cm) plus underlying colluvium (10-25 cm), if present, was mechanically removed. Because of multiple finds of adzes, arrowheads and concentrations of calcined bones found in the spoil heap, the strategy changed and only the topsoil was mechanically removed. This was done for the most part of the burial ground, although the exact dimensions are not known. All the graves were excavated further by hand (Fig. 6.4).

As the cremation graves were already visible at a higher level, these stood out on the excavation surface like little 'islands' (Fig. 6.5). The graves were excavated by hand (Fig. 6.6) and field drawings and photographs were made at various depths. When documenting the graves a division was made between finds recovered when removing topsoil, finds in the fill of the grave or finds present in the bottom of the grave pit (above or below the presumed

deceased in the pit). The presence of charcoal, bones, manganese or ochre powder concentrations were always documented. The fills themselves, even within the graves, varied a lot.

The skeletons from the inhumations did not survive in the burial record but body silhouettes or corpse shadows (19 graves) were preserved in the soil of the graves as was some tooth enamel (11 graves). In the cremation graves calcined bone fragments were found ranging from a few small fragments to larger concentrations of fragments. Analysis of the calcined bones indicates that these belonged to at least two males and one female, two juveniles and five adults.²⁴⁹ Analysis showed that the cremations were burned at temperatures between 700 and 900°C. Also noteworthy was that over 63 percent of the cremations were very fragmented; over half of the studied remains weighed less than one gram.²⁵⁰ According to Trautmann, the erosive soil probably destroyed the cremated remains of children much faster than those of adults explaining the absence of children among the cremation graves.²⁵¹

Most cremation graves are found in the western part of the burial ground despite the fact that a mechanical excavator was used,²⁵² instead of the eastern part which was excavated

²⁴⁹ Trautmann 2006, 105-106.

²⁵⁰ Trautmann 2006, 104.

²⁵¹ Trautmann 2006, 106.

²⁵² Modderman 1970, 2-3.



Fig. 6.5 A cremation grave 'island' (grave 66) during excavation. The small, calcined bone fragments are still visible.



Fig. 6.6 Excavation of an inhumation grave during the 1966 campaign.

by hand. All graves, apart from one²⁵³, respect each other and no intercutting exists. Some graves seem to be placed together in pairs at a relatively close distance to each other. The eastern part of the burial ground seems to have been better preserved with respect to body silhouettes and the depths of the graves.²⁵⁴ Based on the decorated pottery found in the burial pits, it was estimated that the burial grounds were used during the last two phases of the LBK (ceramic phases IIc and II d), which means that the settlement was in use earlier than the burial grounds.²⁵⁵

6.3 Studies by Van de Velde

The burial ground of Elsloo has been subject to many social studies; especially by Van de Velde. Firstly, an internal study tested different approaches to reach conclusions about sex, gender, status and kinship.²⁵⁶ An interesting fact is that Van de Velde used three different kinds of approaches (positional, structuralist and neo-Marxist) to gain insights into burial customs at the Elsloo burial ground and social structure in general. The lack of skeletal remains is problematic in these studies, although this was partly overcome by defining particular 'grave

good sets' as gendered. For his principal component analysis Van de Velde assumed that the different genders (male/female) received discriminating grave goods and therefore "*femininity and masculinity may be expressed by partially independent patterns of associations of grave gifts*".²⁵⁷ Because of the practical nature of the grave goods (e.g. tools) a relation with gender-specific activities was considered. As a starting point he assumed that arrowheads are strong markers for male burials.²⁵⁸ The principal component analysis showed that there was a strong correlation between various grave goods, indicating that female graves were equipped with either querns or red ochre, while male graves were represented by undecorated vessels and/or adzes of type 3 and/or arrowheads.²⁵⁹ Other categories were not gender-specific and considered general. The observations were corroborated at that time by other studies where skeletal remains were preserved²⁶⁰ such as the German Lower Bavarian burial ground of Aiterhofen-Ödmühle.²⁶¹ The Aiterhofen burial ground dates to the middle and younger LBK and consists of 153 inhumation graves and 68 cremations of which 40 were female and 36 were male graves. The age distribution showed 22 children, 8 juveniles and 110 adults.²⁶² The 69 cremation graves contained the remains of 79 individuals of which fifteen were male and as

²⁵³ Modderman 1970, 67.

²⁵⁴ Modderman 1970, 73.

²⁵⁵ Three graves (GrN-5733: 6330±75 (grave 3); GrN-2311: 6510 ±100 (grave 98); GrN-2884: 6085±80 (grave 110)) were radiocarbon dated but failed to confirm the young date of the cemetery; Lanting & Van der Plicht 2002.

²⁵⁶ Van de Velde 1979, 87.

²⁵⁷ Van de Velde 1979, 87.

²⁵⁸ Van de Velde 1979, 87; Modderman 1970, 67.

²⁵⁹ Van de Velde 1979, 89.

²⁶⁰ Van de Velde 1979, 89.

²⁶¹ Reinecke 1978, 12; Osterhaus 1975.

²⁶² Trautmann 2006, 47.

many were female adults, as well as 22 unidentified adults and 27 sub-adults.²⁶³ The high number of cremation graves made it potentially interesting to compare both burial grounds.

As noted earlier, some graves seem to be paired, which led Van de Velde to assume that related adults or partners were buried in each other's vicinity. Based on his analysis and the paired graves, Van de Velde found direct and indirect evidence for the determination of 38 male graves and 33 female graves (Fig. 3.4).²⁶⁴ Attempts were made to distinguish children's graves, but proved to be unsatisfactory, and the conclusion was drawn that child burials are not marked in any way by grave goods.²⁶⁵ One of the main problems was that it could not be established, due to the absence of bones, if any children were buried at all at the burial ground. By comparing the Elsloo burials with the burial grounds of Niedermerz²⁶⁶ and later also Flomborn²⁶⁷ Van de Velde demonstrated local and regional variability.²⁶⁸

²⁶³ Nieszery 1995, 91; Trautmann 2006, 47.
²⁶⁴ Van de Velde 1979, 89.
²⁶⁵ Van de Velde 1979, 91.
²⁶⁶ Van de Velde 1995.
²⁶⁷ Van de Velde 1996; 1997; 2011.
²⁶⁸ Modderman 1988; Hamilton et al. 2013, 44.

6.4 Site plan

As mentioned, the burial ground was excavated during two campaigns, seven years apart. Each campaign had its own local coordinate system, and an effort was made by the excavating team to merge both systems during the last campaign in order to provide an overview of the complete excavation. When these field drawings were digitised on behalf of the Elsloo project, we noticed that something probably went wrong when the drawings were merged and edited for the final publication. There turned out to be a 1.5 - 2.5 m wide gap, 70 m long (Fig. 6.7), which separates the 1959 campaign from the 1966 campaign. This part of the terrain has never been excavated and could possibly yield some more graves. In 1959 the crew excavated a certain stretch of land as far as could be done or was available. The edge of this patch was taken as a starting point for the 1966 campaign.

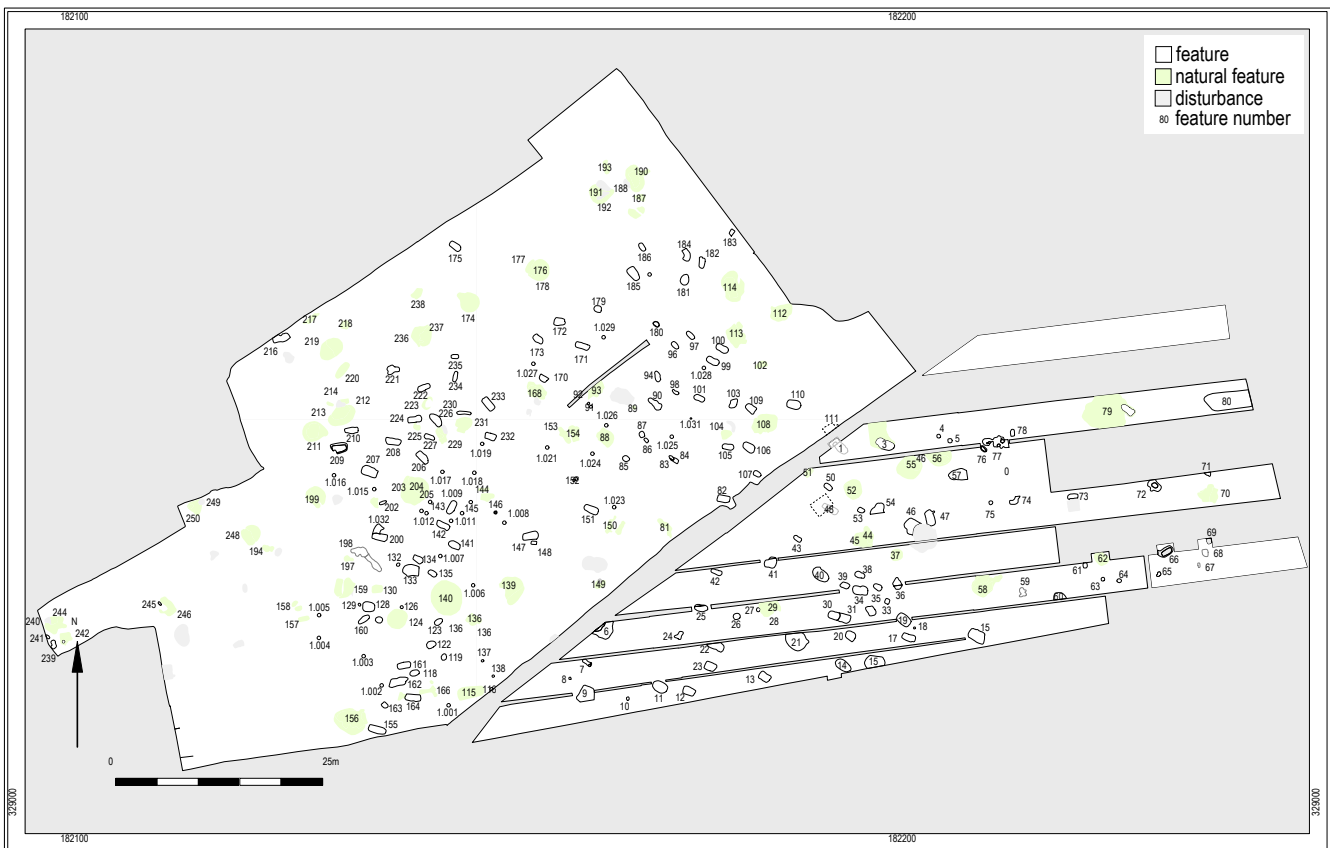


Fig. 6.7 Site plan (derived from digitised original field drawings).

Somehow the border of this plot, which was used as a reference, seems to have shifted, or could have been covered with a spoil heap. But most importantly, the drawings of both campaigns do not overlap and are not adjacent to each other.

Regarding the find processing, we already pointed out that some errors were made during and after the excavation. In our digital era, these errors come to light more easily by cross-checking data carriers. Although some finds are missing, the contents of the graves can be reconstructed based on the final publication, daily field reports, description of the graves and find lists.

6.5 Data merging

During the ‘Elsloo-Koolweg Revisited’ project use was made of all possible kinds of information (find reports, museum inventory list, grave reports, daily reports, field drawings, field sketches, photos, etc.) This led to some alterations regarding the layout of the burial ground (§4.4 and §6.3), as well as the finds involved (§4.5). This renewed and reviewed information was compared and integrated with the original publications by Modderman²⁶⁹ and Van de Velde.²⁷⁰

As stated before, relatively small errors during publication need to be taken into account when embarking on such an enormous task of publishing one of the first known LBK burial grounds. A computer was not available at this time so all calculations, cross-checks and so forth had to be done manually.

The presentation of any data currently is made with the use of all (digital) tools necessary as well as the original field documentation. This will result in some different outcomes with respect to the number of graves, type of graves and number of grave goods present within these graves. When needed, reference will be made to the original results by Modderman and Van de Velde and alterations clarified. Additionally, research has been carried out that at the time of first publication was not available or not as developed as today (charcoal, pollen, lipid residue, use-wear, calcined bone, stable isotope and aDNA analyses, ¹⁴C dating). Furthermore, new scientific insights have been gained over the

past decades (Chapter 3) regarding LBK burial rites, description of burials and graves. We aim to incorporate these insights in our new approach to this burial ground and will sometimes emphasise certain original discoveries which should have received more attention over the years.

6.6 The grave pits

In total 285 features were found during the excavation campaigns, varying from burial pits, concentrations of charcoal and/or calcined bone, with finds or without, as well as pits devoid of finds, recent disturbances and tree throws (Fig. 6.8).²⁷¹ All (grave) pits have been described including their dimensions (length, width, depth, elevation), fill of the pits, presence and absence of grave goods and/or other finds (see Appendix III). A division between the position of grave goods was made for: the top of the pit fill, the pit fill itself and the bottom of the pit.

Most burial pits are similar in appearance, but large variations exist with respect to size (length, width and depth).²⁷² The length of the graves varies between 0.6 - 2 m, the width varies between 0.4 - 1.1 m, and the depth varies between 0.5 - 1.5 m. Some noteworthy features can be mentioned for some of the graves. The structure of grave 87 seems to have had a niche or plateau onto which an undecorated vessel was placed. When examining the cross-section (Fig. 6.12) the presence of a step seems evident. Next to it a large quern, positioned upright, as well as other grave goods are positioned. A similar composition is known from grave 55 of the burial ground of Aldenhoven-Niedermerz (Fig. 6.9; top), where a fragment of a ceramic vessel were placed ca. 40 cm above the grave base.²⁷³ At Arnoldsweiler-Ellebach similar plateaus have been recognised for graves 3932 and 5857 (Fig. 6.9; bottom).²⁷⁴ However, at Aldenhoven-Niedermerz and Arnoldsweiler-Ellebach the plateau is created by an incline of the pit wall. In grave 87 of Elsloo the vessel does not seem to be placed on a plateau or banquette²⁷⁵, as can be deduced from the plan drawings.²⁷⁶ The quern is obviously positioned next to the shoulders of the deceased which means that the vessel is placed more or less

²⁶⁹ Modderman 1970.

²⁷⁰ Van de Velde 1979; Van de Velde based his analysis on Modderman's research and can therefore not be held to account for any errors made regarding the original data and potential different outcomes because of it.

²⁷¹ Based on the digitisation of the original field drawings.

²⁷² Modderman 1970, 66.

²⁷³ Dohrn-Ihmig 1983, 154.

²⁷⁴ Peters 2018, 257.

²⁷⁵ Taken from the *niche-et-banquette* burials of the Paris Basin, which have a very similar construction (Thevenet 2004; Hoffman 2015).

²⁷⁶ Modderman 1970, tafel 148.

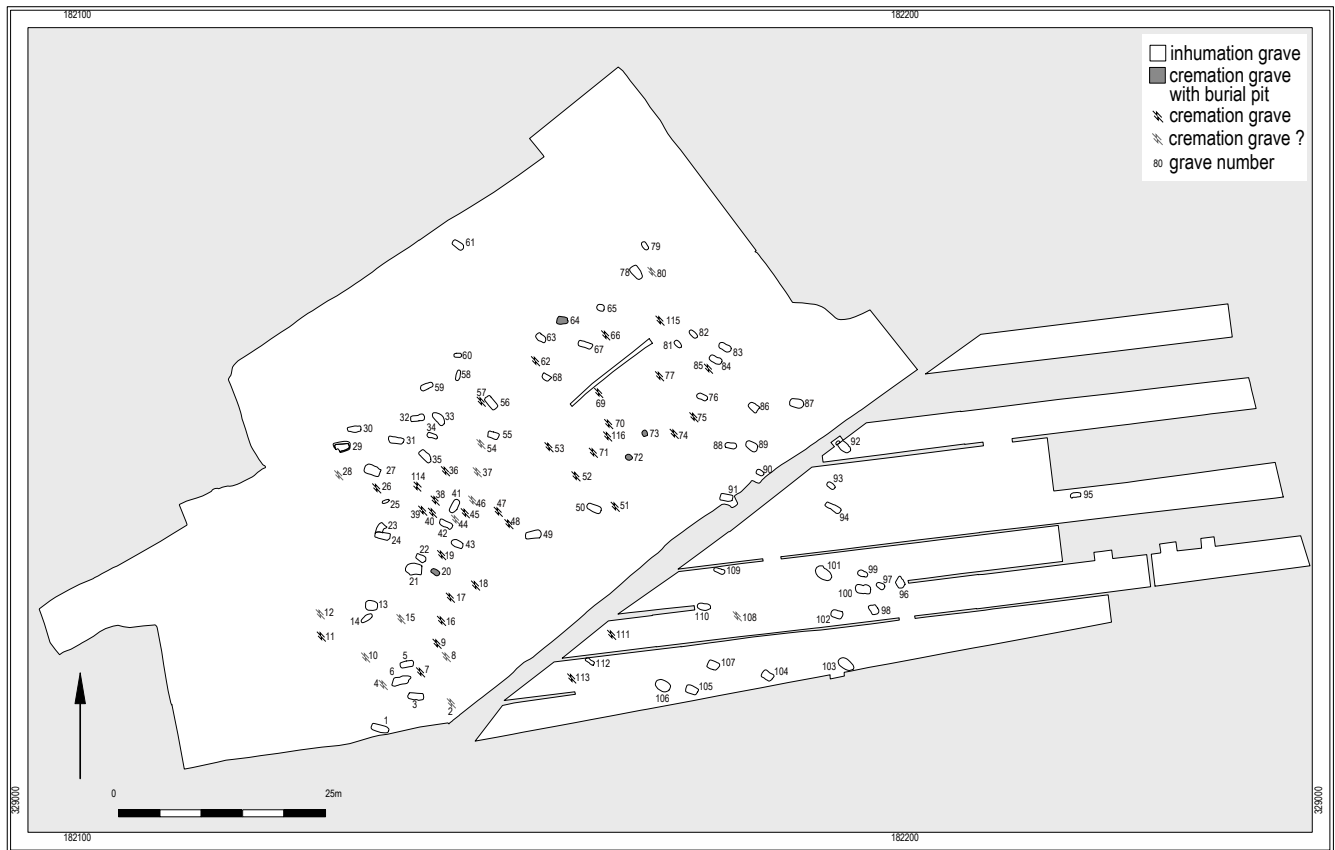


Fig. 6.8 Distribution of inhumation and cremation graves.

directly on the (covered?) head. Grave 105 of Elsloo does seem to have an earth ledge/step, however, on top of which a large quern covered with ochre was standing (Fig. 6.9; middle).²⁷⁷

Overall, the burial pits are distributed in a horseshoe-shaped pattern with an open space in the southern part of the burial ground where only few graves are present. This might potentially be an unexcavated part of the burial ground. In hindsight, more graves could be expected in this part. Alternatively, it could be postulated that this open area served some sort of social or symbolic function during burial rites.

In line with many other LBK cemeteries, the graves are positioned in such a manner that they generally do not crosscut each other. Only the inhumation graves 23 and 24 seem to intercut, as well as cremation grave 57, which overlies inhumation grave 56.²⁷⁸

6.6.1 Grave type: cremation vs inhumation graves

In the original publication a total number of 113 graves is mentioned. These were divided between 66 inhumation graves and 47 cremation graves. But while reading the publication carefully one can feel the struggle there was when trying to label graves as either inhumation or cremation. This is mainly caused by the lack of human remains, absence of grave goods, and presence of calcined bone remains either in concentrations or otherwise as loose finds in larger pits. Different numbers are used throughout the text, tables and figures. For instance, the description of the graves mentions 59 inhumation graves and 54 cremation graves.²⁷⁹ But Table 118 list 68 inhumation graves and 45 cremation graves.²⁸⁰ Van de Velde's study is based on the original publication but mentions 66 inhumation graves and 47 cremation graves.²⁸¹ It is therefore necessary to review all

²⁷⁷ Modderman 1970, tafel 158-159.

²⁷⁸ Modderman 1970, 65.

²⁷⁹ Modderman 1970, 46-65.

²⁸⁰ Modderman 1970, tafel 118.

²⁸¹ Van de Velde 1979, 84.

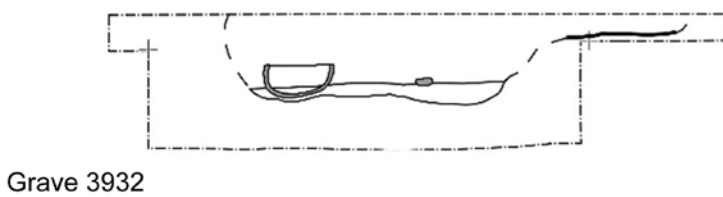
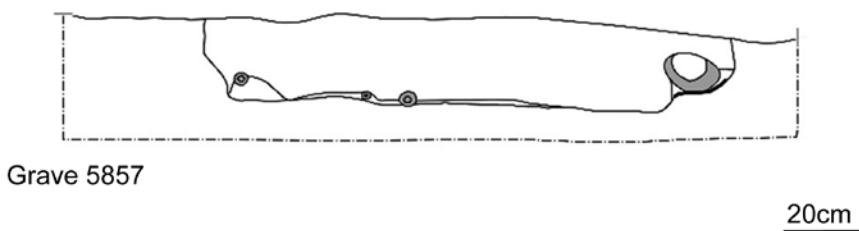
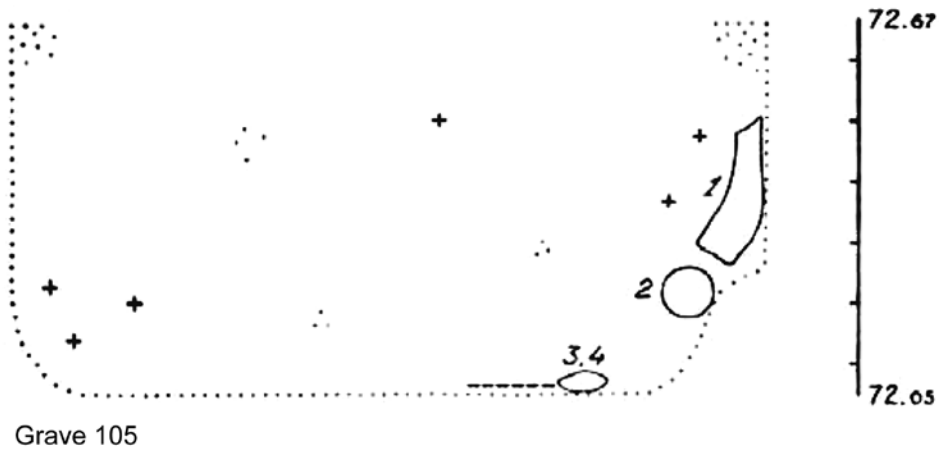
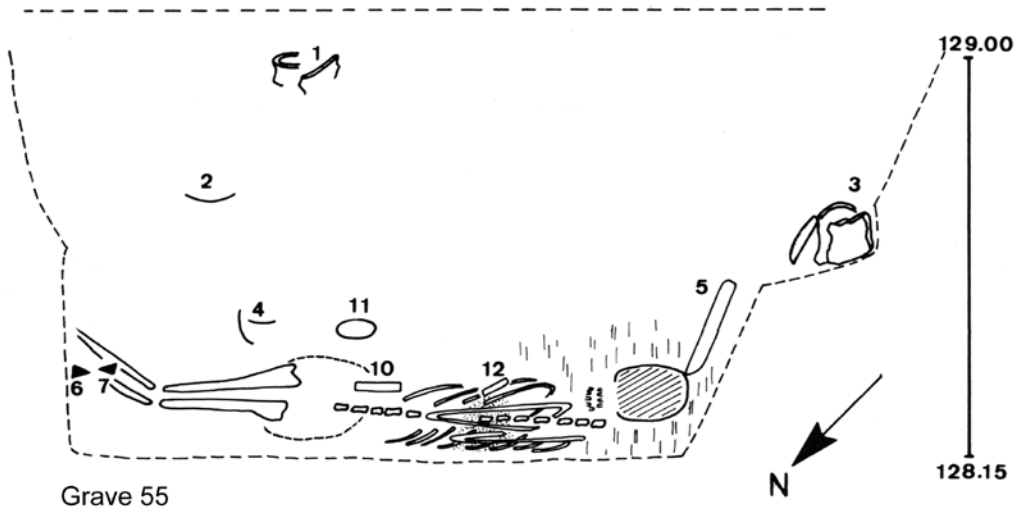


Fig. 6.9 Top: Grave 55 at Aldenhoven-Niedermerz (source: Dohrn-Ihmig 1983, 257), Elsloo grave 105 (source: Modderman 1970, tafel 158), and graves 3932 and 5857 at Arnoldsweiler-Ellebach (Peters 2018, abb.253).

the data available and shed light on the amount and type of graves present in Elsloo.

For the Elsloo project, all the grave descriptions that could be found in the publication, grave reports and daily reports have been reanalysed. This data has been cross-referenced with the actual find inventory. Calcined bone was not always collected during the excavation but there are several graves that held calcined bone remains which were not mentioned in the publication. Calcined bones have been found in 57 features (either presumed burial pits, concentrations of calcined bones directly under the topsoil or in tree throws), mostly in very low quantities. Calcined bones, have been documented for 64 graves, but only collected in 44 graves and vary in weight from as little as 0.2 g up to 507.7 g (see Chapter 7). However, not all pits with calcined bone remains can or should be classified as cremation graves. Calcined bones were also found in fourteen inhumation graves and two other features. If we review the evidence most of the calcined bones are found in 37 (small) concentrations in a yellow greyish layer directly underneath the topsoil (presumably colluvium) or just beneath that layer in the top of the B horizon. The other remains were found in 19 pits with average sizes of 0.6-2 m in length, 0.4-0.8 m in width and 0.45-1.51 m in depth.

The question at hand is how a cremation grave could be defined and identified. If only large concentrations of calcined bone deposited in a pit are considered than only sixteen cremation graves can be classified as such. For Elsloo the outlines of a pit were documented for three cremation graves (graves 20, 72 and 73). Cremation burial pits seem to be shallower than inhumation graves, and the presence of calcined remains and/or grave goods is dependent on preservation. One can argue whether these small concentrations are indeed indicators of a cremation grave, as they can also be seen as stray finds, sometimes moved by (natural) post-depositional processes. We suggest to slightly adjust Modderman's definition of a cremation grave²⁸²: we defined cremation graves as features with *large* concentrations of calcined bones (> 50 g)²⁸³, with or without grave goods or any other finds, deposited in a pit (if recognised or preserved) with dimensions no larger than 0.9 x 0.7 and no deeper than 0.5 m below topsoil, or small concentrations of calcined bones (< 50 g), with grave goods or any other finds just below or

less than 0.5 m below topsoil.²⁸⁴ Out of potentially 50 cremation graves, 30 contained one or more grave goods. Eighteen other graves contained no grave goods or little to no charcoal but over 10 g of calcined bone (graves 39, 48 and 52) or less (graves 2, 4, 8, 10, 12, 15, 28, 36, 37, 44, 46, 54, 77, 80 and 108). Grave 64 also contained a lot of calcined bone (> 50 g), but this was found scattered throughout the fill, which also contained a lot of charcoal as if a fire burned inside the pit (50). It is uncertain whether this should be classified as a cremation grave or something else. Concentrations of calcined bone were also found in the fill of a tree throw (find number 820), part of which probably originally belonged to a cremation grave (labelled grave 114).

Some of the graves are classified as inhumation graves based on the presence of body shadows or tooth enamel. For instance, graves 21 and 88 are clearly inhumation graves where corpse shadows were found on the bottom of the pit, and in graves 6, 63, 88 and 113 tooth enamel was found. But all these graves yielded concentrations of calcined bones. These could also be indications of a double or secondary burial, a burial ritual where calcined bones were used, or even (natural) post-depositional processes, which resulted in these calcined remains ending up in a pit (see Chapter 13).

Ultimately, based on our new parameters we identified 34 cremation graves and 16 potential cremation graves including two newly added ones (grave 115, find number 771; grave 116, find number 761) and grave 64 (Fig. 6.10).

The classification of inhumation graves is less complex, as the dimension of the pits, in combination with body remains and/or grave goods, is more straightforward. Inhumation graves are defined by Modderman as pits with human remains either in the form of tooth enamel or visible body shadows. Pits with matching dimensions were also classified as inhumation graves. Three pits (graves 6, 72 and 73) with sizes that did not correspond to an inhumation grave were also included by Modderman.²⁸⁵

At first sight 66 inhumation graves are identified (Fig. 6.10) of which 24 graves yielded either a body shadow (20 graves) and/or tooth enamel (11 graves). The preservation of human remains in the form of either body shadows and/

²⁸² Modderman 1970, 45: „...Als Brandgräber wurden betrachtet: alle Konzentrationen von Fragmenten von kalzinierten Knochen mit oder ohne Beigaben oder andere Funde...“.

²⁸³ The total weight of most calcined bone remains is less than 10 g per grave.

²⁸⁴ These dimensions should be considered as guidelines and are dependent on local preservation conditions.

²⁸⁵ Modderman 1970, 45.

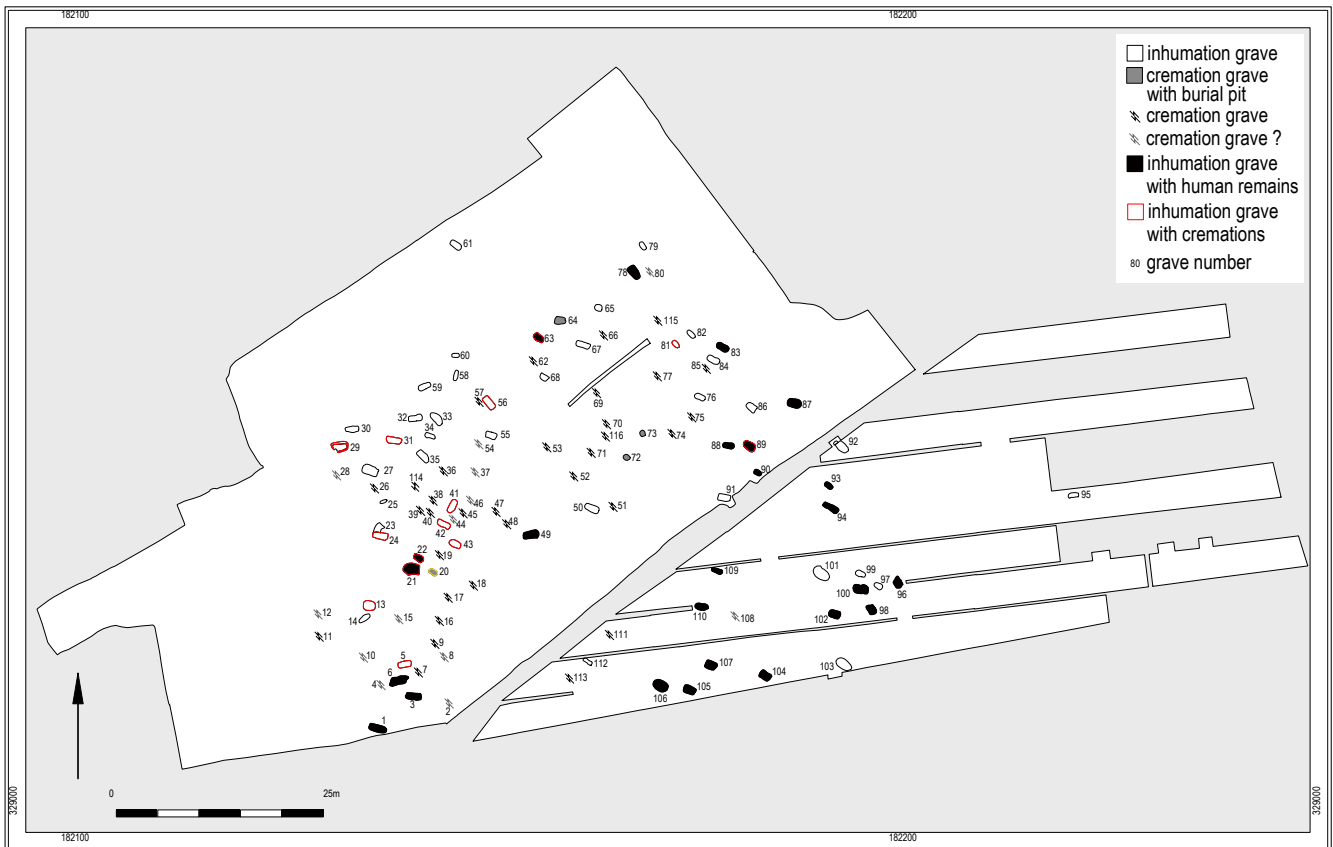


Fig. 6.10 Distribution of inhumation and cremation graves with human remains (tooth enamel, body shadows and cremation remains).

or tooth enamel seems to be restricted to the eastern part of the burial ground, as well as the south-western part. The occurrence of calcined bones seems to be more restricted to the graves in the western part of the cemetery. There seems to be no relation between the depth of the burial pits and favourable conditions for preservation, as the depth at which body shadows and enamel were preserved ranges from 0.8 up to 1.51 m below the topsoil. Modderman, however, does point out that according to him the shallowness of the north-western graves accounts for the bad preservation of either body shadows or tooth enamel (Fig. 6.10).²⁸⁶ The other 42 presumed inhumation grave pits were over 0.6 m long (up to 1.8 m), 0.4 m wide (up to 1.1 m) and over 0.5 m deep (up to 1.24 m). Eleven contained some calcined bone in the fill of the pit. Most of these potential graves (33 graves) contained one or more finds. Only nine out of 42 yielded finds in the fill and nine others yielded no finds at all (apart from some charcoal). However, their dimensions are similar to inhumation graves with finds and/or human

remains and they are therefore classified as inhumation pits. Pits 23 (feature 1032), 29 (feature 209) and 68 (feature 170) had irregular shapes which led the original excavators to question their classification as burial pits. All three pits contained hardly any finds apart from some weathered ceramic sherds. The irregular shape and lack of finds lead us to declassify these pits as burial pits. However, they could have had another function in the burial ground.

In conclusion, and based on our new parameters, the burial ground consists of 63 inhumation graves and 34 definite cremation graves (plus potentially 16 further cremation graves), making the total grave count 97 graves or at most 113 graves (see Appendix III).

6.6.2 Orientation and pairing

The main orientation of the grave features is NW-SE, although some graves are oriented E-W or NE-SW. The digitising of the original field

²⁸⁶ Modderman 1970, 67.

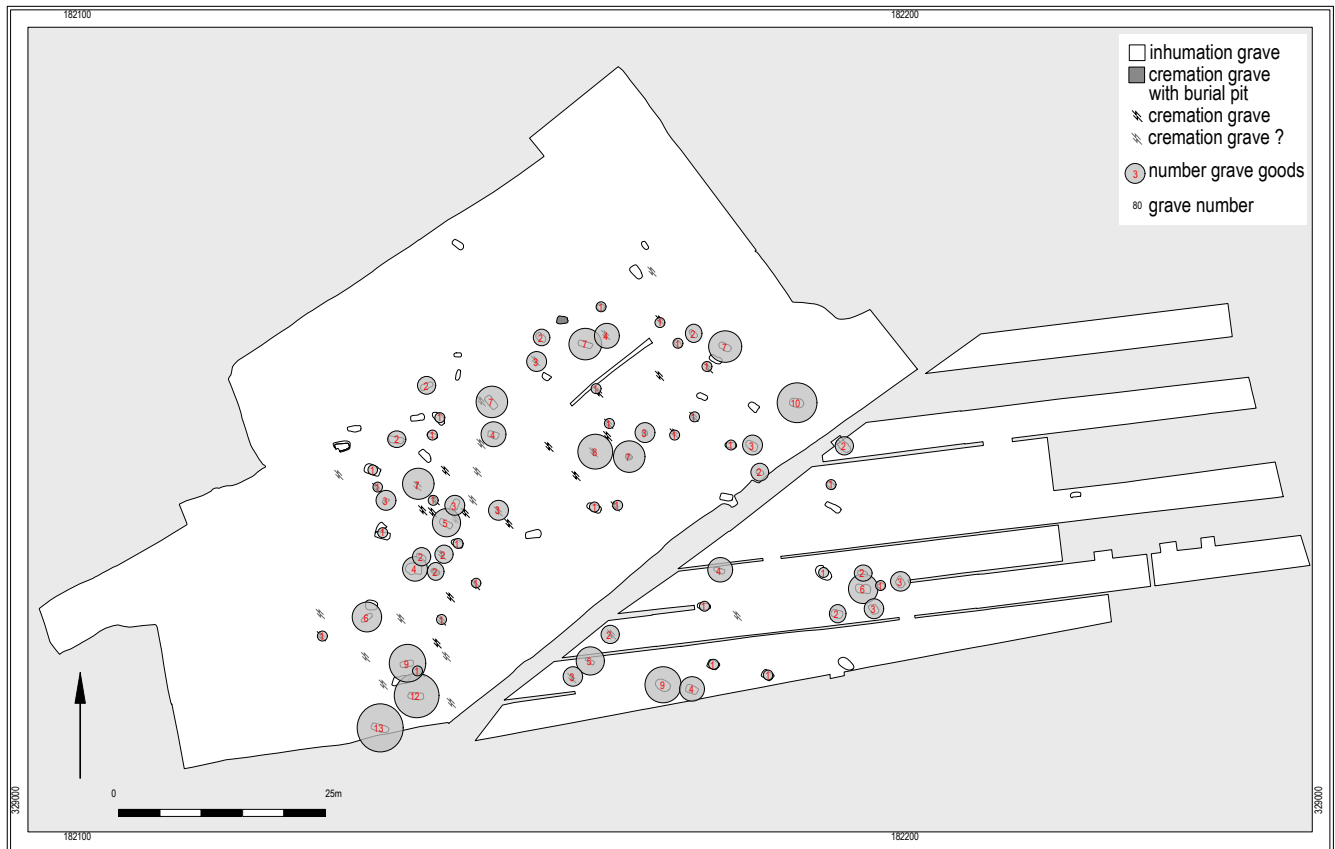


Fig. 6.11 Distribution of total amount of grave goods.

drawings did not lead to other conclusions. Most graves (34 graves) are oriented NW-SE and 25 more graves have a slightly divergent orientation either towards the north (NNE-SSW: eleven graves) or the west (WNW-ENE: fourteen graves and E-W: eight graves). Three graves are oriented in the opposite direction (NE-SW).

Van de Velde recognised that certain grave pits were aligned parallel to each other and oriented in the same direction. He interpreted them as “vestiges of a household (“domestic”) mode of production”²⁸⁷ The paired graves were seen as graves of opposite sexes. Whatever implications may be derived from this, the position of graves in relation to each other should not be overlooked. For the Elsloo burial ground the following graves seem to be related spatially based on a visual analysis: graves 5+6, 13+14, 21+22, 29+30, 78+79, 81+82, 83+84, 93+94, 96+97 and 99+100. This does not imply that other graves are not related to each other.

6.6.3 Body position

The position of the deceased could be derived from the body shadows which were present in

twenty graves (Fig. 6.10). The most common position was crouched on the left side, which has been documented in thirteen graves.²⁸⁸ Two burials seem to have been placed in a right sided crouched position. Only one burial seems to have been placed in an extended (supine) position (grave 100).²⁸⁹ The grave pit is 1.3 m long which might indicate that the deceased could have been a short and/or young person. The three individuals of graves 14, 21 and 106 are believed to have suffered a violent death based on the position of arrowheads around the spine or head.²⁹⁰ Although nothing is known about the age or sex of the inhumations due to poor bone preservation, some smaller grave pits might suggest younger individuals.

Based on the body shadows and the dental enamel the position of the head could be documented in various cases. The head was most often oriented towards the south-east (nine graves) or north-west (eight graves). Twice it was oriented towards the east and one time towards the west. From this it can be stated that the deceased were mostly buried with their faces pointing either north (seven graves) or south (seven graves) and one time facing east.

In most inhumation graves, especially in the north-western part of the burial ground, no

²⁸⁷ Van de Velde 1979, 111; Van de Velde 1993, 165.

²⁸⁸ Modderman 1970, 67.

²⁸⁹ Modderman 1970, 66-67.

²⁹⁰ Van de Velde 1979, 89; Van de Velde 1996, 178.

body shadows or tooth enamel was documented, which makes any speculation on differentiation of body positions and orientation unnecessary or too far-fetched.²⁹¹

6.7 Division and distribution of grave goods

6.7.1 Grave goods

The distribution of grave goods has always been at the centre of attention as they are closely related to the deceased, the community, their rituals and beliefs. Reconstructions of LBK social structure are primarily focused on mortuary remains from burial grounds. In which ways grave goods can be attributed to social status or position, kinship, sex, gender, age and/or division of labour will be addressed in Chapter 14.

Grave goods are most commonly found on and around the deceased, at the bottom of the grave pit. However, some finds are found in the fill of the grave or in the top of the fill. Therefore, a division must be made, and was made, not only between the type of grave goods but also where they were deposited.²⁹²

Out of 113 graves, 86 graves were furnished with one or more (up to thirteen) different grave goods (76%). All graves are described in Appendix III and visualised in Fig. 6.11. Thirty-two cremation (64%) graves held grave goods (ranging from one up to ten grave goods), eighteen cremation graves held no finds at all, apart from some charcoal in two cremation graves. Fifty-four inhumation graves (86%) were also furnished with grave goods (ranging from one up to 26 grave goods). Nine inhumation graves held no finds at all. Charcoal was present in the fill in four out of nine of these graves. Only grave 84 held a considerable amount of charcoal in the top of the fill. Most graves were furnished with one or more grave goods of some kind, deposited either in the fill and/or bottom of the grave. Ochre powder, scattered on the pit floor or concentrated in one part, was documented in thirteen inhumation graves. The presence of ochre powder, macro- and microscopic (§9.4.5), has been witnessed on tools from 18 graves (four cremation graves and 14 inhumation graves).

6.7.2 Fill

The fill of the grave pits was generally homogenous, although variations in layering exist.²⁹³ The fill of the burial pits contained to a greater or lesser extent a variety of small finds ranging from sherds, calcined bones, charcoal and fragments of flint.²⁹⁴ In a dozen graves traces of ochre were found covering the whole bottom of the grave.²⁹⁵ In one inhumation grave (grave 65) the excavators believe a fire had burned inside the burial pit due to the reddish colouring of the pit walls.²⁹⁶ The fill held a lot of charcoal as well as calcined bone. Calcined bones were also recovered from some of the inhumation graves closest to the largest concentration of cremation graves. This suggests that some mixing may have occurred. Worth mentioning is a 'fatty' layer on the bottom of some grave pits, believed to be caused by water accumulation and indicating that these graves were left open for a longer period of time.²⁹⁷

Grave goods were present in the fill of 45 graves (40%), of which 37 were classified as inhumation graves.²⁹⁸ Therefore, more than half (59%) of the inhumation graves contained grave goods in the fill. As can be expected, this percentage is much lower for cremation graves (16%) which is due to these graves being shallower, and the fact that cremation grave pits were rarely recognised.

As to the nature of the grave goods it is apparent that most finds are ceramic sherds, decorated or undecorated; both in equal numbers. Out of the 45 graves, 39 graves (87% of graves with finds in the fill) contained ceramic sherds. Only eight graves contained solely decorated sherds. Flint flakes were present within seven graves. A piece of red ochre and a basalt adze were also retrieved in two graves. In the top of the fill of grave 14 a quern covered with ochre was found.²⁹⁹ Six graves (Fig. 6.12) yielded almost complete ceramic vessels, such as grave 34 (complete decorated bowl³⁰⁰). Grave 65 held an undecorated vessel with vertical lugs on the rim³⁰¹, grave 67 contained most sherds of a decorated vessel³⁰², in grave 87 another undecorated vessel with vertical lugs³⁰³ was recovered, and some sherds belonging to one decorated vessel were found in grave 98³⁰⁴. In the top of the fill of grave 109 an undecorated

²⁹¹ Van de Velde 1979, 89; Van de Velde 1996, 178.

²⁹² Modderman 1970, 45.

²⁹³ Modderman 1970, 69.

²⁹⁴ Modderman 1970, 69.

²⁹⁵ Modderman 1970, 69.

²⁹⁶ Modderman 1970, 71.

²⁹⁷ Modderman 1970, 69.

²⁹⁸ For three graves (graves 114, 115 and 116) there is no mention whether the finds were made in the fill or at the base of the pit.

²⁹⁹ Modderman 1970, tafel 129.

³⁰⁰ Modderman 1970, tafel 134.

³⁰¹ Modderman 1970, tafel 140.

³⁰² Modderman 1970, tafel 142.

³⁰³ Modderman 1970, tafel 134.

³⁰⁴ Modderman 1970, tafel 156.

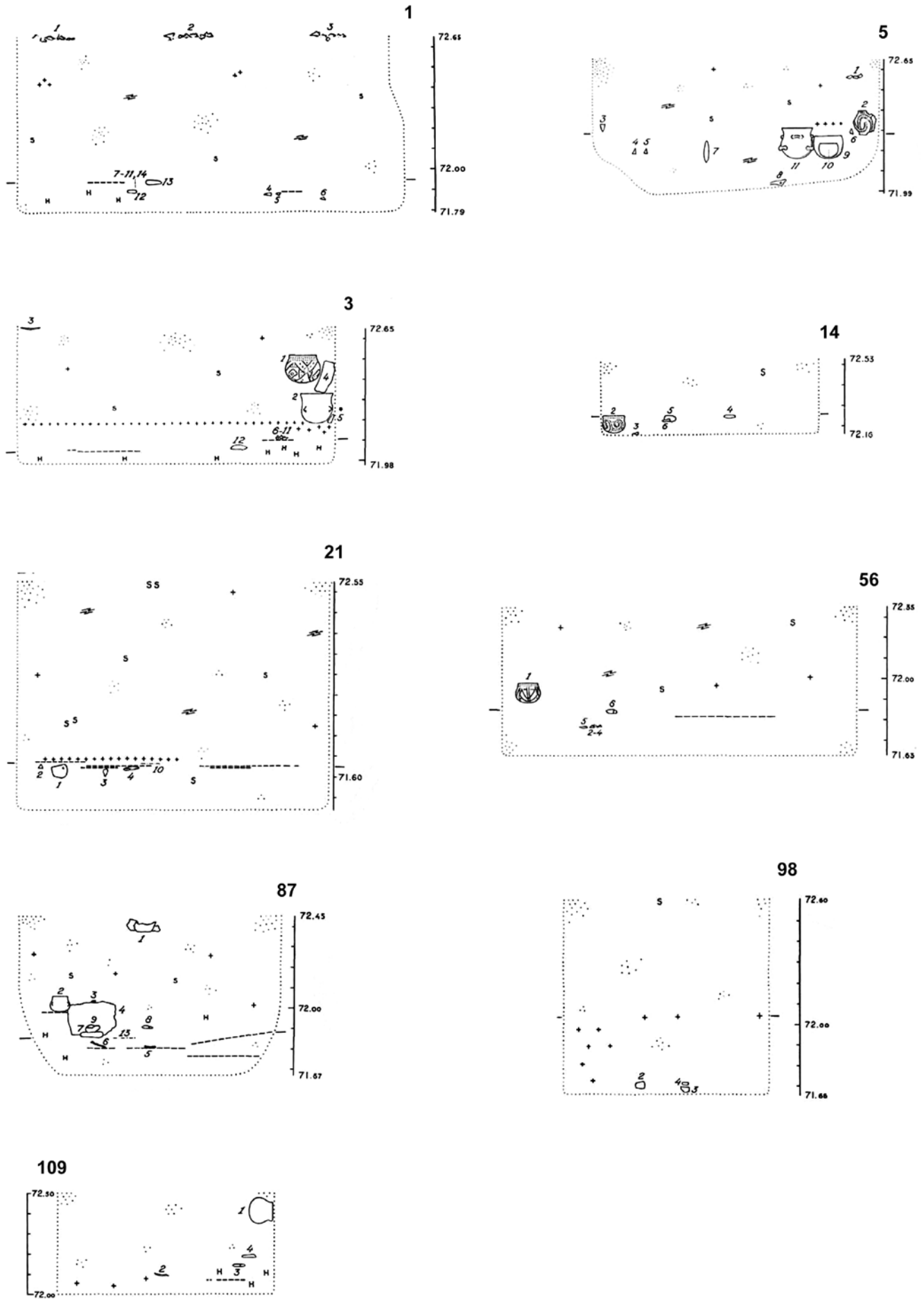


Fig. 6.12 Cross sections of graves 1, 3, 5, 14, 21, 56, 87, 98 and 109 with finds in the fill (source: Modderman 1970).

vessel with vertical lugs on the rim and the belly was found, lying on its side.³⁰⁵ Finds in the top of the fill suggest a secondary burial rite after the deceased was placed in the grave pit and covered with soil.

Thirty-four graves (30%) contain charcoal in the fill in greater or lesser quantities (see also Chapter 10). Four of them are cremation graves and thirty are inhumation graves. In four other inhumation graves (graves 3, 21, 94 and 110)³⁰⁶ larger fragments were documented looking as if they were parts of larger burned tree branches. Modderman thinks they might have served as a cover (with twigs and branches) for the deceased after burial. To him it also provided an explanation as to why the fill of the burials is denser than the surrounding undisturbed soil.³⁰⁷

As mentioned earlier, calcined bone fragments were not only found in cremation graves (see also chapter 10). They were also found in thirteen inhumation graves.³⁰⁸ These graves are almost all situated in the western part of the burial ground where most cremation graves are located, which could be the source of these scattered remains.³⁰⁹ If so, it implies that these inhumation graves are younger than the surrounding cremation graves, or that other cremation graves were disturbed by the digging of the inhumation graves.

Other remarks pertinent as to when and how the pits were filled with soil or other material (twigs or branches) point towards a fatty black layer (*Schlammsschicht*) recognised at the bottom of certain graves (graves 83, 87, 89, 94, 98, 100, 102, 103, 104, 105, 107 and 109; all in the eastern part of the burial ground).³¹⁰ This layer is distributed evenly on the bottom of the grave, mainly in the area where a body shadow was documented as

well. Similar layers can be seen at the burial ground of Arnoldsweiler-Ellebach (Fig. II.1). Modderman suggests that this layer is the result of heavy rainfall when the pits were still open and is therefore a natural phenomenon.³¹¹ This could therefore also be an indication that the graves were left open for a longer period of time before, or after, the deceased was laid to rest.

6.7.3 Distribution

Grave goods (Appendix III and Fig. 6.11) were present in 32 cremation graves and 54 inhumation graves (total 86 graves). This means that over 76 percent of the graves were furnished with grave goods of some kind. The majority of the inhumation (87%) and cremation (64%) contained grave goods. The proportion of furnished cremation graves was presumably larger, as most of them were affected by modern agricultural processes (i.e. ploughing). Forty-one graves only held grave goods placed at the base of the grave. The other 45 graves were furnished with grave goods in the fill and/or at the bottom. Of these, twenty-six graves held grave goods in the fill and at the base.

After evaluation (§4.5), it appears that these graves were furnished with 218 grave goods, either present in the fill or at the bottom of the burial pit (Table 6.1). These grave goods are classified into four different material categories: pottery, stone artefacts, flint artefacts and organic artefacts or organic material (calcined bone or charcoal). All individual artefacts are counted separately, except for:

- Pottery, where ceramic sherds belonging to the same vessel are counted as one;

³⁰⁵ Modderman 1970, tafel 162.

³⁰⁶ Modderman 1970, 69.

³⁰⁷ Modderman 1970, 69.

³⁰⁸ Excluding grave 63 which might have been a dual or secondary burial.

³⁰⁹ Modderman 1970, 70.

³¹⁰ Modderman 1970, 69-70.

³¹¹ Modderman 1970, 69-70.

Table 6.1 Total amount of grave goods per grave type.

Grave type	Pottery (n=52)			Stone (n=79)											Flint (n=85)					Organic			
	complete vessel	decorated	undecorated	quern	grinding stone	hammer stone	stone various	red ochre	adze	adze amphibolit	adze basalt	adze lydite	adze type I	adze type II	adze type III	scraper	blade	arrow head	flake or various flint	core	charcoal	bone tool	cremation
Cremation	3	5	1	1	1	1	0	8	16	4	6	0	4	9	1	1	7	4	8	3	7	1	32
Inhumation	38	29	17	11	0	1	1	12	27	8	9	5	11	9	3	1	22	29	9	1	22	0	14
Total	41	34	18	12	1	2	1	20	43	12	15	5	15	18	4	2	29	33	17	4	29	1	46

- Charcoal, where only the presence in a grave was counted as one;
- Calcined bone, where only the presence in a grave was counted as one;
- Ochre powder, which was only noted for concentrations;
- Adzes, of which adze type was scored as well as the raw material source.

6.7.4 Position of grave goods

Most grave goods can be found at the base of the burial pits, positioned around the body. Mostly they are placed around the head, head and mid-section, mid-section only, or head and feet (Table 6.2).³¹² Graves with no body shadows or tooth enamel (Table 6.3) have grave goods either in the eastern part of the burial pit (19 graves) or in the western parts (14 graves). Sometimes goods cluster in the centre of the grave or on either the north or south side of the grave. If the dominant position of grave goods is around the head and mid-section, it can be argued that the orientation of the body can be reconstructed based on the position of grave

Table 6.2 Position of grave goods in graves with traces of a body (body shadows and/or tooth enamel).

Grave	Head	Mid-section	Feet
1	X		X
3	X		
21	X	X	
49		X	
56	X		
78	X	X	X
83	X		X
87	X	X	
90	X		
93	X		
94	X	X	X
96	X		
100	X	X	
104	X		
106	X		
109	X	X	

³¹² As can be reconstructed based on the body shadows or dental enamel.

³¹³ Van Wijk & Porreij-Lyklema 2015, tabel 9.4 and unverified find reports of the excavations by Modderman.

³¹⁴ Bakels 1987; The adzes have been classified into three types accordingly. Special thanks to C.C. Bakels for her help.

goods, even when human remains are absent. Following this line of argumentation, the head of the deceased in the graves without a corpse shadow should be located east in five graves and west in four other graves (Table 6.3).

6.7.5 Assemblage composition

Table 6.1 clearly shows that flint was most often present within the graves, especially arrowheads and blades. Thirty-six graves were furnished with one or more flint artefacts. In several graves multiple artefacts were deposited as part of a tool set. Grave 1 for instance held three arrowheads, three blades and one scraper. Grave 3 held six arrowheads, which seem to be hafted. Grave 5 also contained a bundle of arrows (five pieces) as did grave 55 (three pieces). Grave 71 had a set of four blades. In the excavated part of the settlement over 74 arrowheads were found.³¹³ Other flint artefacts have been found as well, most of them were blades: 29 blades were found in 17 graves. Only two scrapers have been found in as many graves (graves 1 and 62). Flint cores have been found in four graves.

Stone artefacts were almost as frequent as flint, was but were distributed over a larger number of graves (48 graves). The adze was the most common grave good. Out of 86 furnished 36 graves contained one to three adzes. Most adzes were found in inhumation graves. A total of seven adzes were found in the topsoil without a direct link to a grave: amphibolite (four adzes), a siliclast from Horion-Hozémont (one adze) and a siliclast (one adze). In total 47 adzes have been found in the burial ground. Most of them (22 adzes) were made from amphibolite. Sixteen adzes were made from basalt. Also four lydite adzes were found, as well as two adzes made out of quartzite, gneiss and the aforementioned adze from Horion-Hozémont. Lydite adzes are completely absent in cremation graves. Most adzes in these grave types are made of basalt (six adzes) or amphibolite (four adzes). Basalt (nine adzes) and amphibolite (eight adzes) adzes are evenly distributed in inhumation graves. Additionally, five lydite adzes were found in inhumation graves which date to the Final LBK (58.4).³¹⁴ In cremation graves the thicker type 2 adzes are most often present (nine adzes). Flat

Table 6.3 Position of grave goods in all graves. Bold marks represent the largest concentration of finds.

Grave	North	East	West	South	Centre	Orientation body	Body remains present
1		X	X				yes
3		X					yes
5	X	X			X	E	no
14			X	X			no
20					X		no
21			X		X	W	yes
24			X				no
25			X		X	W	no
31		X			X	E	no
33		X					no
34					X		no
41		X			X	NE	no
42		X	X				no
49					X		yes
50		X					no
55			X				no
56	X						yes
64		X					no
65					X		no
66					X		no
67		X	X		X		no
71			X		X	W	no
73	X						no
81				X			no
82					X		yes
83		X	X				yes
87			X				yes
88			X				no
89		X					no
90				X			yes
93		X					yes
96		X					yes
97					X		no
98					X		no
99					X		no
100		X			X	E	yes
104			X				yes
105		X					no
106			X		X	NW	yes
107		X					no
109		X			X	E	yes
110		X					no

Table 6.4 Adze raw material source per grave. Adze types are presented per grave. Red numbers are missing in the inventory list.

Grave	Grave type	Amount	Raw material	Adze type I	Adze type II	Adze type III
1	inhumation	2	amphibolite		1	1
3	inhumation	1	amphibolite		1	
5	inhumation	1	basalt		1	
14	inhumation	1	amphibolite			1
18	cremation	1	basalt	1		
20	cremation	1	amphibolite			1
21	inhumation	1	basalt	1		
25	inhumation	1	amphibolite	1		
26	cremation	1	?		1	
31	inhumation	1	basalt	1		
33	inhumation	1	amphibolite		1	
38	cremation	1	amphibolite		1	
51	cremation	1	basalt		1	
55	inhumation	1	basalt	1		
56	inhumation	1	basalt		1	
59	inhumation	1	amphibolite		1	
66	cremation	1	gneis		1	
71	cremation	1	amphibolite		1	
72	cremation	3	basalt, amphibolite,?	1	1	
73	cremation	1	kwartsite		1	
74	cremation	1	basalt		1	
83	inhumation	3	amphibolite, lydite, amphibolite		1	
85	cremation	1	basalt		1	
87	inhumation	2	amphibolite, lydite	1	1	
88	inhumation	1	kwartsite	1		
92	inhumation	1	amphibolite		1	
98	inhumation	1	amphibolite	1		
99	inhumation	1	lydite			
100	inhumation	2	lydite	1		1
101	inhumation	1	?			
106	inhumation	1	basalt	1		
109	inhumation	1	basalt	1		
111	cremation	1	amphibolite	1		
112	inhumation	1	basalt	1		
113	cremation	1	basalt	1		
114	cremation	1	basalt			

type 1 adzes are counted four times and type 3 adzes only once. However, the flat type 1 adzes are most common in inhumation graves (eleven adzes), but type 2 adzes are found almost as often (nine adzes). Type 3 adzes are also a rare find in inhumation graves (three adzes).

Red ochre was present in 19 graves; grave 14 contained two pieces of ochre and grave 47 contained a perforated piece of ochre which might have been used as an ornament. From the settlement 39 pieces of ochre are known, including two perforated pieces.³¹⁵ Querns or grinding stones were found in twelve graves; most of them covered with ochre. At least eighteen stone or flint artefacts were covered with ochre.

Pottery (sherds, complete vessels, decorated and/or undecorated) was present in 37 graves. In total 41 more or less complete vessels were retrieved from as many as 31 graves (also see Chapter 8). Most vessels were decorated. A calcined bone tool (57.3.1) was found in cremation grave 71.³¹⁶ It is the only bone artefact that was found during excavation. Other organic remains were calcined bone (see Chapter 7) and charcoal (see Chapter 10).

6.7.6 Division of grave goods between grave types

The classification of the grave types (inhumation/cremation) and the attribution of grave goods to

a certain grave type makes it possible to point out differences between grave types in terms of their grave goods (Fig. 6.13). However, when making such comparisons one must bear in mind the aforementioned restrictions regarding cremation graves. For instance, there are more complete vessels found in inhumation graves, which may be a result of presumably disturbed cremation graves. The most common grave good for inhumation graves is pottery, which in more than half of the instances consists of complete or almost complete vessels. The adze is the second most common grave good, followed by arrowheads, ochre and flint blades. Scrapers and cores are nearly absent. Cremation graves show a similar pattern. Pottery and adzes are most common, but querns, arrowheads and scrapers are (almost) absent.

The composition of the assemblage shows some interesting patterns:

- If no pottery is present in cremation graves, then there are also no arrowheads present³¹⁷;
- If no pottery is present in inhumation graves, then there are also no 'stone various' artefacts, ochre, scrapers, flakes or cores present;
- Querns or other various stone artefacts are always found in both grave types in combination with other artefacts except cores and scrapers;
- If no lumps of ochre are present, then cores are also absent in inhumation graves and scrapers are absent in both grave types;

³¹⁵ Van Wijk & Porreij-Lyklema 2015, figuur 10.6.

³¹⁶ Modderman 1970, tafel 143.

³¹⁷ Four arrowheads were found in grave 114 (find number 820). The classification of this feature as a cremation grave remains uncertain.

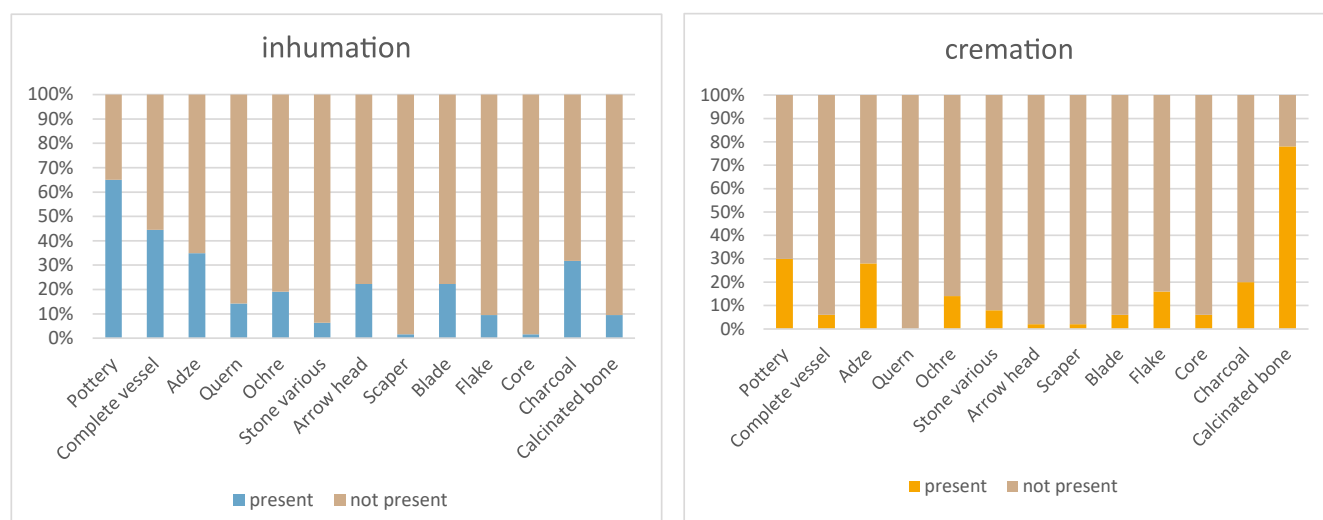


Fig. 6.13 Presence or absence of grave goods per grave type.

- Adzes in cremation and inhumation graves are always found in combination with other finds, apart from two inhumation graves;
- If no scrapers are present in inhumation graves, then no cores are found as well;
- Blades in cremation graves are always found in combination with other grave goods, but in inhumation graves are also present without scrapers or cores;
- Inhumation graves without arrowheads also lack scrapers or cores;
- Scrapers and cores are most likely to be absent within an inhumation grave.

These patterns will be addressed more specifically, and in relation to other burial grounds as well as statements about grave goods and sex/gender. The composition of the assemblage per grave and grave type provided the basis for Van de Velde's principal components analysis and ideas about the division of sex, gender, labour and kinship for the Elsloo burial ground.³¹⁸ His analysis showed strong correlations between querns and red ochre (interpreted as female graves) on the one hand and undecorated vessels, type 2 adzes and arrowheads (interpreted as male graves).³¹⁹

A difference can also be noted regarding the total number of finds per grave type (Fig. 6.14) and the number of different material categories (pottery, stone various³²⁰, ochre, quern, adze, flint (combined) and bone tools) per grave type (Fig. 6.15). Most graves have one artefact, but

some graves have as many as 13 grave goods in a single grave (grave 1). Most inhumation graves have one to four artefacts. Cremation graves appear to have fewer artefacts per grave. This is validated by the number of grave good categories, which is higher for inhumation graves.

6.8 Conclusions

Re-examining the find inventories, find records, photographs, drawings and daily reports yielded some new insights when cross-checking them with the publication. Most important is that there is now a complete find catalogue of the graves. The digitising of the original field drawings showed that there are unexcavated gaps where graves are still to be expected. These new results made it possible to re-evaluate the classification of the graves. As it turns out the burial ground consists of 63 inhumation graves and 34 certain cremation graves, plus 16 possible cremation graves, making the total grave count 97 graves and potentially 113 graves. Over a third of the inhumation graves contained either a body shadow and/or tooth enamel. A new definition for cremation graves is presented in order to facilitate their classification. The presence of concentrations of calcined bone in inhumation graves could be an indication of a dual or secondary burial, but could also be traces

³¹⁸ Van de Velde 1979.

³¹⁹ Van de Velde 1979, 89.

³²⁰ This category includes wet stones, pebbles, and other unclassified stone material or artefacts that were not illegible for study.

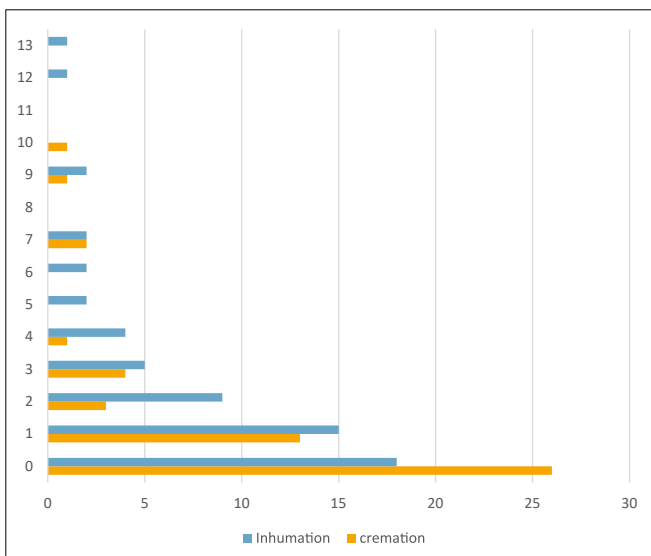


Fig. 6.14 Number of grave goods by grave type.

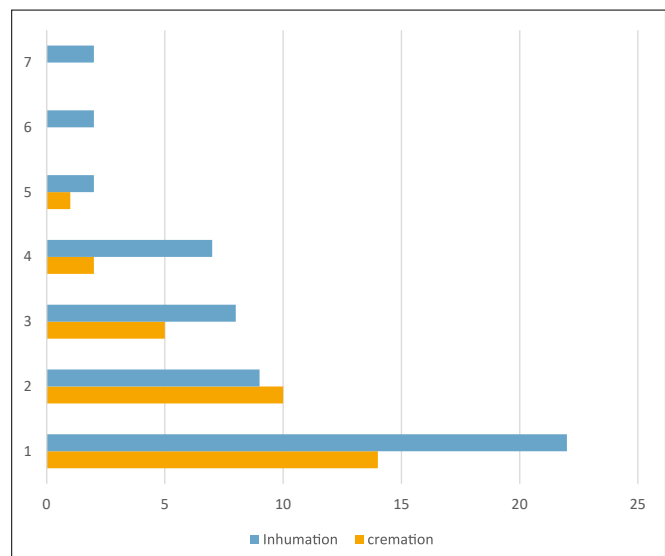


Fig. 6.15 Number of artefact categories by grave type.

Table 6.5 Main characteristics of the Elsloo-Koolweg burial ground.

Nr graves	Inhumation	Cremation	Possible cremation	Main orientation	Main position	Preservation	Male	Female	Adult	Child	Graves with grave goods	Inhumation with goods	Cremation with goods
113	63	34	16	NW-SE	SE	corpse silhouette; tooth enamel; calcined bone	5	11	26	2	84	55	29

of (secondary) burial rites or natural post-depositional processes. It could also indicate that cremation graves were older than inhumation graves and were disturbed by them.

The graves are primarily orientated NW-SE. The position of the deceased could be derived from the body shadows but also from the position of the grave goods. Based on the body shadows and the dental enamel the position of the head was most often towards the south-east or north-west. Based on the position of grave goods the head of the deceased was located east or west. Obviously, due to the absence of a body shadow, it was not possible to see in which direction the deceased was facing.

Grave goods were present in the fill and/or bottom of the burial pits. Grave goods were absent in 38 percent of the graves. Inhumation graves seem to be furnished with more grave goods, but this image may be skewed due to the fact that most cremation graves were found directly under the topsoil and therefore subject

to disturbance by, for instance, ploughing.

Pottery is the most frequent grave good, followed by flint arrowheads and blades as well as adzes. In several graves multiple artefacts were deposited as part of tool sets. Most grave goods seem to have been functional and personal ornaments are nearly absent. However, as these importantly were probably made of organic materials (spondylus shell necklaces, buckles etc.), this might importantly be absence of evidence. There seems to be a division between the kind of grave goods with which different grave types were furnished. Querns, arrowheads and scrapers are (almost) absent in cremation graves. There are larger variations in the number of grave goods present within a grave and in the number of grave good categories. Some graves have as many as 13 grave goods in a single grave, but most graves are furnished with one to four artefacts. Cremation graves appear to have fewer artefacts of the same kind per grave.

7 Human remains

S. Baetsen

7.1 Introduction

The subject of this study are the human bone and tooth fragments found in the burials. When the cremation graves were first discovered, it was thought that they belonged to the Iron Age or Roman period.³²¹ The combination of typical LBK grave goods and calcined bone fragments as found in the 1966 campaign showed that they date to the LBK.

Altogether 59 contexts contained calcined bone fragments, but it remained unknown whether they are human or animal, or both. In some cases, the cremated fragments were tiny and too small or fragile to be lifted from the surrounding sediment and preserved. Apparently, the cremated bone fragments of at least 42 separate burials were excavated. Fragmentary bone material and tooth enamel from the inhumed individuals were still present in a few burials. Because of their fragile state some were lifted as a small block and stored including the surrounding sediments. After the excavations the cremated bone remains and tooth enamel fragments, among other materials, could not be studied properly.³²² However, in the dissertation by Van de Velde an attempt was made to analyse the structure of the cemetery according to gender and status of the burials based on artefacts (ceramics) and location.³²³ Another dissertation by Trautmann, analysing the importance of cremation in early Neolithic communities in Central Europe, presents the cremation burials of Elsloo comprehensively. A major part of the cremated bone fragments from the burials have been described and studied by her.³²⁴

This study deals with all human bone and tooth fragments that were recovered during the aforementioned excavations at Elsloo. The state of preservation of the remains was unknown after fifty years of storage at the depot of the National Museum of Antiquities (RMO) in Leiden. Therefore, preliminary research was carried out to evaluate the potential of the bone material. We investigated the possibility for applying recent science-based methods like histology, isotope analyses and aDNA that could support and refine basic physical anthropological data. The results should, in combination with those of other (material)

categories, contribute to a broader interpretation of death rituals and population dynamics in Europe's early prehistory and the LBK site of Elsloo in particular. Therefore, specific variables and questions that are widely used in the Netherlands to describe cremated human bone fragments dating from Bronze Age, Iron Age or Roman sites were posed before analysing the bone and tooth fragments.³²⁵ These are:

- Are the bone and tooth fragments present in the burials human or animal, or a combination of both?
- Do bone and tooth fragments belong to one or more individuals?
- What is the total weight of cremated human bone fragments in every separate burial?
- Are the human bones properly burned, and at what temperature approximately?
- What is the degree of fragmentation and rate of completeness of the burned bone fragments?
- Which skeletal parts are represented in every separate burial and in what proportions?
- What are the demographic characteristics of the buried individuals? This involves age at death, gender, stature and bone changes caused by anatomical variation or pathological processes.

The next section mentions the methods applied in this physical anthropological study of the bone and tooth fragments. Conditions for selection and results like weight, fragmentation, age and gender are presented in the following sections. In the final section the study will be summarised, and answers given to our research questions.

7.2 Methodology

Of all events and processes to emphasise or formalise the changed status between the deceased individual and his/her surroundings, the burning of a body is only one of many possibilities. The custom to burn the deceased has been around since the Mesolithic (§3.2) and is common practice in the North-west European Iron Age and Roman period. A structural description of this treatment should make use of

³²¹ Field reports 1959.

³²² Van Wijk, 2019, 2.

³²³ Van de Velde 1979.

³²⁴ Trautmann 2006, 102-108.

³²⁵ See for example Smits 2006; Baetsen 2010a; Cuijpers 2015; Berk 2017.

characteristics such as grave type, weight, fragmentation, completeness, degree of burning, the presence or absence of skeletal parts and the physical features of the deceased.³²⁶ This research makes use of the methodologies proposed and applied by Smits in her dissertation about cremation burials from cemeteries dating to the Roman period.³²⁷ In addition, methods suggested by Trautmann, Maat and van den Bos, and Maat are used.³²⁸

Physical characteristics are often described for both burned and unburned bone fragments using sex, age at death, dental status, stature and bone changes due to disease or anatomical variation. Common guidelines to follow here are compiled in laboratory protocols established by Barge's Anthropologica, the Amsterdam Academic Medical Centre (AMC) and Leiden University (UL).³²⁹ Because cremated bodies are characterised by fragmented, deformed and incomplete bones, it is important to consider the (im)possibilities and limitations of research on burned human remains.³³⁰

Physical anthropological studies often refer to cremation, cremated remains, calcined bone or burned human bone. However, it is not always the same subject that is described. Definitions as described by McKinley have been used in this study.³³¹ The term cremation here refers to the process of burning the deceased

individual. In fact, it is not about the burned (bone) remains or their deposition. Cremation is only one part of several processes in the treatment of a deceased person. After collection and burial of the (pyre) remains, the contents of a (cremation) grave can therefore consist of burned human bone and other materials. In addition, the cremation residues can remain *in situ* without treatment or be treated at the location.³³² It can be deduced from this that not only the burned human bone, but also for example animal bone, ceramics, tools, glass or wood present on the pyre can be regarded as part of a cremation.

7.3 Results

In Table 7.1 a summary is presented referring to all the find numbers (FN) that were registered as containing human bone. A total of 56 separate numbers were available for a first scan to evaluate their potential for research. In two cases a separation was made by adding a number or letter. Burial 71 contains FN 736.17 and 736.30, the first being reserved for a small object made of bone and the other for the burned human bones. The letters A to F were added to FN 786.2 from burial 64, all six bags

³²⁶ Smits 2006, 7-8. Cuijpers 2015, 61-86.

³²⁷ Smits 2006, 7-32.

³²⁸ Trautmann 2006; Maat 1997; Bos & Maat 2002.

³²⁹ Maat, van den Merwe & Hoff 2012; Waters-Rist *et al.* 2016.

³³⁰ Smits 2006, 8.

³³¹ McKinley 2004, 9-13.

³³² McKinley 2004, 9-10.

Table 7.1 General Summary.

Pit	Burial	Findnumber	Type	Indicated weight (gr)	Additional research	Contents (fragments of)	Largest fragment (mm)	Animal bone
129	111	464.2	CREM	135.2	Yes	fragments of cranium. dia/epiphysis and axial	Epiphysis 35.7	No
129	108	465.2	CREM	2.1	No	fragment of diaphysis. rest NC		NC
128	98	501.32	INH	11.7	Yes	block sample containing fragments of unburned bone and tooth enamel		No
	96	505.30	INH	554	Yes	block sample containing fragments of tooth enamel		
130	6	506.1	INH	356	Yes	block sample also containing ceramics		No
133	113	508.31	CREM	30.1	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 26.6	No
	109	513.30	CREM?	600	Yes	block sample containing fragments of cremated bone		
128	110	514.30	INH	4.2	Yes	block sample containing fragments of unburned bone (mandibula) and tooth enamel		No
134	105	518.31	INH	4.4	Yes	block sample containing fragments of unburned bone and tooth enamel		No
	104	519.1	INH	566	Yes	block sample containing fragments of tooth enamel		
201	7	703.1	CREM	465	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 81.5	No
201	9	706.1	CREM	10.9	Yes	fragments of cranium and dia/epiphysis		No
201	16	707.31	CREM	56.5	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 39.2	No

Pit	Burial	Findnumber	Type	Indicated weight (gr)	Additional research	Contents (fragments of)	Largest fragment (mm)	Animal bone
201	21	714.30	CREM	8.6	Yes	fragments of cranium and dia/epiphysis	Neurocranium 24.3	No
201	20	715.31	CREM	77.3	Yes	fragments of cranium. dia/epiphysis and axial	Neurocranium 34.4	No
201	19	716.31	CREM	55.1	Yes	fragments of cranium. dia/epiphysis and axial		No
201	45	718.30	CREM	0.9	No	thin and fragile cranial fragment. possible child		No
201	46	719.1	CREM	1.2	No	diaphysis fragment. rest NC		NC
201	47	720.2	CREM	488.4	Yes	fragments of cranium. dia/epiphysis. axial and 8 roots of teeth	Costa 48.5	No
202	48	721.1	CREM	38.3	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 25.9	No
201	72	724.31	CREM	475	Yes	fragments of cranium. dia/epiphysis and axial. Including damaged part of pars petrosa	Diaphysis 5.21	No
201	73	725.30	CREM	62.3	Yes	fragments of cranium. dia/epiphysis. axial and 2 roots of teeth	Diaphysis 35.2	No
201	74	729.30	CREM	12	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 23.1	No
201	51	731.30	CREM	42.4	Yes	fragments of dia/epiphysis and axial	Diaphysis 53.2	No
201		732.1	CREM	1	No	diaphysis fragment. rest NC		NC
201	52	735.1	CREM	80	Yes	fragments of cranium. dia/epiphysis. axial and 1 root of tooth	Costa 46.2	No
201	71	736.17	CREM	2.4		object (small pen) made of bone		Yes?
201	71	736.30	CREM	17.6	Yes	fragments of cranium. dia/epiphysis and 1 root of tooth	Neurocranium 20.9	No
201	(70)	737.1	CREM	3.4	No	nc		NC
201	69	740.2	CREM	2	No	nc		NC
201		751.2	CREM	8	Yes	Fragments of dia/epiphysis	Diaphysis 26.1	No
201	6	753.1	CREM	0.4	No	nc		NC
201	42	754.30	CREM	2.5	No	nc		NC
201	22	755.1	CREM	0.4	No	nc		NC
201	11	758.30	CREM	1	No	cranial fragment. rest NC		No
201	12	759.1	CREM	1.9	No	diaphysis fragment. rest NC		No
201	85	766.1	CREM	24.5	Yes	fragments of cranium and dia/epiphysis	Diaphysis 23.9	No
201	77	770.1	CREM	0.2	No	diaphysis fragment. rest NC		NC
202	80	778.1	CREM	0.2	No	diaphysis fragment. rest NC		NC
202	64	786.2A-F	CREM	77	Yes	fragments of diaphysis	Diaphysis 2.94	No
202	66	790.1	CREM	56.6	Yes	fragments of cranium. dia/epiphysis and axial	Neurocranium 28.9	No
202	62	793.1	CREM	170.6	Yes	fragments of cranium. dia/epiphysis and axial	Mandibula 33.7	No
201	88	796.1	INH/ CREM?	7.2	Yes	nc		NC
202	57	797.1	CREM	507.7	Yes	fragments of cranium. dia/epiphysis. axial and 1 root of tooth	Neurocranium 50.3	No
201	56	809.2	CREM	1.6	No	diaphysis fragment. rest NC		No
202	54	812.1	CREM	1.9	No	diaphysis fragment. rest NC		NC
201	(37)	818.1	CREM	0.5	No	nc		NC
202		820.1	CREM	103	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 41.6	No
201	41	822.1	CREM	0.2	No	nc		NC
202	38	823.1	CREM	0.2	No	thin and fragile cranial fragment. possible child		No
202	26	824.1	CREM	133.8	Yes	fragments of cranium. dia/epiphysis and axial	Neurocranium 29.9	No
201	40	825.1	CREM	318	Yes	fragments of cranium. dia/epiphysis and axial	Diaphysis 40.9	No
202	39	826.1	CREM	165.2	Yes	fragments of cranium. dia/epiphysis and axial	Neurocranium 41.4	No
202	28	827.1	CREM	1.2	No	diaphysis fragment. rest NC		NC
201	24	828.1	CREM	2.7	No	cranial fragment. rest NC	Neurocranium 19.2	No
202	63	830.1	CREM	157.6	Yes	block sample containing fragments of cremated bones		NC

NC = Not Classifiable.

holding small amounts of burned human bone. It is not clear why this distinction was made. All find numbers are related to a feature number (F). However, in four cases a relation appears not to have been clear and F 9999 was noted with the most probable feature number added in brackets. This means that FN 720 most likely belongs to F 144, FN 737 to F 1026 and FN 818 to F 1018. Only FN 732 could not be attributed to a feature. In addition, every feature that was considered a burial also received a grave number. Only F 149/FN 751, besides the aforementioned FN 732, was not labelled with a grave number. In the description and analyses of the human bone and tooth fragments this grave number will be the primary key to indicate the separate burials.

7.3.1 Selection

Before physical anthropological analyses were carried out a scan was made to assess if, how much and in what condition bone and tooth materials were still present after 50 years of storage. Furthermore, we checked if bone fragments were present that could be classified as originating from animals. In Table 7.1 the results of this first scan are listed. As far as it was possible to ascertain, no animal bones were found. Only the small bone tool in grave 71 probably was made from an animal bone. In eight burials the cremated fragments are too small or have no distinctive traits to be classified as either human or animal.³³³ All graves contain a very low amount of bone material; a maximum weight of 7.2 g was recorded for burial 88. It is possible that small, non-classifiable fragments in other burials belonged to animals. But in none of them was a recognisable piece of animal bone found. Therefore, it seems unlikely that there are animal bones present in the burials.

Twenty burials contain less than 3 g of bone fragments. The majority of them are recognisable as small human neurocranial or diaphyseal fragments, but no further analysis is possible. However, in two cases (graves 45 and 38) cranial fragments are very thin and fragile and could have belonged to a child. In 35 burials, it seemed that enough well-preserved bone and tooth fragments were available for additional analyses (Table 7.1). Some of these were lifted

together with the surrounding soil in small or large blocks. Of these blocks, graves 6, 96, 98, 104, 105 and 110 still hold fragments of unburned bone and tooth enamel. Their condition is poor, the blocks are dried out and rock hard. After careful preparation only small fragments were left. The tooth fragments in grave 110 belong to the left and right central lower incisor (element numbers 31 and 41). In grave 105 the fragments belonged to premolars and molars that could not be specified any further. No enamel wear or other characteristics could be observed. According to the label FN 506, belonging to grave 6, should also contain pieces of ceramic but they could not be identified. The blocks taken from graves 63 and 109 are supposed to contain fragments of cremated bone. After careful preparation only three small and unrecognisable fragments of burned bone were present in grave 63. The cremated remains in grave 109 and the unburned bone and tooth fragments in graves 96 and 104 were not analysed. They remained untouched as a block and kept for future analysis and display purposes.

After separation of contexts that contained only bone or tooth fragments with limited research abilities, a total of 26 were available for further analysis (Table 7.2).

7.3.2 Weight of cremated human bone fragments

The cremated human bone fragments are first weighed as a whole, so including the smallest fragments of burned bone, grit and powder from the residue and as much as possible without fragments of other materials such as animal bone, charcoal, sediment concretions or ceramic fragments (Table 7.2). In the column 'indicated weight' are the quantities as they were registered after excavation, the column 'total weight' presents the amount during analyses. Almost every grave shows a small, but not significant loss of weight after having been cleared, as far as possible, of non-human bone materials.

A common treatment is to separate the cremated bones into fragments larger than 10 mm, parts smaller than 10 mm but larger than 3 mm and a residue smaller than 3 mm.³³⁴ Only

³³³ Graves 6, 22, 37, 41, 42, 69, 70 & 88.

³³⁴ See for example Maat 1997; Bos & Maat 2002, 3; Smits 2006, 7-32; Baetsen 2008; Cuijpers 2015; Berk 2017.

Table 7.2 Cremation graves.

Burial	Fnr	Total weight (g)	> 10mm	< 10mm - > 3mm	< 3mm	Cremation level	Indicated weight (g)
7	703	450	364	80	6	4	465
9	706	10	6	3	1	4	11
16	707	54	37	16	1	4	57
19	716	54	34	18	2	4	55
20	715	75	50	19	6	4	77
21	714	8	4	3	1	4	9
26	824	131	44	49	38	4	134
39	826	147	60	52	35	4	165
40	825	311	120	114	77	4 (5)	318
47	720	454	160	234	60	4 (2)	488
48	721	36	26	9	1	4	38
51	731	42	23	17	2	4	42
52	735	74	45	27	2	4	80
57	797	496	199	175	122	4	508
62	793	155	79	61	15	4	171
64	786	35	17	15	3	4	77
66	790	47	24	13	10	4	57
71	736	14	5	8	1	4	18
72	724	460	330	111	19	4 (2)	475
73	725	56	34	20	2	4	62
74	729	11	6	4	1	4, 5	12
85	766	19	9	9	1	4 (2)	25
111	464	122	40	67	15	4	135
113	508	22	9	12	1	4	30
	751	7	3	3	1	4 (2, 3)	8
	820	132	78	39	15	4	103
	Total	3422	1806	1178	438		3619
	Average	132	69	45	17		139

the weight of this smaller than 3 mm residue is noted after checking for clearly identifiable parts. When the contents of this residue cannot be split any further into different categories of material, the weight of materials other than human bone can be estimated and subtracted.³³⁵

The weight of bone fragments from an adult can be on average approximately 2000 g after cremation.³³⁶ Individual differences are possible, with the original quantities varying between approximately 1500 g and 2700 g.³³⁷ These differences are possible because the skeleton of an adult woman for example weighs less, on average, than that of a man. Various studies have shown that the weight of the

burned bone fragments found and recovered per individual is actually always lower than what was originally left after the person in question was cremated.³³⁸ How much ultimately is found in a burial varies widely. For example, in eight Roman sites from Germany and Switzerland, Wahl found weights between 199 g and 814 g for men and between 19 g and 555 g for women depending on the type of burial.³³⁹ In addition, the potential weight also depends on age (bones of a child are lighter than those of an adult), stature or diseases such as osteoporosis.³⁴⁰ So besides the different types of burials, also physical-anthropological characteristics of the person concerned influence the weight of the

³³⁵ McKinley, 2004, 10.

³³⁶ Wahl 2008, 149.

³³⁷ Smits & Hiddink 2003, 150-151; Smits 2006, 10-11.

³³⁸ Bos & Maat 2002, 10-11; Smits 2006, 10; Wahl 2008, 149.

³³⁹ Wahl 2008, 149.

³⁴⁰ Smits 2006, 11.

bone remaining after cremation. After cremation it also depends on how important it was considered, possibly relating to an individual's status, to gather and collect all remains from the funeral pyre.³⁴¹

The weight of burned human bone fragments from the LBK cemetery at Elsloo varies between burials but seems very low, even if it could be assumed that only about half of the burned human bone fragments made it into prehistoric cremation burials.³⁴² Altogether 3422 g of cremated human bone is present in 24 burials, meaning an average of 132 g per burial (Table 7.2). In her dissertation Trautmann found an even lower average of 77 g for this site. But she included all supposed cremation burials, also the ones containing a low amount (<1 g) of bone, and which could not be identified as definitely human.³⁴³ Not one cremation burial from Elsloo contains more than 500 g and just four (graves 7, 47, 57 and 72) over 400 g. Exactly two thirds (sixteen graves) hold less than 75 g of cremated human bone fragments. Related to what could be expected (approx. 2000 g per adult), the weight at Elsloo is on average less than 7 percent and at best 24.8 percent (grave 57). The pieces larger than 10 mm weigh 1806 g overall and 69 g on average. Residues between 10 and 3 mm and smaller than 3 mm appear in low amounts too, only 45 and 17 g on average.

Obviously, the cremation graves from Elsloo contain a low number of burned bone fragments on average. Confirmation is provided by Trautmann who calculated an average weight of 157 g for all cremation burials, not one burial exceeding 1000 g, as found at other LBK cemeteries. No differences in weight variation seemed to be present between burials of men or women or between age categories.³⁴⁴ Comparing the results to, for example, cremation burials from cemeteries dating to the Roman period, the low amount in LBK cemeteries is also noticeable. Here averages were found to be between 191 and 643 g per burial.³⁴⁵ It is unlikely that this low amount of cremated bone fragments in the burials from the LBK cemetery at Elsloo was intentional and that just a few fragments (representing the body) were enough (*pars pro toto*) for the diseased person to be considered as going into the next phase of the death ritual. It is more probable that preservation, or preservation conditions are the main causes for differences between cemeteries,

indicating they were relatively poor at Elsloo.³⁴⁶ Besides, the upper levels of many burials were destroyed, their contents widely spread and eventually disintegrated due to post-depositional processes (56.5).

7.3.3 Classification and inventory of bone fragments

To obtain an impression of the relative completeness of a skeleton and whether fragments of all skeletal parts are present, the larger and recognisable cremated bone fragments are divided into five inventory categories (Table 7.3). These are neurocranium (skull vault), viscerocranium (facial skull parts), axial (trunk; shoulder, vertebrae, ribs, pelvis), diaphysis (shafts of arm and leg) and the epiphyses (joint ends of arm and leg).³⁴⁷ All unrecognisable fragments larger than 10 mm are assigned to the non-determinable category. An inventory of the skeletal parts present can provide information about, for example, a selection of skeletal parts or preservation differences and is important for the determination potential for analysis of sex and skeletal age at death.³⁴⁸

The percentage of burned human bone fragments (larger than 10 mm) that could be determined is 50 percent overall and 50.4 percent on average per burial (Table 7.3). This means that half of all the cremated bone fragments (in relation to the total weight of all cremated bone) could be assigned to the five inventory categories. The percentages sometimes differ considerably between burials and vary between 31.1 percent (grave 111) and 74 percent (grave 7). In some cases, this can be related to a low total weight, indicating that determination of one fragment has a relatively large influence on the final percentage. However, the burials with a substantial amount (>300 g) of cremated human bone show a similar variation.

This percentage (50%) of fragments that could be determined is higher than, for example, in burials dating to the Roman period. At those sites cremated fragments were processed the same way as those from Elsloo and percentages vary between 30 and 44 percent.³⁴⁹

Key figures exist for how many cremated human bone fragments of different skeletal

³⁴¹ Trautmann 2006, 80.

³⁴² Trautmann 2006, 80-81.

³⁴³ Trautmann 2006, 105-105.

³⁴⁴ Trautmann 2006, 168-169.

³⁴⁵ See Bos & Maat 2002, 5; Smits & Hiddink 2003, 150; Hiddink 2003, 427; Hiddink 2006, 23; Smits 2006, 40-46; Baetsen 2009, 109; Baetsen 2010 (a), 237, 243; Baetsen 2011 (a), 203; Baetsen 2011 (b), 154-155; Baetsen 2011 (c), 198-201; Baetsen 2011 (d).

³⁴⁶ Trautmann 2006, 104.

³⁴⁷ Smits 2006, 7-32.

³⁴⁸ Smits 2006, 13.

³⁴⁹ Smits & Hiddink 2003, 152; Baetsen 2009, 109-110; Baetsen 2010 (a), 237; Baetsen 2011 (a), 204; Baetsen 2011 (b), 156-157; Baetsen 2011 (c), 200-201; Baetsen 2011 (d), 123-141.

Table 7.3 Presence of skeletal regions.

Burial	Fno	Total weight	Classifiable	Neurocranial	Viscerocranial	Axial	Diaphysis	Epiphysis	NC	% cranial	% dia/epiphysis	% axial
7	703	450	74.0%	58	3	95	111	66	31	18.3%	53.2%	28.5%
9	706	10	60.0%	1			5			16.7%	83.3%	0.0%
16	707	54	64.8%	2	2	2	29		2	11.4%	82.9%	5.7%
19	716	54	59.3%	12			17	1	2	37.5%	56.3%	6.3%
20	715	75	64.0%	27	2	2	15	2	2	60.4%	35.4%	4.2%
21	714	8	50.0%	3			1			75.0%	25.0%	0.0%
26	824	131	32.1%	20	2	1	18	1	2	52.4%	45.2%	2.4%
39	826	147	39.5%	17			9	17	15	29.3%	55.2%	15.5%
40	825	311	35.7%	15		40	52	4	9	13.5%	50.5%	36.0%
47	720	454	33.5%	19	1	37	85	10	8	13.2%	62.5%	24.3%
48	721	36	72.2%	1			2	21	2	3.8%	88.5%	7.7%
51	731	42	54.8%				1	22		0.0%	95.7%	4.3%
52	735	74	55.4%	17			4	20	4	41.5%	48.8%	9.8%
57	797	496	37.7%	88	4	20	62	13	12	49.2%	40.1%	10.7%
62	793	155	49.7%	19	3	22	28	5	2	28.6%	42.9%	28.6%
64	786	35	48.6%				16	1		0.0%	100.0%	0.0%
66	790	47	51.1%	3			1	14	6	12.5%	83.3%	4.2%
71	736	14	35.7%	2				2	1	40.0%	60.0%	0.0%
72	724	460	69.3%	61	3	47	171	37	11	20.1%	65.2%	14.7%
73	725	56	58.9%	17	4	4	6	2	1	63.6%	24.2%	12.1%
74	729	11	54.5%	2			1	2	1	33.3%	50.0%	16.7%
85	766	19	42.1%	1			6	1	1	12.5%	87.5%	0.0%
111	464	122	31.1%	6		6	17	9	2	15.8%	68.4%	15.8%
113	508	22	36.4%	1			2	5	1	12.5%	62.5%	25.0%
	751	7	42.9%					3		0.0%	100.0%	0.0%
	820	132	56.1%	11		17	46		4	14.9%	62.2%	23.0%
	Total	3422	50.0%	403	24	315	791	177	96	25.0%	56.6%	18.4%
	Average	132	50.4%	18	3	16	30	10	6	26.0%	62.4%	11.4%

NC = Not Classifiable.

regions should be present if complete bodies were burned. Based on ratios of the complete, unburned skeleton, ratios (weight) were found to be 16 to 18 percent skull fragments (cranium), 21 to 23 percent axial (trunk) fragments (axial) and 50 to 59 percent shaft and joint end fragments (diaphysis/epiphyses).³⁵⁰ Among the burials from the LBK cemetery at Elsloo quantities deviate from this, sometimes to a considerable degree (Table 7.3). Relatively more

cranial fragments (25%) and fewer axial (18.4%) are present. This does not appear to be solely based on burials that contain a high weight (> 300 g) of cremated human bone. Remarkable is grave 57, which has the highest weight (496 g) and consists of almost 50 percent cranial fragments. Furthermore, seventeen of the 26 burials contain cremated bone fragments from all three inventory categories. Only four (graves 9, 21, 71 and 85) lack axial fragments, in one

³⁵⁰ McKinley 1989, 68; Smits 2006, 12-13.

(grave 51) cranial fragments are absent and in two burials (grave 64 and FN 751) fragments of both are not present. Other LBK cemeteries in Central Europe seem to have a similar distribution of skeletal elements overall but show a considerable variability within. A little less than one third (29%) contain fragments from all sections (cranial, torso and extremities) of the body.³⁵¹ This is not limited to burials with a higher weight of burned fragments but is also present among burials containing less material, just as the burials from Elsloo show. The presence of fragments from smaller skeletal sections (hands, feet, teeth) indicates great care when collecting the fragments from the pyre.³⁵² However, a deliberate selection of specific skeletal parts cannot be demonstrated for the burials from the LBK cemetery of Elsloo. Furthermore, a large part of the possible burned bone fragments appear to be missing, which should be taken into account when analysing the content.

7.3.4 Fragmentation and intactness of bone fragments

To classify fragmentation, size-based classes were defined. However, measurement of over a hundred or more bone fragments, to calculate an average, is extremely labour-intensive.³⁵³ It is more efficient, for example, to measure the largest fragment per inventory category with a calliper. This size determines the assignment to a fragmentation class. Fragments smaller than 15 mm are in class 1 and are considered very small. Fragments larger than 45 mm are in class 5 and considered very large.³⁵⁴ However, it must be taken into account that this concerns a 'post-excavation' fragment size and not the dimension during deposition of the bone material.³⁵⁵ Ultimately, it is about the fragment size after years of deposition in the soil, excavation, storage, washing and sieving.³⁵⁶ Therefore, a fragmentation class may say more about these post-depositional processes than about the original fragment size.³⁵⁷

In addition to these fragmentation classes the rate or degree of completeness (intactness ratio) can be calculated.³⁵⁸ It should provide possibilities to assess whether the cremated bone fragments can be analysed for physical-

anthropological traits, such as sex and age at death. Here the cremated human bone fragments must be sieved with mesh sizes of 10 and 3 mm. The weight of the fragments larger than 10 mm should then be divided by the total weight of all fragments greater than 3 mm. This will result in a number between 0 (all fragments are smaller than 10 mm) and 1 (all fragments are larger than 10 mm).³⁵⁹ The closer the ratio is to 1, the better the chances are supposed to be. But when the total weight of the fragments larger than 10 mm exceeds 150 g, it is likely that physical-anthropological traits can be analysed regardless of the intactness ratio in case of an adult person. However, physical-anthropological features can also be recognised on fragments smaller than 10 mm, so the residue smaller than 10, but larger than 3 mm should always be checked. Therefore, a rate of intactness expresses the weight ratio between large fragments (>10 mm) and medium fragments (<10 mm - >3 mm). A high rate of intactness suggests a higher proportion of larger bone fragments and can be characteristic of, for example, the manner of interment such as in an urn, or the inclusion of only a selection of large fragments in a pit.

An overview of the maximum size of cremated bone fragments per skeletal region and burial is presented in Table 7.4. Altogether six burials contained very large fragments (class 5), in three (graves 7, 51 and 72) these belong to a diaphysis, in two (graves 47 and 52) to the axial region and in one (grave 57) to the neurocranium. On average fragments of the diaphysis (3.3) are the largest and the epiphysis smallest (2.2). There are three burials that have a mean fragmentation below 2, graves 71 (1.3), 74 (1.8) and 85 (1.7) contain almost exclusively very small and small fragments. The average size of all categories together is 2.7 and per grave 3.6.

For five LBK cemeteries studied by Trautmann the average degree of fragmentation was found to be very small (<15 mm). About two-thirds (67%) of all cremation burials belonged to this category and a quarter (26%) to the small one (15-25 mm), leaving just 7 percent of burials with medium-sized fragments (25-35 mm) on average.³⁶⁰ Therefore, based on mean fragmentation the cremation burials from Elsloo belong to the better-preserved ones. This means that the fragments on average seem significantly less small than at the other cemeteries.

³⁵¹ Trautmann 2006, 168.

³⁵² Trautmann 2006, 168.

³⁵³ Smits 2006, 12.

³⁵⁴ Wahl 1982, 29-31; Smits 2006, 12.

³⁵⁵ McKinley 1994, 342.

³⁵⁶ Trautmann 2006, 80.

³⁵⁷ McKinley 1994, 339-340.

³⁵⁸ Maat 1997.

³⁵⁹ Maat 1997; Bos & Maat 2002, 3.

³⁶⁰ Trautmann 2006, 166-167.

Table 7.4 Fragmentation and intactness ratio.

Burial	Fno	> 10mm	Rate of intactness	Neurocranial	Viscerocranial	Axial	Diaphysis	Epiphysis	Fragmentation (mean)	Fragmentation (largest)
7	703	364	0.82	4	3	4	5	4	4.0	5
9	706	6	0.67	1			3		2.0	3
16	707	37	0.70	2	2	2	4		2.5	4
19	716	34	0.65	2		3	3	1	2.3	3
20	715	50	0.72	3	2	1		2	2.0	3
21	714	4	0.57	2			2		2.0	2
26	824	44	0.47	3	2	2	3	2	2.4	3
39	826	60	0.54	4		2	3	3	3.0	4
40	825	120	0.51	3		4	4	2	3.3	4
47	720	160	0.41	3	1	5	4	2	3.0	5
48	721	26	0.74	1		2	3	2	2.0	3
51	731	23	0.58			1	5		3.0	5
52	735	45	0.63	3		5	4		4.0	5
57	797	199	0.53	5	3	4	3	2	3.4	5
62	793	79	0.56	3	3	3	3	3	3.0	3
64	786	17	0.53				3	1	2.0	3
66	790	24	0.65	3		2	2	2	2.3	3
71	736	5	0.38	2			1	1	1.3	2
72	724	330	0.75	4	3	4	5	4	4.0	5
73	725	34	0.63	3	3	3	4	2	3.0	4
74	729	6	0.60	2		1	2	2	1.8	2
85	766	9	0.50	1			3	1	1.7	3
111	464	40	0.37	2		3	3	4	3.0	3
113	508	9	0.43	2		1	3		2.0	3
	751	3	0.50				3		3.0	3
	820	78	0.67	2		4	4		3.3	4
	Total	1806	0.53	5	3	5	5	4	4.4	5
		Mean	0.58	2.6	2.4	2.8	3.3	2.2	2.7	3.6

Comparable averages are found, for example, for burials dating to the Roman period in the Netherlands.³⁶¹ However, in all these cases calculations were based on only the largest fragment per skeletal region. The numbers do not say anything about the size and amount of the smaller fragments.

For this purpose, the rate of intactness can be used. In Table 7.4 ratio(s) for the burials from Elsloo are presented. Based on the total weight the ratio is 0.53 and 0.58 on average per burial.

This means that slightly over half (by weight) of the cremated bone fragments larger than 3 mm are also larger than 10 mm. In six burials (graves 7, 9, 16, 20, 48, 72 and 114) the ratio indicates that over two-thirds of the fragments are larger than 10 mm, with ratios varying between 0.67 and 0.82. Although the weight of the larger fragments (>10 mm) varies between the graves, they seem to offer good possibilities for recognizing physical-anthropological traits. The relatively largest number of smaller fragments

³⁶¹ Smits 2006, 42-43, 75-76; Baetsen 2009, 110-111; Baetsen 2010 (a), 238; Baetsen 2011 (a) 205-207; Baetsen 2011 (b), 155-158; Baetsen 2011 (c), 203-204.

(<10 mm) or the lowest ratio were found in graves 71 (0.38) and 111 (0.37). In general, the ratio is slightly higher than, for example, ratios calculated for cemeteries dating from the Roman period in the Netherlands.³⁶²

As mentioned before, there are several events that influence the fragmentation of cremated bones. Examples of this include the way in which the fire has been extinguished (water or sand), the method of collection (before, during or after cooling), placing them in a container or in a pit, differences in structure of the bone tissue and post-depositional processes, such as animal and plant activity, soil erosion and the excavation itself.³⁶³ To what extent each event influences the fragmentation here in Elsloo is difficult to quantify. In general fragmentation seems moderate; deliberate fragmentation of the remains after the cremation, as is for example suggested for Roman sites, could not be ascertained.³⁶⁴

7.3.5 Degree of cremation and temperature

The classification of different stages in the process of cremation is based on the coloration of the bone. This colour mainly depends on the temperature reached and the duration of the cremation process. In addition, the conditions of the bone before cremation, such as a varying fat level, moisture, the presence or absence of blood and the porosity of the bone marrow, are also influential.³⁶⁵ Differences in these conditions can result in differences in the ultimate colour of the bone fragments. Various examples are available to classify the colours. The Munsell soil colour charts and the CIELAB colour system are mainly used in the United States, a colour and temperature classification common in the European region is that of Wahl and Holck.³⁶⁶

In Table 7.2 the results for the cremation levels at the cemetery at Elsloo are shown. Most cremated bone fragments seem to have a chalk white (phase 4) colour, which shows that the temperature during cremation reached (for a considerable amount of time) between 650° and 800° C. If there are also a few fragments of black (phase 2), grey (phase 3) or old white colour (phase 5) which indicate poor, medium or very good combustion, this is noted in brackets. If

these are present in substantial quantities, no brackets are used. The degree of cremation can be an indication of the level of care with which the cremation was carried out.³⁶⁷ Most of the bone fragments from Elsloo are burned well (phase 4). All the burials show a uniform coloration of the fragments, in only six (graves 40, 47, 72, 74, 85, and FN 751) of them do a few poor, medium or very well burned fragments appear. In her study of LBK cremation burials throughout Central Europe, Trautmann found a similar result for the cemetery at Elsloo. She indicated that most burned human bone fragments here are burned well and show little variation in coloration compared to fragments from other LBK cemeteries.³⁶⁸ Although burned well in general, in most cases the temperature seemed lower or the conditions for cremation were slightly less favourable than seen in cremation burials from the Roman period in the Netherlands.³⁶⁹ In this period, most bone fragments were burned very well.

The degree of cremation can be an indication of the level of the care with which the cremation was carried out.³⁷⁰ During the Roman period, poorly and moderately burned fragments were found relatively more often among the well to very well burned fragments. Also, fragments are often not even in colour and have a black or blue-grey surface. This means that the burials from the cemetery at Elsloo probably included only well burned fragments. This in turn suggests that less thoroughly burned fragments were not collected or added, for example those that had ended up at the less hot edges of the pyre during the cremation process. It is a fairly common process that occasionally bone fragments jump or fall to places where the heat intensity was higher or lower.³⁷¹ But as said before, if we assume that the burials from Elsloo are not complete and many fragments are missing, then both less well and better-burned fragments may have been present in the missing material.

7.3.6 Demography

Although approximately half of all the fragments were smaller than 10 mm, most of the cremated human bone fragments could be studied for physical–anthropological characteristics (Table 7.5). It cannot be stated exactly how many

³⁶² Bos & Maat 2002, 5-6; Baetsen 2011 (a), 205-207; Baetsen 2011 (b) 155-157; Baetsen 2011 (c), 203-204; Baetsen 2011 (d), 123-141.

³⁶³ McKinley 1994, 339-342; Smits & Hiddink 2003, 144; Smits 2006, 11-12.

³⁶⁴ See Wahl 1988; Boyle 2010, 205.

³⁶⁵ Devlin & Herrmann 2008, 110-111, 126.

³⁶⁶ Devlin & Herrmann 2008, 111-113; Wahl 1982, 28-29; Holck 1986, 131-133.

³⁶⁷ Smits & Hiddink 2003, 143.

³⁶⁸ Trautmann 2006, 166.

³⁶⁹ See Bos & Maat 2002, 6; Smits & Hiddink 2003, 143-145; Hiddink 2003, 425; Hiddink 2006, 21; Smits 2006; Baetsen 2009, 110; Baetsen 2010 (a), 239, 243; Baetsen 2011 (a), 205; Baetsen 2011 (b), 156-157; Baetsen 2011 (c), 202-204; Baetsen 2011 (d), 123-141.

³⁷⁰ Smits & Hiddink 2003, 143.

³⁷¹ Smits 2006, 14.

Table 7.5 Physical anthropological characteristics.

Burial	Fno	Indications of skeletal age	Possible age	Indications of skeletal sexe	Robustness	Sex	Pathology/non metrical traits
7	703	auricular surface ilium 35-45, suture obliteration 40-60	40-50	Arcus zygomaticus -2	smooth	female ?	
9	706	size, shape and proportions of an adult	18+		robust/smooth	nc	
16	707	size, shape and proportions of an adult	18+	Os zygomaticum -2	robust/smooth	female ?	
19	716	sutures still oblong and pointed, probable young adult (18-25)	18-25				
20	715	suture obliteration 20-40	20-40		smooth	female ?	
21	714	suture obliteration 20-40	20-40	Planum nuchale -2	robust/smooth	female ?	
26	824	size, shape and proportions of an adult, suture obliteration 30-50	30-50		smooth	female ?	
39	826	size, shape and proportions of an adult, suture obliteration 20-40	20-40	Planum nuchale +1	robust/smooth	male?	
40	825	size, shape and proportions of an adult, suture obliteration 30-50	30-50		smooth	female ?	
47	720	auricular surface ilium 40+, suture obliteration 30-50	40-50	Sulcus preauricularis +1, Arc composé +1	robust	male	bone reaction dens apex
48	721	size, shape and proportions of an adult	18+		smooth	female ?	
51	731	size, shape and proportions of an adult	18+	Robust, firm linea aspera	robust	male?	
52	735	sutures still oblong and pointed, probable young adult (18-25)	18-25		robust/smooth	nc	
57	797	sutures still oblong and pointed, probable young adult (18-25), shape, size and proportions ribfragments appear more youthfull 12-18	12-25		robust/smooth	nc	
62	793	size, shape and proportions of an adult, suture obliteration 30-50	30-50	Crista supramastoideus +1	robust/smooth	male?	
64	786	size, shape and proportions of an adult	18+		smooth	female ?	
66	790	size, shape and proportions of an adult	18+	Protuberantia occipitalis externa +1	robust/smooth	male?	
71	736	suture obliteration 20-40	20-40		robust/smooth	nc	
72	724	suture obliteration 40-60	40-60	Protuberantia occipitalis externa -1, planum nuchale -2	smooth	female	
73	725	suture obliteration 20-40	20-40	Arcus superciliaris -2	smooth	female ?	
74	729	size, shape and proportions of a non adult. separate loose epiphysis, 7-12 jaar	7-12				
85	766	size, shape and proportions of an adult	18+		robust/smooth	nc	
111	464	size, shape an proportions of an adult, vertebral appearance resembles more 30-50	30-50		smooth	female ?	
113	508	size, shape and proportions of an adult	18+		robust/smooth	nc	
114	820	size, shape and proportions of an adult, suture obliteration 20-40, auricular surface ilium 20-30	20-30		robust/smooth	nc	
	751	size, shape and proportions of an adult	18+		robust/smooth	nc	

NC = Not Classifiable.

individuals the cremated bone fragments represent, but no double skeletal parts have been found within one burial. In addition, the number of bone fragments per burial does not suggest that multiple people were deliberately interred within one context. In several burials identical skeletal parts (mostly cranial fragments) appear. Therefore, it seems unlikely that, for example, fragments of one individual were deliberately scattered over multiple burials. Considering these observations, it is assumed that every separate burial contained one person, as far as the cremation graves are concerned.

Several morphological characteristics of the pelvis and cranium could be noticed on the fragments in nine burials. In addition, the degree of robustness on some skeletal elements was used to obtain an indication of sex. For example, areas on the bone surface where muscles attach may have a smooth (female) or more robust (male) appearance. Combining these traits, it was possible to give an indication of sex for sixteen individuals, characteristics on eight others were not distinctive enough and two hold no traits at all (Table 7.5). In eleven burials (graves 7, 16, 20, 21, 26, 40, 48, 64, 72, 73 and 111) the bone fragments appear to be of females and in five (graves 39, 47, 51, 62 and 66) of males. This distribution results in a female/male ratio of 2.2:1, which differs from a usual more or less 1:1 ratio in the corresponding living society. A discussion on the meaning of these ratios was given in Trautmann's work on LBK burials and cemeteries throughout Central Europe.³⁷² Here females (55%) outnumber males (45%) at almost every cemetery for both cremation and inhumation burials (Table 3.3).³⁷³ Several explanations are suggested emphasizing the many cremation burials where sex could not be determined or suggesting a separate burial location away from the cemetery for males. Men may have been more mobile and especially young men spent a considerable time away from the settlement, probably herding animals. However, a more plausible explanation for the difference between the number of females and males, could be that it is the result of poor bone preservation causing a non-representative scale.³⁷⁴ Results should be interpreted carefully, often indications for sex are based on only a few traits and the number of undeterminable adult individuals is considerable. The dominant presence of females among the cremation

burials at Elsloo does not have to be related to cultural choices.

For the assessment of age at death different methods can be used to provide an accurate estimate. The age of non-adults is based on the development of the deciduous and permanent teeth, ossification of the axial skeleton and the closure of joint ends.³⁷⁵ For adult individuals, the skeletal age is preferably assessed using a combination of characteristics.³⁷⁶ Cremated remains however usually only allow a rough estimate of age based on only one characteristic. A regularly used method is based on changes in the ear-shaped (auricular) articular surface of the ilium, where it joins the sacrum.³⁷⁷ This particular skeletal component is found relatively often among cremated human remains. In addition, skull-vault fragments are regularly found and, when they show fragments of the sutures, used to provide an indication of age.³⁷⁸

Bone fragments that more or less indicate the age at death of an individual are present in seventeen of 26 graves (Table 7.5). In the other nine, size, shape and proportions only indicate that they belonged to an adult (18+). Cremated bone fragments indicative of the presence of babies or very young children have not been found in any of the 26 burials. The youngest person present at the cemetery of Elsloo seems to be the juvenile in grave 74, where proportions and a separate unfused epiphysis fragment indicate an age between 7 and 12 years.³⁷⁹ Another possible non-adult could be interred in grave 57. The oblong, sharp pointed cranial sutures suggest an age between 18 and 25, but shape, size and proportions of several costae (rib) fragments appear to be more youthful and consistent with an age between 12 and 18 years. They do not appear to be of a second individual or an animal. Fragments of relatively older individuals, aged over 40 years, were found in three burials belonging to two women (graves 7 and 72) and one man (grave 47). Beside these, four middle-aged adults seem to be present, three of them probably women (graves 26, 40 and 111) and one probably a male (grave 62). The ages of the remaining individuals vary between 18 and 40 years. This distribution is not very remarkable and widely found on cemeteries dating from prehistory until Early Medieval times. Also, at LBK cemeteries this age category accounts for by far most individuals, for both inhumed and cremated persons. In her analyses

³⁷² Trautmann 2006, 169-174.

³⁷³ Although at the cemetery at Elsloo more cremated males (11%) than females (6%) were found by her. The majority (83%) however seemed undetermined and only fourteen individuals were involved. Trautmann 2006, 170, Figure 47.

³⁷⁴ Trautmann 2006, 170-171.

³⁷⁵ Rauber-Kopsch 1914; Brothwell 1981; Ubelaker 1989; Scheuer & Black 2000.

³⁷⁶ Maat, van den Merwe & Hoff 2012;

Waters-Rist *et al.* 2016.

³⁷⁷ Lovejoy *et al.* 1985.

³⁷⁸ Rösing 1977, 60; Meindl & Lovejoy 1985;

Hermann *et al.* 1990, 66-67.

³⁷⁹ Among the non-selected find numbers there were two cases (graves 38 and 45) that contained cranial fragments which are very thin and fragile and could have belonged to a child. But this is only an impression of the author.

Trautmann found about one quarter to be children and juveniles, half to be adults and for one quarter age could not be determined.³⁸⁰ So it is obvious that the group of non-adults, especially babies and young children, seems significantly underrepresented at the cemetery of Elsloo. The absence of babies could be an indication that they received a different treatment and were interred somewhere else, as is known to be custom in Roman times. A suggestion is that they were not placed in the cemetery but kept closer to the house and interred within the confines of the settlement.³⁸¹ Another possibility is that bones of babies and young children are small and fragile and therefore deteriorate faster and spread more easily in the surrounding sediments. In addition, Trautmann observed that burials of cremated children were not dug in as deeply as those containing adult remains, their position closer to the surface causing them to become more vulnerable to erosion.³⁸² But if we assume that a high number of the individuals of undetermined age do not make up for the missing children and babies, a very young age could be seen as a determining feature for being cremated and ending up within the cemetery. Probably, this depended on social, cultural or religious aspects of the society.³⁸³

All bone fragments were examined for changes due to disease, trauma or anatomical variation. Besides some reactions on the dens apex, part of second cervical vertebra, no pathological bone changes have been found. However, cremated bone fragments here are small and their weight is only about half of what could be expected. Also, few diseases cause clear, macroscopically visible, changes involving bone tissue and only at an advanced stage. Therefore, it cannot be concluded, based on the cremated bone fragments, that the individuals from Elsloo were without diseases or were very healthy during life.

7.4 Conclusions

During the excavation of the cemetery at Elsloo 56 (find)numbers were registered that contain inhumed or cremated human bone or teeth (Table 7.1). A scan was made to assess research possibilities and if animal bones were among them. Only the bone tool in grave 71 was made

out of an animal bone, in eight burials the cremated fragments were too small or had no distinctive traits to be classified as either human or animal. The remaining content of 35 burials held enough and well-preserved bone and tooth fragments suitable for additional analyses (Table 7.1). Some of these fragments were lifted together with the surrounding soil in small and large blocks. The blocks taken from graves 63 and 109 were supposed to contain fragments of cremated bone, but after preparation only three small and unrecognisable fragments of burned bone were present in grave 63. The cremated remains in grave 109 and the unburned bone and tooth fragments in graves 96 and 104 were not analysed because they had to remain untouched as a block.

After separating out these burials that contained only bone or tooth fragments with limited research possibilities, a total of 26 contexts were available for further analysis (Table 7.2). All represent at least one individual. No indications of more than one individual per grave or the inclusion of (burned) animal bones were noticed.

Almost all cremated human bone fragments are chalk white in colour. Therefore, the majority of the cremated bone fragments are burned well (phase 4) and indicate that the temperature during cremation rose (for a considerable amount of time) to between 650° and 800° C. The fragments show a uniform coloration, only six burials contain a few poor, medium or even very well burned fragments.

The total weight of cremated bone fragments is 3422 g, resulting in an average of 132 g per burial. That is a low amount and less than 10 percent of what could be expected. Most fragments are present in grave 57 (496 g) and very few (< 20 g) in six graves (Table 7.2).

The percentage of cremated bone fragments that could be determined is about 50 percent (Table 7.3). This means that half of all bone fragments could be assigned to one of the five inventory categories. However, the percentages differ considerably between burials and varies between 31.1 percent and 74 percent.

In seventeen graves cremated bone fragments from all three inventory categories are present. Only four graves lack axial fragments, in one grave cranial fragments are absent and in two graves fragments of both are missing. Relatively more cranial (25%) and fewer

³⁸⁰ Trautmann 2006, 171-172.

³⁸¹ Trautmann 2006, 173.

³⁸² Trautmann 2006, 173-174.

³⁸³ Trautmann 2006, 172, 174, 177.

axial (18.4%) fragments are present. Remarkable is burial 57, which contains the highest weight (496 g) and consists of almost 50 percent cranial fragments. Yet a deliberate selection of specific skeletal parts could not be demonstrated, also because a large part of the possible contents appeared to be missing.

The fragmentation of the cremated bones is at a usual (2.7) level (Table 7.4). But only six graves contained very large fragments (class 5), in three graves these belong to a diaphysis, in two graves to the axial region and in one to the neurocranium. Fragments of the diaphysis are the largest on average (3.3) and the epiphysis smallest (2.2). Three graves have a mean fragmentation below 2 and contain almost only very small and small fragments. The rate of intactness seems to be slightly higher than usual, 0.58 on average per burial (Table 7.4). Little more than half of the cremated bone fragments larger than 3 mm are also larger than 10 mm. In six burials the ratio indicates that more than two-thirds of the fragments are larger than 10 mm, varying between 0.67 and 0.82.

Although the graves contained a relatively low amount of burned human bone fragments, which are generally small in size, half of them could be identified and statements about physical characteristics such as sex and age were possible (Table 7.5). An indication of sex could be obtained for individuals from sixteen graves, eleven individuals appear to be females and five males. This gives a female/male ratio of 2.2:1,

which differs from a more or less 1:1 ratio in a normal living society. Why there seem to be more females present in cremation graves is not clear. It is obvious that cremation was not exclusively for women but maybe some men received a different treatment and/or were buried elsewhere. But the results here should be interpreted carefully, as the indications are based on only a few characteristics. An indication of age at death was possible for individuals in seventeen graves (Table 7.5). For nine more, size, shape and proportions only indicate that they belonged to an adult (18+), babies or very young children have not been found. The youngest person present at the cemetery at Elsloo seems to be the juvenile in grave 74, where proportions and a separate unfused epiphysis fragment indicate an age between 7 and 12 years. Fragments of relatively older individuals, aged over 40 years, were found in three burials belonging to two women and one man. The ages of the remaining individuals vary between 18 and 40 years and this distribution is not very remarkable if it is assumed that age was not a defining feature before being cremated and buried within the cemetery. However, the absence of babies and young children could be an indication that they received a different treatment and were interred somewhere else.

No pathological bone changes were found, but it cannot be concluded that the individuals from the LBK burial ground at Elsloo were without diseases or were very healthy during life.

8 The pottery of the burial ground of Elslou

I.M. van Wijk

8.1 Introduction

LBK pottery is an important find category as the decoration on the fine ware serves to relatively date and phase find assemblages. Normally, and especially within settlement research, we have to acknowledge that archaeological finds constitute but a small sample of what was present in the 'life assemblage'. We do not know what we miss, nor how representative what we do find is for the original state of affairs. To a certain point this holds true for burials as well, but with some slight alterations. A burial (pit) is more or less regarded as a closed archaeological context where goods have been deliberately deposited for various reasons: this essentially is part of the burial rite. This burial rite may also involve the reburial of the deceased and/or goods or the addition of human remains and/or grave goods after the initial burial.³⁸⁴ But post-depositional processes have an impact on the way graves and their contents are preserved, and the way in which they can be excavated and analysed today. Most grave goods, including pottery, are generally placed at the base of the (inhumation) graves, often beyond the reach of ground-penetrating (agricultural) equipment. The shallower cremation graves are subject to more disturbances. Therefore, if we want to get a grip on the burial ritual, all finds in a grave, or the absence of them, should be taken into consideration. Modderman was aware of this notion but also struggled with it in his classification, yet he made an exception for sherds which may or may not have been intentionally broken as part of the burial rite.³⁸⁵ On the other hand, Modderman leaves open the option that these sherds might already have been present in the burial ground and accidentally became part of the graves.³⁸⁶ Either way, it is of importance for our analysis to make no a priori differentiation regarding the ceramic sherds and their possible provenance.

Pottery should not only be analysed for its function as a container as it also has a social or ritual function within a community. Therefore, it is of importance to analyse the morphology, decoration techniques as well as decoration types. The closed context and the decorated pottery within a grave also provide an opportunity – keeping the forementioned post-depositional processes in mind – to date the

graves individually and the burial ground as a whole.

8.2 Methodology

Bandkeramik pottery is usually divided into fine (mostly decorated) ware and coarse (mostly undecorated) ware.³⁸⁷ However, this is not always the case, as it can also happen that undecorated fine ware pottery or decorated coarse ware can occur within an assemblage. However, on the basis of the small numbers of such cases, this should be treated as a subcategory within the fine or coarse ware respectively.

For this analysis, the pottery typology designed by Modderman was taken as the basis.³⁸⁸ This typology is mainly based on decorated pottery, with an emphasis on differences in wall and rim decoration types, band lugs or knobby lugs. A more detailed typology is offered by Van de Velde.³⁸⁹ This typology is a statistical addition to and further elaboration of Modderman's typology, and results in a finer chronological resolution. The quantitative description is based on the decoration techniques (spatula type, finger impressions), motifs and motif details, components (lines, dots, hatching) and whether or not a rim decoration is present. The pottery is described using both methods. The colour of the sherds, an indication of the degree of firing, is not documented, as LBK pottery is believed to be fired in open fires and therefore oxidizing or reducing conditions are mainly dependent on the position of the vessels within the fire.

Sherds are grouped into 'sherd families' (SF) which encompass sherds that are likely to come from the same vessel. An SF can be represented by a single sherd but also multiple sherds which belong to the same vessel. These have only been defined per grave, find or feature; i.e., there was no attempt to identify sherds possibly belonging to the same individual pot spread over several features. As to the shape of the vessels, they have been grouped into four different categories: an open bowl (cat. 1)³⁹⁰, a bowl with an 'S' profile and low rim (cat. 2)³⁹¹, a bowl with an 'S' profile and high rim (cat. 3)³⁹², and other shapes (cat. 4).

The extensive survey of the find material yielded a lot of ceramic sherds, of which some

³⁸⁴ Lenneis 2010; Pechtl & Hofmann 2013; Hofmann 2015.

³⁸⁵ Modderman 1970, 70; Pechtl & Hofmann 2013; Hofmann 2015; Peters & Balkowski 2020.

³⁸⁶ Modderman 1970, 70.

³⁸⁷ Buttler & Haberey 1936, 10; Gabriel 1979; Van de Velde 2007.

³⁸⁸ Modderman 1970, 122 and 199.

³⁸⁹ Van de Velde 1979; Van de Velde 2007; Van de Velde 2012.

³⁹⁰ Comparable with Stehli type 4, 5 and 6 (Stehli 1973, abb. 35).

³⁹¹ Comparable with Stehli type 3 (Stehli 1973, abb. 35).

³⁹² Comparable with Stehli type 2 (Stehli 1973, abb. 35).

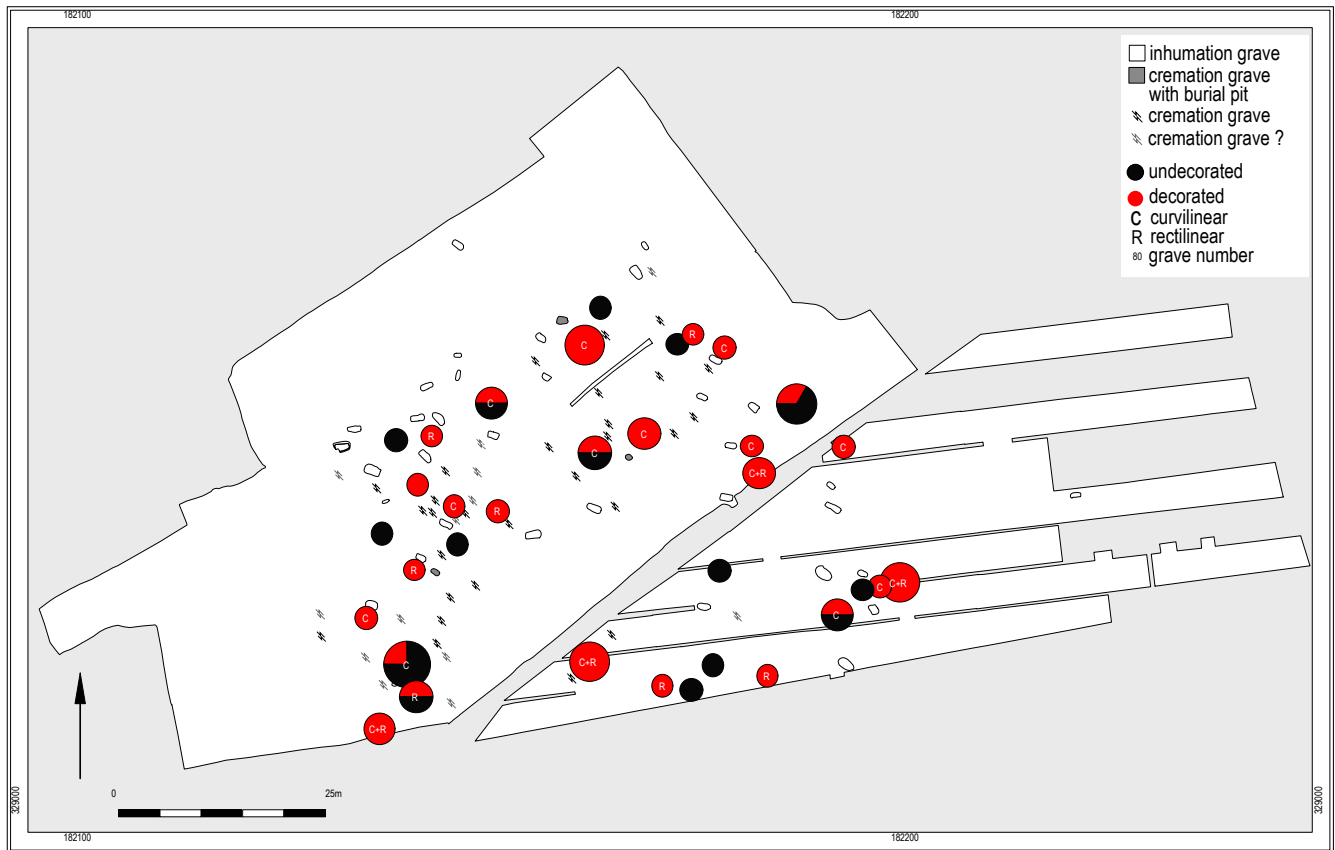


Fig. 8.1 Graves with decorated and/or undecorated pottery as well as kind of decoration (curvilinear vs rectilinear).

were not published. For this analysis, all the sherds present within the RMO inventory have been analysed, apart from the mostly complete vessels on display. These have been documented in photographs and/or drawings, and the published grave catalogue. Not all sherds were counted and described. Find numbers attributed to spoil heaps and other randomly gathered sherds without context are not studied at all. Some sherds showed severe wear patterns which indicated they must have been lying on the surface for a longer period. Because of their weathered state it is more or less impossible to describe these sherds in detail. For each find number or grave it is recorded whether such sherds were present or not.

8.3 Analysis of pottery

Ceramic sherds have been found in as many as 65 graves (Fig. 8.1): almost half of all the graves therefore contain pottery of some kind. In total

1309 sherds have been extensively analysed and could be attributed to 130 sherd families (SF) or vessels originating from 56 graves (Table 8.1). Most of the decorated sherds have already been drawn and/or photographed, and were published by Modderman.³⁹³ Most of the grave goods, including the (complete) pottery vessels, have also been photographed by the RMO (Fig. 8.2).³⁹⁴ This allowed us to study the remaining 18 vessels which were on display or on loan. Most of the complete vessels are reconstructed, which means that they were refitted and plaster was added to complete the vessel. It should be noted that the number of sherds includes these reconstructed vessels, for which the sherd count is one. It should be emphasised that almost all 'complete' vessels show signs of wear, e.g. that sherds are missing and the vessels therefore are not completely intact.

LBK pottery can be divided into fine ware and coarse ware. Fine ware is usually thin-walled and slightly tempered. Most decorated wares are fine wares. Coarse ware is thick-walled and mostly heavily tempered and undecorated. In

³⁹³ Modderman 1970, tafel 121-172.

³⁹⁴ <https://www.rmo.nl/collectie/collectiezoeker/>.

Table 8.1 Morphological description of the pottery per (type of) grave.

	N					Shape				Finishing				Temper			Modderman phase	remarks
	sherds	sherd families	complete vessels	decorated	undecorated	open bowl	closed bowl, low rim	closed bowl, high rim	other	polished	smooth	coarse	weathered	silt	grog	sand		
Vessels total	1309	130	45	72	55	9	41	15										
Inhumation graves	954	99	43	51	45	8	35	15	1	12	59	15	16	20	36	36	1c-IIId	
Cremation graves	322	28	2	19	9	1	5			1	10	5	12	12	14	12	1d-IIc	
Other features	33	3	0	2	1		1				2	1		1	2	1		
Cremation graves																		
11	1	1		1									1			1		
19	2	1			1								1	1				
47	100	1	1	1			1			1				1	1	1	1d-IIb	
57	5	1			1						1			1				
64	2	1		1					1					1				
69	35	5		4	1					1			4	2	3	2	11b-IIId?	
71	21	4		3	1		3			2	1	1	1	1	3	1	11b-IIc	
72	27	3		2	1					2			1	3	1	3	11b-IIId?	
73	53	3		2	1		1						1	0	1	1	11b-IIId	
74	4	1		1									1				11b-IIId?	
85	1	1			1						1	1	1					
111	20	4		2	2					2	2	2	2	2	4	1	11b-IIId?	secondary burn
114	51	2	1	2		1				2			2	1			1d-IIb	
Inhumation graves																		
1	83	5		3	2		3			4			1	3	4	4	1d-IIa	
3	79	7	2	3	4		3	1	1	3	2	1	3	4	1	1	11b	
5	116	8	4	3	5	2	1	2		6	2		1	2	5	5	1d-IIa	
6	8	2		1	1					1	1	2						
14	21	1	1	1			1			1				1	1	1	1d-IIa	
21	77	6	1	4	2	1	5			4	1	1	3	2	2	2	1d-IIa	repair holes
22	26	5		1	4					5			1	3	2			
24	42	3	1		3			1	1	1			1	1	3	3		secondary burn (2)
25	8	1			1		1						1					secondary burn
27	20	4		2	2					1	3	2		3	2			
31	2	1	1		1			1	1					1				
34	1	1	1	1					1	1							11b-IIc	spoon?
41	2	1	1	1			1			1				1	1	1	1d-IIa	
42	16	1	1		1		1			1								
43	10	1			1								1					
49	1	1			1								1		1			

Table 8.1 continued.

	N			Shape						Finishing				Temper			Modderman phase	remarks
	sherds	sherd families	complete vessels	decorated	undecorated	open bowl	closed bowl, low rim	closed bowl, high rim	other	polished	smooth	coarse	weathered	silt	grog	sand		
55	7	1		1					1				1	1		Id-IIa?		
56	17	2	1	1	1		1		1			1				Ila-IIb		
65	73	2	1	1	1	1			1		1					2	Ila-IIc?	
67	13	3	2	3				2	2	1			1			1	Iic-IIc	
76	11	2		1	1					2			1	1	2			
81	5	1	1		1			1		1								
82	44	3	1	1	2		1			1		1	1	2	1	Ila-IIb		
83	1	1	1	1				1	1								IId	
86	2	1								2			1					
87	48	7	3	3	4	1	2	1	1	6			1	4	3	Iic-IIc		
89	1	1	1	1				1		1				1	1	IId	derivative rim decoration	
90	19	2	2	2			2		1	1			2	1	1	IId		
92	6	1	1	1				1		1			1				IId	
93	1	1	1	1			1			1							Id-IIa	
94	35	2		1	1		2			1	1		1	1	1	Ila-IIc?		
96	3	3	3	3			3			3							Iic-IIc	two almost identical
97	8	1	1	1			1			1			1				Ila-IIb	
98	52	1	1	1						1		1	1				Iib-Iic	
100	13	3	2	1		1				1							Iic	
102	1	1	1	1			1										Iib-IIc	
104	16	2	1	1	1	1	1			2							Iib	
105	1	1	1		1		1											
106	1	1	1	1				1		1							Ila-IIb	two different rim decorations
107	1	1			1	1						1						
109	15	1	1		1			1			1			1	1			
110	1	1			1						1	1	1	1	1	Iic-IIc	secondary burn?	
112	47	5	3	4	1		3	1		4	1						Iib	

total 84 vessels (SFs) were classified as fine ware with either a polished or smooth surface. Only 21 SFs were designated coarse ware with almost no decoration, and with (mostly vertical) lugs. The tempering of a vessel is indicative of its presumed intended function: clay pellets and grog as well as organic matter bolster the resistance to thermal stress (kitchen fire), whereas sand and silt prolong life expectancy in general.³⁹⁵ It may be assumed that vessels with little or no tempering can therefore be

considered table ware, while cooking pots are tempered with (many) clay pellets, organic matter and/or grog. Storage containers are primarily tempered with sand and quartz.³⁹⁶ It turned out that most vessels contained some kind of temper, either grog, sand or silt, but always in very low quantities. Only coarse ware had large quantities of clay pellets and/or grog, which might indicate that these vessels were used for cooking. Of interest is that four vessels heavily tempered with clay pellets and/or grog

³⁹⁵ Orton, Tyers & Vince 1993, 221; Schepard 1954, 27; Van de Velde 2008, 101.

³⁹⁶ Orton, Tyers & Vince 1993, 221; Schepard 1954, 27; Van de Velde 2008, 101.

(grave 24, 87, 110 and 111) also showed signs of secondary burning, which substantiates a possible function as cooking vessels. Additionally, the vessel from grave 65 is heavily tempered with sand and also showed signs of secondary burning. The vessel from grave 111 could also have been placed in the pyre, as it was deposited together with calcined human bones. Secondary burning demonstrates that the vessels were probably used before being deposited into a burial pit. This is also underlined by an undecorated vessel with a repair hole.

Most ceramic vessels (SF) have been found in inhumation graves (99 SF). Over half of them were decorated (51 SF; 52%). Cremation graves held fewer vessels (28 SF) but most of them were decorated (91 SF; 68%). As was expected, most of the inhumation graves contained (almost) complete vessels due to better preservation deeper in the ground. But apart from these complete vessels, it was very surprising to realise that most vessels (85 SF; 65%) were deposited fragmented and incomplete within a grave. Some graves contained more than five vessels per grave (graves 1, 3, 5, 21, 22, 87 and 112), or even up to eight vessels (grave 5). Some smaller vessels were placed inside a larger vessel.³⁹⁷ As all vessels were represented by multiple sherds, a deliberate deposition must be considered. Most of the time vessels were placed next to each other (i.e. grave 94).³⁹⁸ Sometimes they appear to be placed on their sides (graves 31, 41, 67, 89, 106, 109) or upside down (graves 34, 42, 92).

The closed bowl shape with either a low rim or high rim is the most frequent type within the graves, although no vessels with a high rim have been found in the cremation graves. Undecorated open bowls are present in much lower numbers. Other shapes seem to be absent or at least not common. The only irregular shape is a decorated vessel in grave 34. This small vessel has an open bowl shape with vertical lugs on the rim and has a break on the rim where a handle may once have been attached.

8.3.1 Fine ware

Most vessels, fragmented or complete, that ended up in a grave were decorated (Table 8.2). The decorations on either the rim or the wall

were mostly made with single dented spatulas. Simple line decoration is only documented for a few graves. Most decorations consist of bands (drawn with lines) filled with dots, sometimes with use of the stab-and-drag technique (*Furchenstich*), or hatched lines (parallel hatch or cross hatch), and sometimes a combination of the point technique and (cross) hatching. Grave 67 contained a complete, decorated vessel with a wave-like motif that was filled with dots made with a multi-dented spatula on one side and on the other side with parallel hatches. Some vessels have no lines demarcating the decoration (i.e. graves 3, 34, 67 and 90). The borders are drawn with single spatulas either as rows of dots or even double dots (grave 96), or with a wider spatula resulting in short incisions (grave 90). The rim decoration, mostly consisting of two rows of dots but with as many as six rows of dots, shows less variation. Sometimes dots were made with a multi-dented spatula, using the stab-and-drag technique, but mostly with a single-dented spatula. A vessel in grave 89 displays two different kinds of rim decoration. Here, four rows of dots are bordered by vertical short stripes on both sides. A more or less similar rim decoration is documented for a vessel in grave 106, albeit this rim decoration consists of three rows of dots only bordered by a single row of vertical lines or nail imprints below. The decoration was executed rather poorly, especially in contrast to other vessels in some of the graves. More 'accidents' happened when the decoration was set up. Vessels in grave 93 and 106 show that not every potter was skilled. This also demonstrates that other (social) reasons were considered when depositing a vessel in a grave than just the mere beauty of decorated vessels. This is also underlined by the undecorated vessels.

Bone incrustation was found on two vessels. No traces of ochre incrustation were seen. Bone incrustation has also been documented for the Elsloo settlement with five vessels.³⁹⁹ The decoration of the pottery of the settlement of Elsloo⁴⁰⁰ is generally executed with a single dented spatula being used to set up the line and/or (mostly) dot decoration on the walls of the vessels. Less than 6 percent of the decorated vessels have decoration that is carried out using the stab-and-drag technique or (cross) hatches. Most rim decoration consisted of two bands of dots.

³⁹⁷ Modderman 1970, taf. 126.

³⁹⁸ Modderman 1970, taf. 154.

³⁹⁹ Van Wijk & Porreij-Lyklema 2015, tabel 8.1.

⁴⁰⁰ Van Wijk & Van de Velde 2015, 95-120.

The decoration on LBK vessels is set up in such a manner that there are only two kinds of main motifs: the ‘wave’ or the ‘spiral’, executed either in a curvilinear or rectilinear fashion. These main motifs are regarded as socially significant symbols and, especially in combination with the curvilinear or rectilinear execution, as tokens of matrilineal kinship.⁴⁰¹ But to differentiate between the two motifs is difficult due to the incompleteness of the vessels. That is why the ‘wave’ motif is recognised on 18 vessels while the spiral is documented only ten times. A much clearer division can be made when looking at the curvilinear or rectilinear fashion in which these main motifs were executed (Fig. 8.1), although it is easier to recognise a curvilinear motif on fragments of a broken vessel. The curvilinear motif was used exactly twice as often as the rectilinear motif, for both vessels deposited in inhumation graves (curvilinear: 24 SF, rectilinear: 12 SF), and cremation graves (curvilinear: 4 SF, rectilinear: 2 SF). Within the settlement of Elsloo the occurrence of either curvilinear or rectilinear motifs differs per house yard, but even there some patterns exist.⁴⁰² A yard has either one of

both motifs (1:0, present at seven yards), an even distribution (1:1, six yards), or twice as much (2:1, six yards). For the 18 studied yards the curvilinear motif was dominant (eleven yards) over the rectilinear motif (five yards).⁴⁰³

8.3.2 Coarse ware

Coarse ware occurs slightly less often in the graves compared to fine ware and even less often in cremation graves (32% vs 45% in inhumation graves), but especially complete coarse vessels are rare. Only 10 percent (14 vessels) were completely deposited, of which only two in cremation graves. This division is in line with pottery found in settlement contexts⁴⁰⁴ where fine (decorated) ware is most frequently found. The coarse ware is fashioned either as an open bowl (7 vessels) or as closed bowls with high rims (7 SF) and mostly has a round base. Their size varies from small to large. Ten vessels had lugs (vertical) on the rim or on the wall as band or knob ears; either for a better grip or because they were used to attach strings.

⁴⁰¹ Sinopoli 1991, 124-125; Krahn 2003, 516; Frirdich 1994, 254; Van de Velde 1979, 112-113; Van de Velde 2008, 117-118; Claßen 2006, 243.
⁴⁰² Van Wijk & Van de Velde 2015, tabel 8.1.
⁴⁰³ Van Wijk & Van de Velde 2015, tabel 8.1.
⁴⁰⁴ Van Wijk & Van de Velde 2015, tabel 8.1; Van Wijk, Amkreutz & Van de Velde 2014, 480 and 484.

Table 8.2 Motifs and decoration of the pottery per (type of) grave.

	Motive		Spatula					Wall decoration				Incrustration	Rows rim				Rim decoration				Spatula			remarks	
	curvilinear	rectilinear	1	2	3	4	5	multiple	line decoration	point decoration	Furchenstich		hatch	bone	1	2	3	4+	line decoration	point decoration	Furchenstich	finger/nails imprint	single		multiple
Vessels total	28	14	36	3	1	5	1	7	51	35	7	17		2	12	22	6	7	3	39	3	1	30	5	
Inhumation graves	24	12	30	2	1	5	1	6	37	25	5	14		1	10	16	6	7	1	32	3		21	5	Ic-IIId
Cremation graves	4	2	6	1				1	14	10	2	3		1	2	6			2	7		1	9	0	Id-IIc
Cremation graves																									
47		1	1						1		1									1			1		Id-IIb
64									1	1															
69	1		1						3	3				1											IId-IIId?
71			1						3	1		1			1	1			2	1		1	2		IId-IIc
72									2	2						1				1			1		IId-IIId?
73	1	1	1	1					1	2						1				1			1		IId-IIId
74								1				1				1				1			1		IId-IIId?

	Motive		Spatula					Wall decoration				Incrustation	Rows rim				Rim decoration				Spatula		remarks		
	curvilinear	rectilinear	1	2	3	4	5	multiple	line decoration	point decoration	Furchenstich	hatch	bone	1	2	3	4+	line decoration	point decoration	Furchenstich	finger/nails imprint	single		multiple	Modderman phase
111	1								1	1		1		1	1				2			2		IIb-IId?	secondary burn
114	1		2						2			1										1		Id-IIb	
Inhumation graves																									
1	2	1	3						3			1		1	1				2			1		Id-IIa	
3		1	2						3	3				1		1			2			1		IIb	
5	2		2						2	1	1							1				1		Id-IIa	
6									1	1															
14	1		1						1	1				1					1					Id-IIa	
21	2	2	4						4	1		2		2	2				4			2		Id-IIa	repair holes
22			1						1	1															
27	1								1						1							1			
31																									
34		1	1							1					1				1			1		IIb-IIc	spoon?
41	1		1						1	1				1					1					Id-IIa	
55			1						1															Id-IIa?	
56	1			1					1			1			1					1		1		Ila-IIb	
65								1		1		1												Ila-IId?	
67	3		1	1						3		1			3				3			3		IIc-IId	
76			1						1																
82		1										1		1		1				1		1		Ila-IIb	
83	1							1	1		1					1			1				1	IIc	
86		1	1						1																
87				1	3				1	2	1			1					1					IIc-IId	
89	1						1		1	1						1			1			1		IIc	derivative rim decoration
90	1	1	1			1				2				1	1				1	1		1		IIc	
92	1							1	1	1						1			1				1	IIc	
93		1	1						1					1					1			1		Id-IIa	
94										1					1				1			1	1	Ila-IId?	
96	2	1	1					2	2	1	2				2	1			3			2		IIc-IId	2 almost identical
97	1		1						1			1							1			1		Ila-IIb	
98										1							1		1					IIb-IIc	
100			1					1	2	1		1					1		1					IIc	
102	1		1						1			1		1					1					IIb-IId	
104		1	1						1			1			1				1					IIb	
106		1	1						1							1			1			1		Ila-IIb	2 different rim decorations
110																								IIc-IId	secondary burn?
112	3		3			1			3	1		3			1	1	2		1			1	2	IIb	



Fig. 8.2 Photographic overview of a selection of decorated and undecorated vessels (reconstructed but not to scale).

8.3.3 Sherds

As many as 45 graves contain ceramic sherds in the fill or in the fill and at the base. Most of them are inhumation graves (37 graves), simply because inhumation graves have a (deeper) burial pit. Because most cremation burials were dug in very shallow, it has been stated that most pottery or other grave goods from these shallow graves are missing. Only six cremation graves contained pottery, but probably more cremation graves contained pottery. Sometimes these sherds are found in concentrations of multiple sherds, for example in grave 1, which has three separate concentrations in the top of the fill belonging to three different vessels. But most frequently (concentrations of) sherds are scattered throughout the pit or on the pit bottom. The preservation of these sherds varies from nearly pristine to very weathered. Weathered sherds most often have been lying on the surface for a long time and were subject to the elements,

vegetation and animals⁴⁰⁵. They probably have ended up in the burial pits by accident. They could be regarded as waste; the question remains what kind of activity yielded this 'waste'. But sometimes even complete pots have a very weathered surface, although they are still completely intact (e.g. graves 21, 90 and 112⁴⁰⁶). Acidic conditions within a pit could have caused weathering as well, for example due to decomposing organic matter like (human) flesh, plants or animal meat. Weathered sherds (371 sherds, 32 SFs) are found in as many as 25 graves (including 9 cremation graves). A single sherd can be broken into several smaller fragments. We investigated the total surface area of these sherds to make a more representative estimate of single sherds that ended up in a grave. Sherds with a larger surface area or multiple sherds from the same vessel are disqualified as stray finds. Nineteen graves (of which 7 cremation graves) contained weathered sherds that had a surface area of less than 100 cm² and also belonged to the same SF. They are regarded as stray finds which –we believe– ended up unintentionally in the burial pit. In nine graves

- ⁴⁰⁵ Some sherds from grave 3 and 87 show traces of rodent teeth or nails.
⁴⁰⁶ The complete vessel from grave 112, which was very shallow, is weathered on one side, probably the side facing upwards, while the other side was in mint condition.

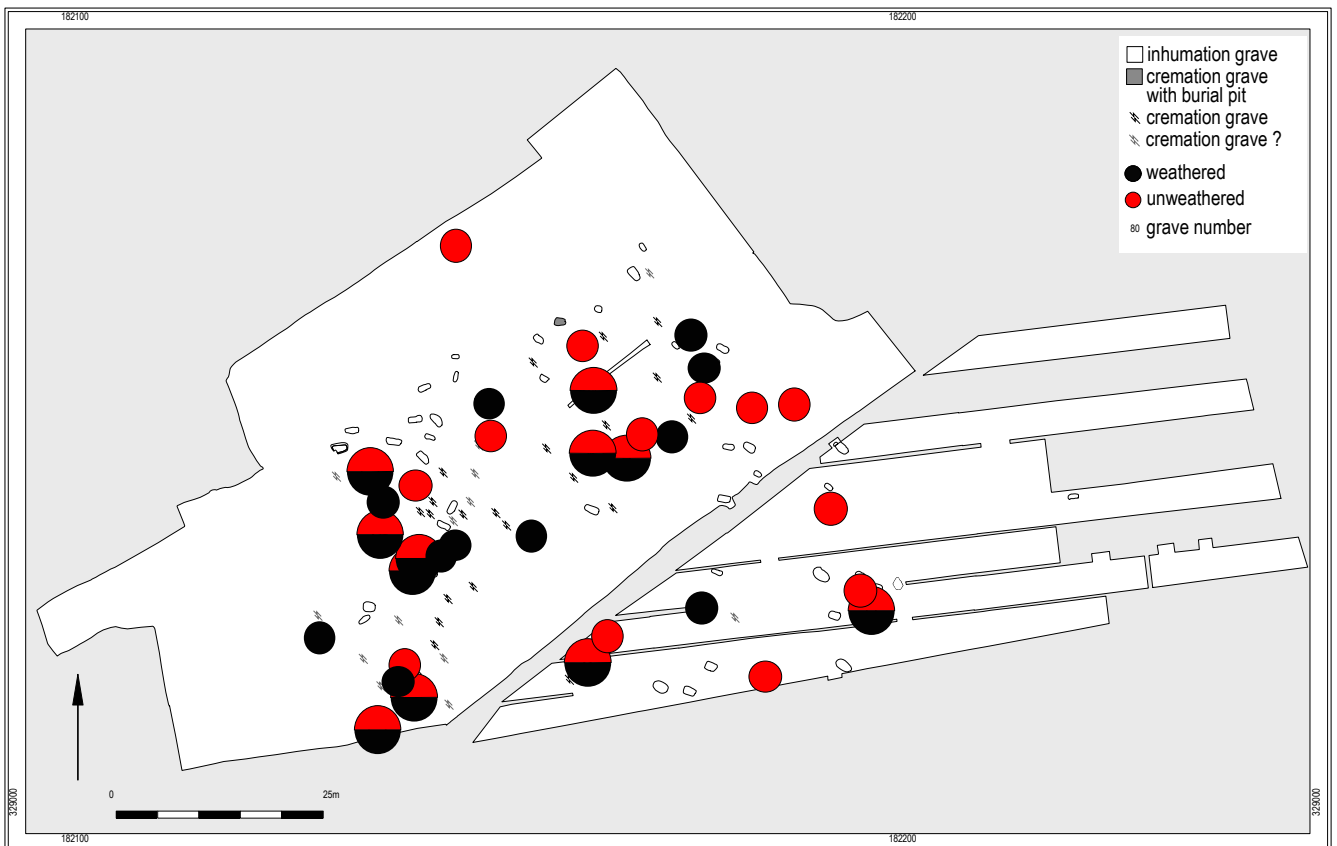


Fig. 8.3 Distribution map of burials with ceramic sherds.

concentrations of sherds belonging to the same vessel/SF had a surface area of 100 cm² or more. Some of them show indications of secondary burning.

To see which sherds presumably ended up intentionally in a burial pit, all weathered sherds (surface area > 100 cm² and belonging to a single SF) as well as non-weathered sherds were considered. In this way, 488 sherds belonging to 43 SFs (28 decorated fine ware SFs and 15 undecorated coarse ware SFs) and found in 21 graves (of which two cremation graves) were studied.⁴⁰⁷ Fig. 8.3 shows their distribution within the burial ground. Surprisingly, not one burial pit contained just a single sherd. All pits held multiple sherds and if a single sherd was found, other concentrations were present within the same pit as well. This substantiates the idea that sherds were deliberately deposited in burial pits as grave goods.⁴⁰⁸

8.4 Chronology

The decoration on LBK pots serves to order the associated finds chronologically. This alleviates one of the major difficulties, the impossibility to generate precise radiocarbon dates for this period (c. 5220-4950 cal BC in our research area) because of a 'wobble' in the calibration curve. Pottery decoration changes over time in a structured way, just as any social phenomenon. The periodisation based on decoration type goes back to Modderman's subdivision after his excavations at the settlements of Elsloo and Stein. He combined these observations with changes in house construction and stratigraphic observations and so developed a chronological scheme with two main phases, subdivided into three and four sub-phases, respectively. Although widely used, this scheme is not without problems. These relate to the fact that some decoration types are not mutually exclusive (especially important when dealing with smaller finds assemblages). Also, for the older phases the restricted change in pottery decoration called for the use of other variables, such as house construction.

Decorated pottery makes up about one third to a half of the LBK's ceramic inventory, so this change allows a fairly sharp relative ordering of the finds and features associated with

decorated pots. Although a relative chronology (before/after, earlier/later) is easily obtainable, the quantification of chronological differences (x years before; for y years) is impossible: there is no ground for supposing that changes in the decoration occurred at a chronologically uniform rate.⁴⁰⁹ For settlement assemblages, relative dates are generated with the aid of statistical methods (Principal Component Analysis or PCA) and based on the composition of the individual, systematically and independently changing decoration components. With PCA the change in the different variables of the pottery decoration is registered, which can then be used to order individual finds chronologically. The PCA, as well as Modderman's typology, considers the presence and/or absence of decorative motifs, which sometimes makes this typology difficult to use for funeral assemblages due to the limited number of vessels present within a grave.⁴¹⁰ As mentioned earlier, ceramic finds are present within the fill and/or at the bottom of the burial pit, and it is unknown whether these finds are contemporaneous (§8.3.3).⁴¹¹ Moreover, fewer vessels wind up in a burial pit compared to refuse pits found in settlements.

An attempt was made to order the decorated vessels from the burial pits chronologically (Table 8.2; Fig. 8.4). The presence of multi-dented spatulas, *Furchenstich* technique as well as the absence of lines as decoration borders are strong markers for the Late phase of the LBK (Modderman phase IIc-IIId). The presence of (cross) hatches and rim decoration is known from the Middle phase onwards (Modderman phase Id/IIa-IIId). Based on these assumptions, the oldest graves contained pottery without any of the aforementioned decorations, while the youngest graves carry a combination of these. This means that the oldest graves probably date to the Middle phase of the LBK, as early as Modderman phase Id-IIa.⁴¹² This is contrary to Modderman's statement that the burial ground was taken into use from as late as Modderman phase IIc.⁴¹³

The duration of the LBK period in the Netherlands has been determined to lie between 5250-4950 cal BC based on a diverse set of radiocarbon dates (Fig. 8.6).⁴¹⁴ The oldest date for the LBK in the Netherlands was obtained from charred wheat seeds from the site of Stein-Heidekampweg⁴¹⁵ and provides a date of

⁴⁰⁷ Sherds from cremation graves without recognisable pit as well as sherds which most definitely belonged to a complete vessel were taken out of the equation.

⁴⁰⁸ Modderman 1970, 70; Nieszery 1995, 138-140; Peters & Balkowski 2020, 164; Hofmann 2015.

⁴⁰⁹ Van Wijk 2016a, 141.

⁴¹⁰ However, the funeral pottery from Elsloo provided the basis for Modderman's typology, merely because of the opportunity it provided to study complete decorated vessels.

⁴¹¹ Nieszery 1995, 121; Peters & Balkowski 2020, 153.

⁴¹² Modderman 1970, 199.

⁴¹³ Modderman 1970, 73-74.

⁴¹⁴ Lanting & Van der Plicht 2000, 45.

⁴¹⁵ Van Wijk, Meurkens & Porrij-Lykema 2012, 61.

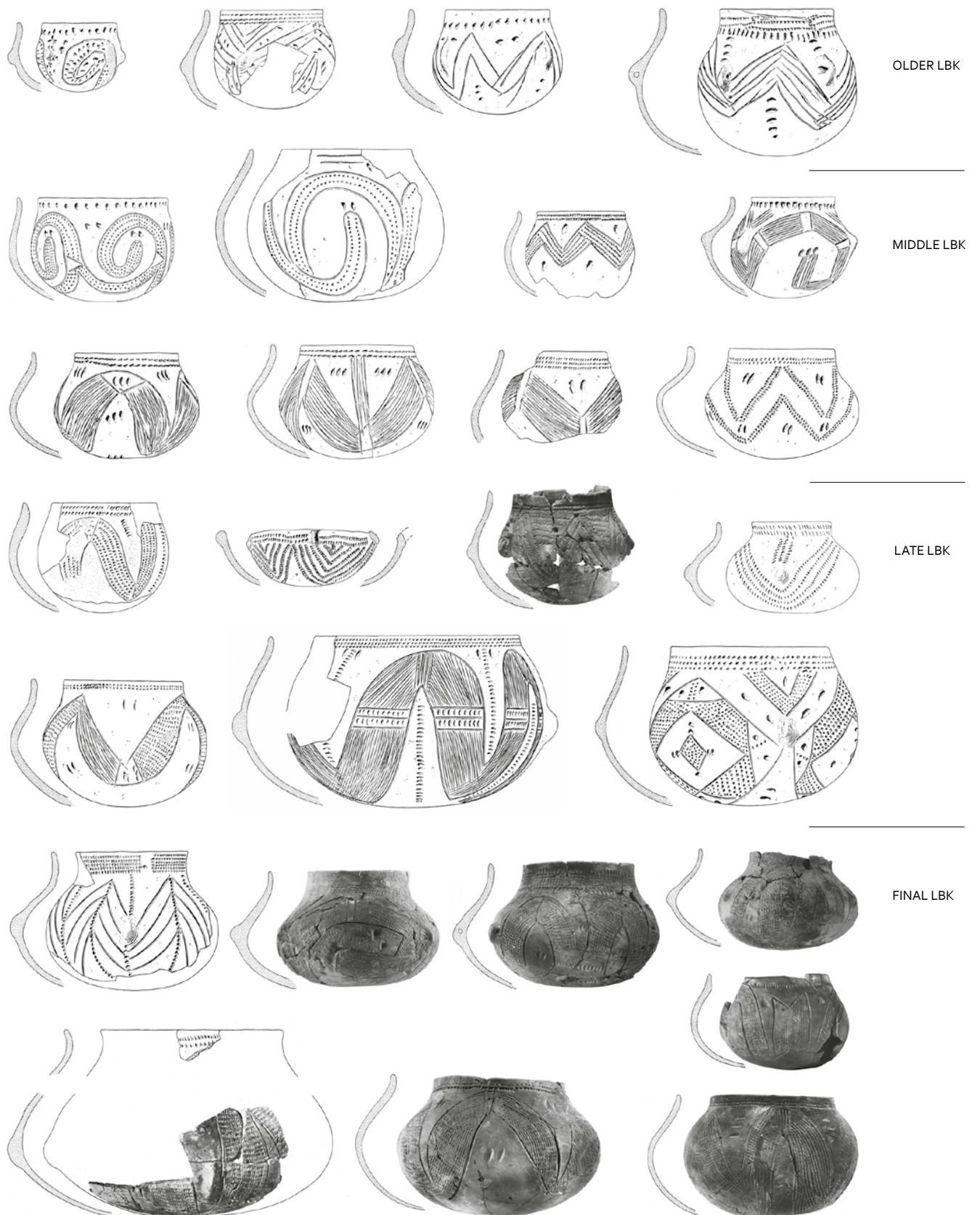


Fig. 8.4 Decorated vessels from Elsloo burial pits chronologically ordered (from top to bottom) based on the presence of decoration types, scale 1:8 (drawings and photographs from Modderman 1970, tafel 121-166).

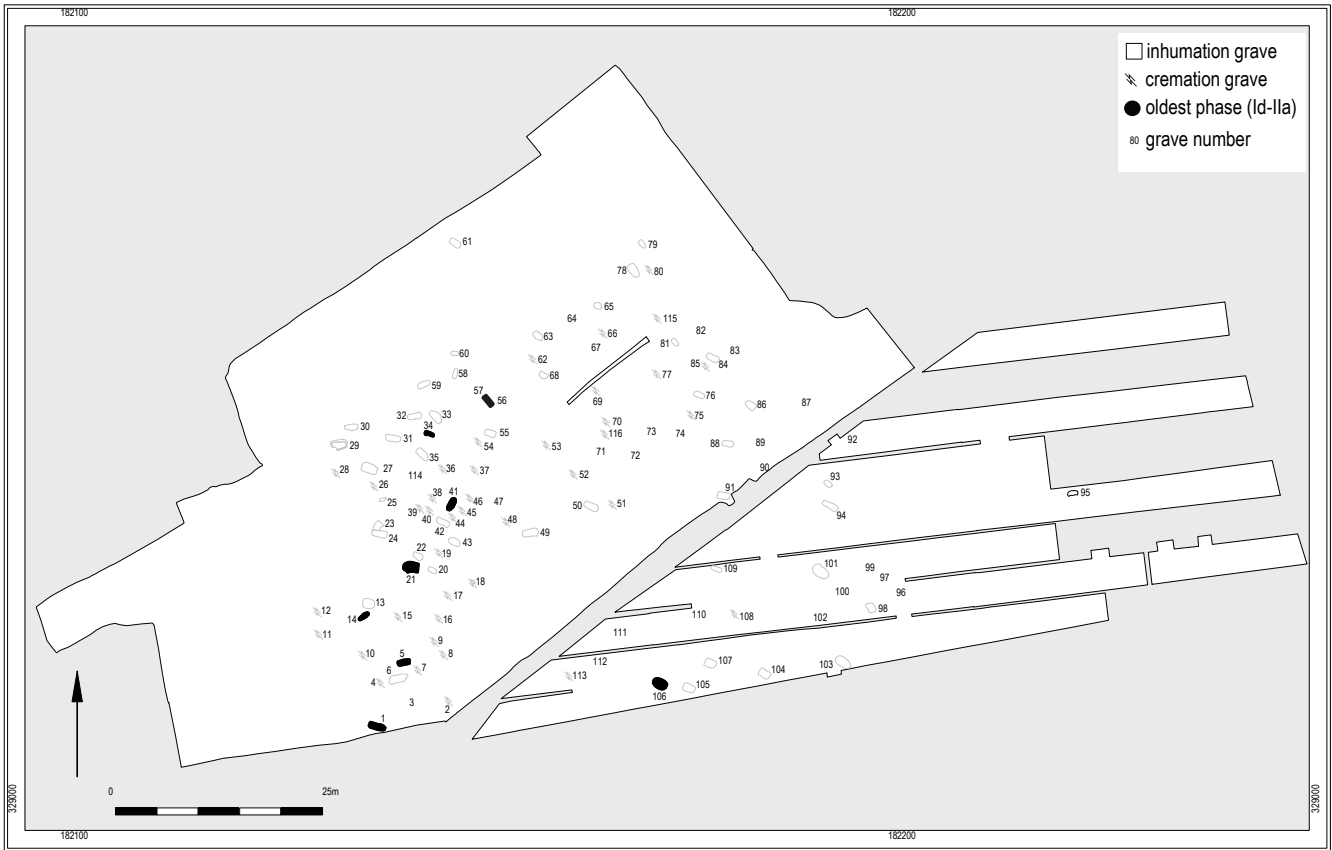


Fig. 8.5a Distribution of chronologically ranked burial pits ranging from Modderman phase Ic/d-IIa and Modderman phase IIa-IIb (8.5b) to Modderman phase IIc-d (8.5c).

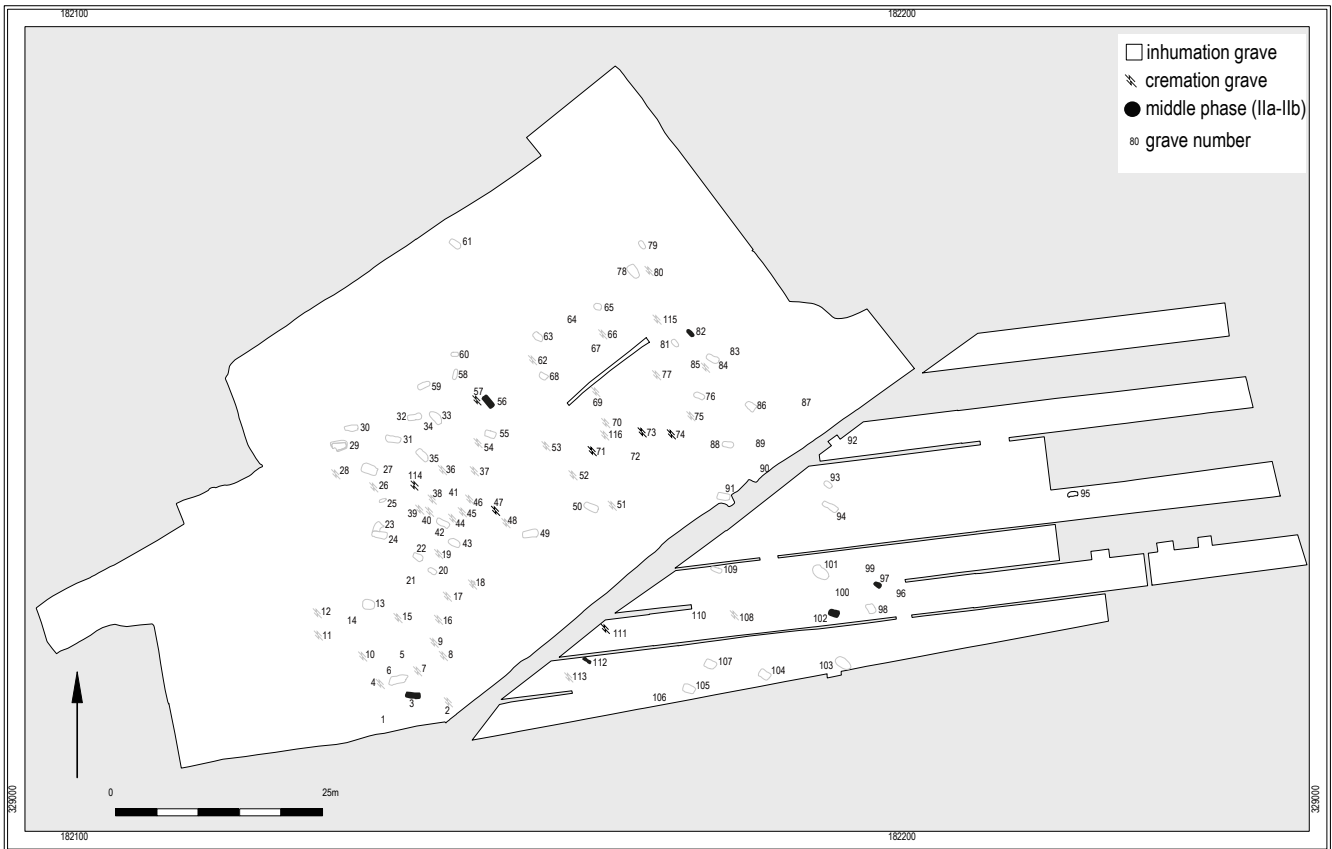


Fig. 8.5b

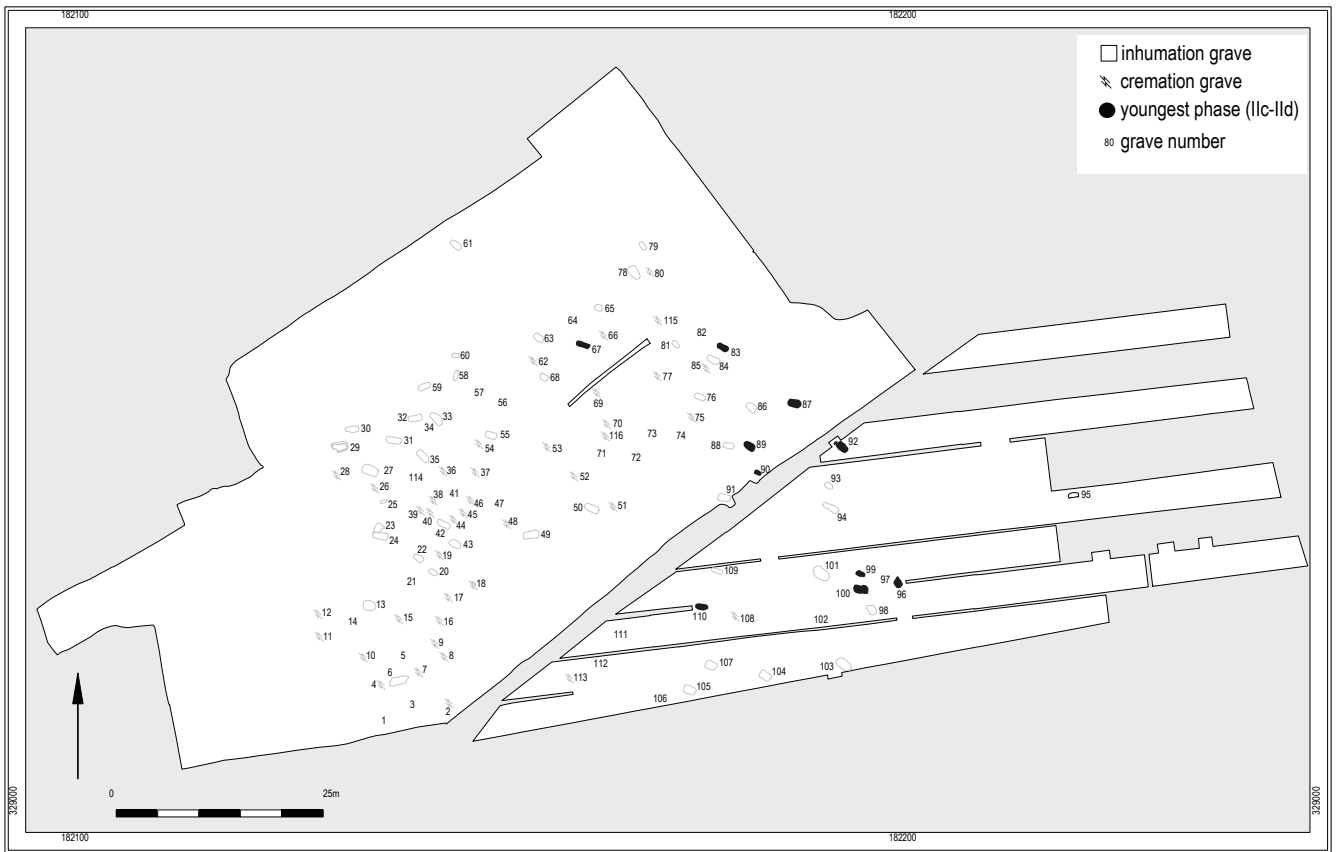


Fig. 8.5c

5466-5219 cal BC (6340 ± 50 BP). The youngest date is on charred wheat seeds from the site of Maastricht-Cannerberg providing a date of 5042-4809 cal BC (6035 ± 40 BP).⁴¹⁶

For the Elsloo burial ground another attempt was made to bolster the ceramic relative dates with radiocarbon dates and to see how they would fit in the bigger picture. Some graves and pits or postholes from the settlement were already dated on an earlier occasion (see also Fig. 8.6).⁴¹⁷ These samples were taken from charcoal present within grave 3, 98 and 110 (Table 8.3). Additional samples from charcoal and calcined bone were taken from nine graves to make sure the calcined bone fragments can indeed be attributed to the LBK, but also to verify the relative pottery dates. Four calcined bone samples from as many graves have been carbon dated.⁴¹⁸ The results clearly show that these cremation graves are in fact LBK (dated 5299 - 5032 cal BC). Another two dates are being gathered through lipid extraction from ceramic vessels (§11.1).⁴¹⁹ All results are presented in Table 8.3.

The first samples to be taken from graves 3, 98 and 110 show a very large standard deviation ($\pm 75-100$) contrary to the recently taken dates from graves 71, 74, 90, 92, 96, 99, 100, 111 and 114 ($\pm 29-45$) due to enhanced radiocarbon

dating techniques.⁴²⁰ Based on the relative pottery dates, results⁴²¹ were expected to range from 5100 cal BC up to 4950 cal BC.⁴²² However, the radiocarbon dates range from 5357 cal BC up to 5011 cal BC, covering almost the entire timespan of the LBK, but not the Late phase (Modderman phase IIId). As the Elsloo dates seem to be older or at least cover a larger timespan, we think this is due the provenance of the samples: mainly charcoal (no branches). For charcoal an old wood effect is to be expected which causes the dates to be too 'old'. An alternative would be to date ceramics by ¹⁴C dating lipids from pottery.⁴²³

The number of datable grave goods is limited. A number of graves are dated and assigned to phases as defined in the typo-chronology by Modderman, or radiocarbon dates, and/or intercutting graves, and the prevalence of lydite adzes. An attempt is made to order the graves chronologically (Fig. 8.4). In total 31 graves could be relatively dated using these criteria. Only two cremation graves could be dated, based on pottery with diagnostic decoration. The date ranges of the pottery, however, are quite substantial. This holds true for the ¹⁴C dated cremation graves as well. Importantly, there are no indications that the cremation graves are still

⁴¹⁶ Van Wijk 2016a, 103-104.

⁴¹⁷ Lanting & Van der Plicht 2000, 45.

⁴¹⁸ Samples from graves 71 (GrM-25654: 6210 \pm 30 BP), 74 (GrM-25653: 6215 \pm 30 BP), 111 (GrM-25652: 6197 \pm 29 BP) and 114 (GrM-25657: 6185 \pm 30 BP).

⁴¹⁹ Unfortunately, these results were not yet available at the moment of publication and therefore presented elsewhere (Roffet-Salque & Van Wijk in prep.).

⁴²⁰ Dee *et al.* 2020.

⁴²¹ The ¹⁴C dates (in yrBP) are calibrated using OxCal (version 4.4; Bronk Ramsey, 2009). Used calibration curve: IntCal20 (Reimer *et al.*, 2020).

⁴²² Lanting & Van der Plicht 2000, Fig. 3.

⁴²³ Casanova *et al.* 2021.

Table 8.3 Ceramic and ¹⁴C dates of the graves. Recent dated samples are highlighted in bold.

Phase	Grave nr	Date conform ceramics	Date conform ¹⁴ C	Date conform adze source	Labcode	¹⁴ C Age	SD	CalBC 2sig		Sample
Older - Final LBK	98		Ib		GrN-2311	6510	100	5631	5306	charcoal
Older - Final LBK	110		Ib-IIc		GrN-2884	6055	80	5212	4787	charcoal
Middle LBK	5	Ic								
Middle LBK	14	Ic								
Middle LBK	1	Ic-IId								
Middle LBK	21	Ic-IId								
Middle LBK	34	Ic-IId								
Middle LBK	41	Ic-IId								
Middle LBK	106	Ic-IId								
Middle - Late LBK	47	IId-IIb								
Middle - Late LBK	56	IId-IIb								
Middle - Late LBK	74	IId-IIb	Ib-IIc		GrM-25653	6215	30	5299	5052	calcined bone
Middle - Late LBK	102	IId-IIa								
Middle - Late LBK	114	IId-IIb	Ib-IIc		GrM-25657	6185	30	5281	5032	calcined bone
Middle - Late LBK	71	IIa-IIb	Ib-IIc		GrM-25654	6210	30	5297	5050	calcined bone
Late LBK	82	IIa-IIb								
Late LBK	104	IIb								
Late LBK	112	IIb								
Late - Final LBK	97	IIa-IIb								
Late - Final LBK	3	IIb-IIc	Ib-IIc		GrN-5733	6330	75	5476	5078	charred branches
Late - Finale LBK	73	IIb-IIc								
Late - Final LBK	99		Ib-IIc	IIc-IIId (Iydite)	GrM-25722	6158	29	5210	5011	charcoal
Late - Final LBK	111	IIb-IIId	Ib-IIc		GrM-25652	6197	29	5289	5045	calcined bone
Final LBK	100	IIc	Ib	IIc-IIId (Iydite)	GrM-25717	6540	45	5616	5381	charcoal
Final LBK	67	IIc								
Final LBK	87	IIc-IIId								
Final LBK	96	IIc-IIId	Ib-IIc		GrM-25720	6188	29	5282	5037	charcoal
Final LBK	83	IIId								
Final LBK	89	IIId								
Final LBK	90	IIId	Ib		GrM-25723	6290	30	5324	5210	charcoal
Final LBK	92	IIId	Ib		GrM-25721	6310	30	5357	5214	charcoal

present during the last phases of use of the burial ground. This might also provide an explanation why calcined bones were found in the (younger) inhumation graves, as intrusion of older disturbed cremation graves.

Fig. 8.5 clearly shows a gradual shift of the burials over time. The oldest graves are found in

the south-western part of the burial ground, while the youngest graves can be found in the north-western part. This means that the graves were dug closest to the settlement. It remains the question whether cremation graves were also present during the initial use of the burial ground.

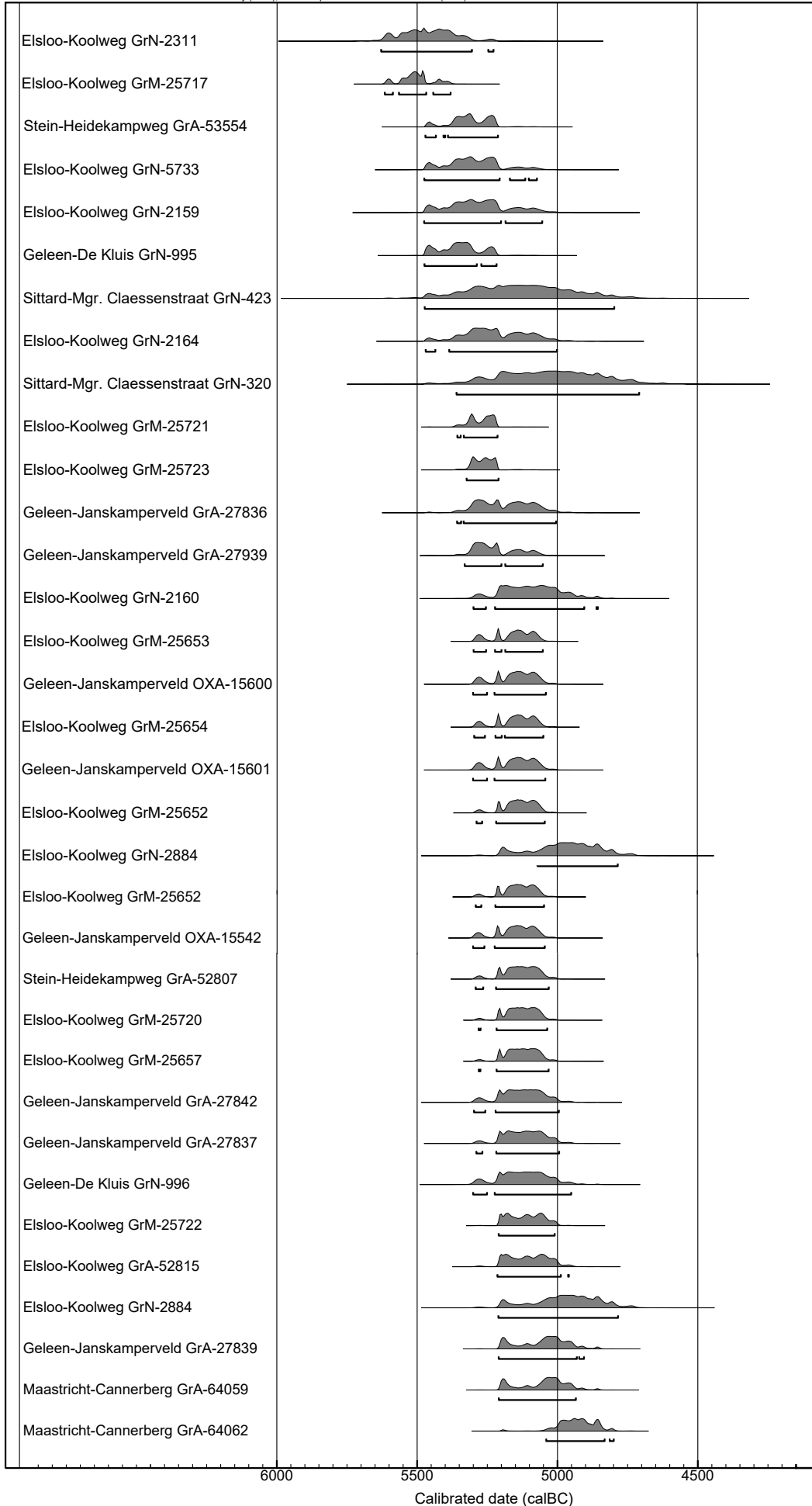


Fig. 8.6 Chronological distribution of all known LBK ¹⁴C dates in the Netherlands.

8.5 Conclusions

LBK pottery is one of the most striking, and indeed the name-giving, type artefact of the Linearbandkeramik Culture. The decoration, its motifs, evolution in techniques and decoration style, presumed function, and overall beautiful appearance have been the subject of many technological and sociological studies. This also holds true with respect to pottery from burial grounds. The pottery from the Elsloo settlement and cemetery provided the basis for Modderman's pottery typology and relative chronology.⁴²⁴ It is however interesting that only a few remarks were made by him about the distribution, appearance and division between the graves that held pottery, and the absence of it in other graves. In this section we have tried to counter this omission.

For this analysis, all available ceramic sherds were studied and described. Patterns were compared with respect to the placement of the sherds within grave pits as well as general patterns witnessed within the Elsloo settlement. This showed that the most frequently deposited sherds within the cemetery are decorated fine ware but that undecorated and coarse ware is numerous as well, just like in the settlement.⁴²⁵ It became apparent that some sherds or vessels showed signs of intense weathering and/or probable secondary burning. The first shows that sherds were subjected to the elements for a longer period of time, which suggests that they ended up in the burial pits unintentionally and were probably lying around, for whatever reasons, on the ground within the cemetery. Sherds with signs of secondary burning suggest that the pottery was not pristine when being deposited but probably used for a longer period of time as a cooking vessel or that it burned on a funeral pyre before ending up in a burial pit. Another striking finding is the number of sherds present within the burial pits, either in the fill or at the bottom of the burial pit. Although a lot of graves contained (almost) complete but mostly

fragmented vessels (n=41), most graves held sherds that only partly make up a complete vessel. Sherds from 89 other incomplete vessels have been found in the graves. Mostly only one (part of a) vessel is deposited in a grave, but many graves hold more vessels, up to seven in a single grave. The latter suggests that sherds belonging to only parts of a vessel were intentionally deposited in the graves and therefore part of the burial ritual. This was also noted by the early investigators from the first excavations who even suggested that these sherds were used to hold food offerings.⁴²⁶

Decorated and undecorated pots were put side by side or even placed in other vessels. There seems to be no clear distinction between cremation and inhumation graves on this point. However, a clear distinction can be made between the way the decorative motifs are set up, either in a curvi- or rectilinear fashion or with an even distribution of the two styles. Again, no distinction is evident between inhumation and cremation graves. Based on the pottery analysis, it can be stated that there seems to be no distinction between burial rituals for inhumation or cremation graves.

A distinction can be made for cremation graves with respect to sex and age. Because most cremation burials were very shallow, it has been stated that most pottery or other grave goods are missing. Only six cremation graves contained pottery. Some statements can be made, but reservations? must be made towards the credibility of these claims. In total 16 graves were attributed to either a female (possible 11 graves) or male (potential 5 graves). But only five of these graves (female: graves 64, 72, 73 and 111; male: grave 47) contained any pottery. As only one potential male grave contained pottery, a comparison seems unwarranted. Regarding age, it seems that pottery is only present in cremation graves which belong to adults, including older adults and seniles. Pottery therefore might be used as an indicator for adult graves, albeit with a lot of reservations; the data is simply not sufficient to quantify any of these suggestions.

⁴²⁴ Modderman 1970.

⁴²⁵ Van Wijk & Potreij-Lyklema 2015, 95-118.

⁴²⁶ Daily reports 1958 campaign.

9 The biographies of stone and flint grave goods

A. van Gijn & A. Verbaas

9.1 Introduction

The Linear Bandkeramik cemetery of Elsloo-Koolweg has been excavated many decades ago and it was hoped that subjecting this material to new technological approaches would add to our knowledge about this exciting site. Research on Early Neolithic burials elsewhere, making use of isotope analysis, dental studies and skeletal examination for health issues as well as micro-wear analysis, has provided exciting insights into the sexual division of tasks and issues of gender, identity and status.⁴²⁷ It is clear that with a holistic approach, combining all possible lines of evidence, we can get a glimpse of such aspects of past life, usually considered elusive. This chapter is the result of a micro-wear analysis of the grave goods of stone, flint and one bone tool.⁴²⁸ By studying the objects' raw materials, manufacture and use life we obtain insights into their biographies, which, in turn, are intimately connected to the life and identity of their makers and users.⁴²⁹

Specific research questions of our study are:

- Were the objects deposited in the graves in a used state or were they specifically manufactured for the occasion?
- Is there evidence that they may have been intentionally modified prior to deposition?
- What was the function of these tools in their former domestic life?
- How do the functions of different types of tools, flint implements, adzes, querns and hematite relate to each other, is there a pattern discernible?
- Do the data about the use of the implements tell us anything about the people who were buried?
- Are there sex or age differences apparent in the kind of burial goods present? Where Van de Velde had to rely on an innovative anthropological analysis correlating specific grave goods to gender, Baetsen's analysis of the cremation remains has been able to determine age and sex of several graves (see Chapter 7).⁴³⁰

9.2 Methods and sampling

As mentioned, the intention was to study all the stone and flint objects from the graves for the presence of traces of wear. Unfortunately, not all were available for study, as some were in the permanent displays at museums and due to Covid19 restrictions could not be removed (see Chapter 4). Eventually it was possible to study nineteen objects from the permanent display, although time was limited.

All adzes, flint tools and ground stone tools were first examined by means of stereomicroscope (Leica Stereo M80), with magnifications of 10–64x and equipped with a Leica camera MC 120HD. This allowed us to obtain a general impression of shape, manufacturing traces and possible zones with microwear. These magnifications are also used to map residue visible on the tools and to get a preliminary assessment of the state of preservation. All observations were marked onto the drawings that were made of each object and photographs were made. The objects were also studied by means of metallographic microscopy (Leica DM6000 and an Olympus BXFM). This type of microscope provides magnifications of up to 300x. Photographs were as far as possible made with a Leica DM6000 metallographic microscope equipped with a Leica camera DFC450, allowing a Z-stack. Larger artefacts were studied and photographed with the Olympus BXFM fitted with a SC50 camera. Objects were only cleaned after the examination by stereomicroscope to ensure that we were not removing residue. Chemical cleaning was not used at all and in those cases where objects were clearly greasy from extensive handling they were briefly rinsed with water and fluid soap and carefully patted dry. Occasionally alcohol was used, but when we observed possible remains of adhesives we refrained from using this. The blocks of hematite were weighed, and the number of ground facets were noted. Use-wear analysis was not performed on these pieces with the exception of one ornament made of this material (see 59.5).

⁴²⁷ Masclans Latorre 2020; Masclans *et al.* 2021; Masclans Latorre, Bickle & Hamon 2021.

⁴²⁸ Van Gijn 1990; Marreiros *et al.* 2015.

⁴²⁹ Gosden & Marshall 1999; Van Gijn 2010; Hoskins 1998.

⁴³⁰ Van de Velde 1979; Van de Velde 1979; Van de Velde 1992.

The preservation of many of the finds was not optimal. The finds were stored in cardboard bags (§4.5) and although no experiments were carried out to demonstrate this, we are fairly certain that some of the more vulnerable flint edges and part of their surfaces may have been affected by rubbing with the rather abrasive surface of these bags. They display a band of rough polish without a clear directionality along their edges and also the dorsal ridges show this type of wear. As this type of wear was frequently present, we decided that where no directionality could be detected in the polish, we would consider it 'bag damage'. Unfortunately, some of the less well-developed traces of use originally present on the surface, like those from for example cutting meat, have likely been obliterated by this secondary damage. This may also be the case with possible traces of hafting or prehension. The effect of the cardboard bags

on the stone implements like adzes and querns was less obvious and did not pose a problem for our interpretations.

Some finds were stored in matchboxes of split wood or small glass jars, both materials probably also having a detrimental effect on the preservation of the traces. It is also obvious that the grave goods have been handled by many researchers in the past, as they show frequent pencil marks, streaks from contact with metal and patches of old plasticine probably used for mounting the objects for display or photography. Lastly, all tools were numbered and especially the smaller flint tools were frequently completely covered with large find numbers and an abundance of lacquer. We did not remove these numbers, but it did impede a thorough inspection of some surfaces.

Apart from all the post-excavation damage, we also noticed some natural, post-depositional

Table 9.1 Overview of the number of tools studied, the frequency of used implements and the numbers of items that were not interpretable, divided by general artefact category.

		Not analysed	Traces	No traces	Not interpretable	Total
Flint						
	blade	-	7	4	7	18
	fragment	-	-	2	1	3
	blade retouched	-	1	-	-	1
	flake	-	1	7	2	10
	point indet.	-	3	-	-	3
	triangular point	-	13	2	2	17
	quartier d'orange	-	1	-	-	1
	round scraper	-	1	-	-	1
	unmodified nodule	3	-	-	-	3
	subtotal	3	27	15	12	57
Stone						
	adze	1	18	1	17	37
	hammerstone	-	2	-	-	2
	quern handstone	-	1	-	-	1
	quern fragment	-	11	-	-	11
	grinding stone	-	2	-	-	2
	hematite bead	-	1	-	-	1
	hematite nodule	21	-	-	-	22
	subtotal	22	35	1	17	76
Total		25	62	16	29	133

modifications. The flint tools were generally in a reasonable condition, although some were not interpretable due to the above-mentioned bag damage and some abrasion from sediments (Table 9.1). A total of nine flint pieces showed signs of burning. Although this does not necessarily obliterate the better developed traces of use⁴³¹, in our case these artefacts were not considered interpretable. The one bone or antler tool present (find nr. 736.17) was unfortunately not suitable for microwear analysis, as it was calcified. However, it could be seen that the tip was rounded. The querns were in reasonably good condition and could all be examined for traces of use. The adzes, in contrast, were more problematic. Especially the basalt adzes were severely weathered, with their surfaces (and especially their edges) having lost their homogeneous structure and presenting a jumble of minerals and voids, making an examination with the metallographic microscope impossible. Although in general the amphibolite pieces were in better condition, the edges were often ‘crumbled’ and the stone surface had lost its ‘coherence’, which would have obliterated any traces of wear. However, on some it was possible to see traces of hafting and use (Table 9.1). The lydite adzes were the best preserved by far.

Finally, it should be stressed that the inferences on tool use presented in this chapter should be regarded as interpretations and not determinations or identifications. All our inferences are based on a visual similarity of the features observed on the archaeological tools

with those we see on our experimentally used implements. Our statements on tool use are therefore inherently analogies, despite the fact that the use of microscopy obviously allows us to see features and discern patterns that frequently allow highly probable interpretations.⁴³²

9.3 Flint tools

9.3.1 Introduction

A total of 49 flint objects were studied in the Laboratory for Material Culture Studies at the Leiden Faculty of Archaeology, and another eight in the Leiden National Museum of Antiquities. Three finds were only examined by stereomicroscope and considered to be natural pieces; they were not further included for microwear. The remaining 54 included 28 objects with traces of wear, 14 without such evidence and 12 objects that were not interpretable. The large majority of the flint implements were points (n=20), followed by blades (n=18) and unretouched flakes (n=10). One elongated implement was classified as *quartier d'orange* (or *débitage en frites*), because of the presence of a triangular cross-section and an unretouched edge with an obtuse angle.⁴³³ One round scraper was also present. The 28 flint implements with traces of use showed 66 zones of use (Actually Used Area, hereafter referred to

⁴³¹ Halbrucker *et al.* 2021.

⁴³² Van Gijn 2014.

⁴³³ Van Gijn & Mazzucco 2013.

Table 9.2 Flint objects: inferred motion and contact material (total number of Actually Used Areas, AUA's).

	Abrasion - hafting	Shooting? / impact	Wedging	Handling	Hafting	Longitudinal	Multiple	Transverse	Unknown	Total
Ochre	2	-	-	-	-	-	-	-	-	2
Inorganic material	2	-	-	-	-	2	-	-	-	4
Bast	-	-	-	-	-	1	-	-	-	1
Unknown	13	4	1	2	2	1	1	3	4	31
Soft material	-	1	-	1	1	1	1	-	-	5
Hide / plant	-	-	-	-	-	1	-	2	-	3
Polish '23'	-	-	-	-	-	-	-	5	-	5
Total	17	5	1	3	3	6	2	10	4	51

Table 9.3 Flint: inferred contact material versus tool type (by AUA).

	Ochre	Inorganic material	Bast	Unknown	Soft material	Hide / plant	Polish '23'	Total
Blade	-	2	1	4	2	2	2	2
Flake	-	-	-	1	-	-	-	1
point indet	-	2	-	6	-	1	-	9
Triangular point	2	-	-	17	2	-	-	21
<i>Quartier d'orange</i>	-	-	-	2	1	-	3	6
Round scraper	-	-	-	1	-	-	-	1
Total	2	4	1	31	5	3	5	51

Table 9.4 Flint: inferred motion versus tool type (by AUA).

	Abrasion - hafting	Shooting? / impact	Wedging	Handling	Hafting	Longitudinal	Multiple	Transverse	Unknown	Total
Blade	-	-	-	1	-	5	1	5	1	13
Flake	-	-	-	-	-	-	-	1	-	1
point indet	4	2	-	-	2	1	-	-	-	9
Triangular point	13	3	-	-	1	-	-	1	3	21
<i>Quartier d'orange</i>	-	-	-	2	-	-	1	3	-	6
Round scraper	-	-	1	-	-	-	-	-	-	1
Total	17	5	1	3	3	6	2	10	4	51

as AUA). This included locations with actual use-wear traces or locations with traces from hafting or handling (Table 9.2). The eight flint items from the permanent display in the Leiden National Museum of Antiquities were studied by metallographic microscope only.

In the following the different flint tools analysed will be described according to their typological classification, examining the relationship between tool type and contact materials and motions inferred (Table 9.3, Table 9.4).

9.3.2 Points

Points were the most frequently encountered tool type, almost all of them of the characteristic LBK, triangular shape. Some are very well made (like nr. 781.13 from grave 5), others display much less technological expertise or care in their manufacture. Almost all have been abraded just above their barbs, usually with a longitudinal motion, by an unknown, abrasive but medium-

hard material (Fig. 9.1a). It seems likely that this is connected to the hafting arrangement, but it is strange that this abraded area is located just above the barbs, and not on them, as is often the case in different archaeological settings.⁴³⁴ On some points ochre residue is present near or on this area of abrasion, but it appears that the ochre is secondary and not connected to the actual abrasive motion. What the hafting arrangement exactly looked like is unclear. The base of the points did not show any wear traces. Adhesives were not demonstrated conclusively, although here and there possible adhesive residues were present. However, we cannot say whether or not the points were deposited in a hafted state.

Seven points possibly displayed evidence for use as a projectile. This inference was based on the presence of an impact scar, a feature that is problematic as the tip of a point is fragile and will easily break upon impact, also when this is not due to a use as projectile.⁴³⁵ These inferences should therefore be regarded as highly tentative. The presence of linear streaks of polish is considered to be a more secure indication of a

⁴³⁴ Van Gijn 1990, fig. 67.

⁴³⁵ Rots & Plisson 2014.

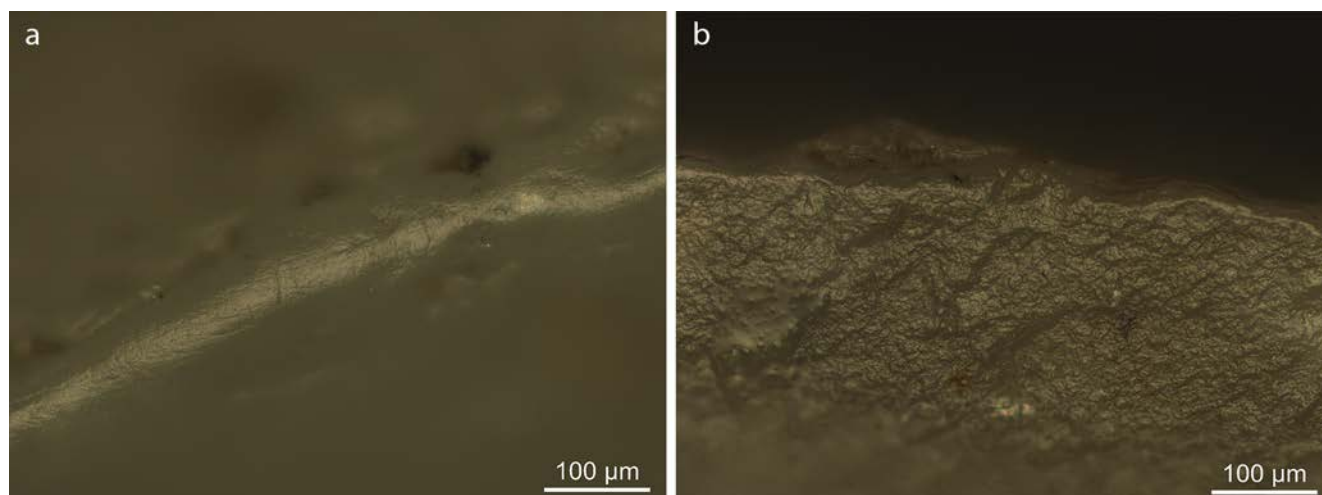


Fig. 9.1 Wear traces seen on the points made by metallographic microscope. a) Grinding traces on the barb of find nr. 509.14; b) Polish displaying features from contact with both hide and soft plant material, tentatively interpreted as being the results of contact with bast, seen on find nr. 765.13.

use as projectile⁴³⁶, but these could not be found on the points' surfaces, possibly because of the post-depositional and post-excavation damage. So, inferences about their actual use as projectile should be regarded with caution. The majority did not display such evidence, some even appeared rather fresh and almost newly made, for example nr. 834.12, found in grave 25. This has also been observed elsewhere.⁴³⁷

Some points proved to have somewhat more intricate life histories. One lopsided point (nr. 765.13, classified as 'point indet') was produced on a blade that was previously used to cut an unknown material referred to as 'hide/plant'. The polish shows similarities to both experimentally obtained plant working, which creates a smoother polish, and features which indicate a more abrasive material, like hide, soft mineral material or possibly even abrasive plants (Fig. 9.1b). It is frequently encountered in Late Mesolithic and Neolithic contexts⁴³⁸ and so far it has not been resolved what the associated contact material is. It can be suggested that it could be bast, the softer, more fibrous, inner part of the bark. The reasoning is that the fibres caused the more abrasive, striated features of this type of polish which otherwise bears a great resemblance to polishes from plant contact. Unfortunately, so far this has not been supported by experimental explorations. After the blade was turned into a point, the barb of the point and some of the distal end was abraded and the point was most likely hafted. It does not have any indications of having been used as a projectile, however.

9.3.3 Quartier d'orange

One large flint implement (nr. 508.30) was classified as a *quartier d'orange*, a tool that is characterised by its elongated, blocky shape and often triangular cross-section, and the presence of one or more unretouched edges with an obtuse edge angle of 80-90 degrees. If only a part of the edge displays these features, this should be for at least a length of 2-3 cm. Such tools are sometimes referred to as *débitage en frites* because the most likely way in which they were produced is by taking off 'French fries' from a thick big flake, using the proximal end as a platform. This results in the blocky shape with obtuse angles. They are invariably used in a transverse motion on an, as yet, unknown contact material, commonly referred to as 'polish 23' after its code in the Leiden database.⁴³⁹ We know some of the properties the contact material must have had: it was abrasive but relatively soft, as it only rounds the edge but does not cause any edge removals, and it has a fixed width of c. 2 cm. The two aspects of the edge display very different polish attributes. These tools, being unretouched, used to be regarded as 'waste' and were only recognised as typical LBK tools when microwear research was applied and the mysterious traces became known. In fact, it was first reported by Lawrence Keeley for the LBK site of Hienheim, Germany.⁴⁴⁰

⁴³⁶ Rots & Plisson 2014.

⁴³⁷ Masclans Latorre, Bickle & Hamon 2021; Masclans Latorre *et al.* 2021.

⁴³⁸ Gassin *et al.* 2014; Little & Van Gijn 2017.

⁴³⁹ Van Gijn 1990; Van Gijn & Mazzucco 2013.

⁴⁴⁰ Keeley 1977.

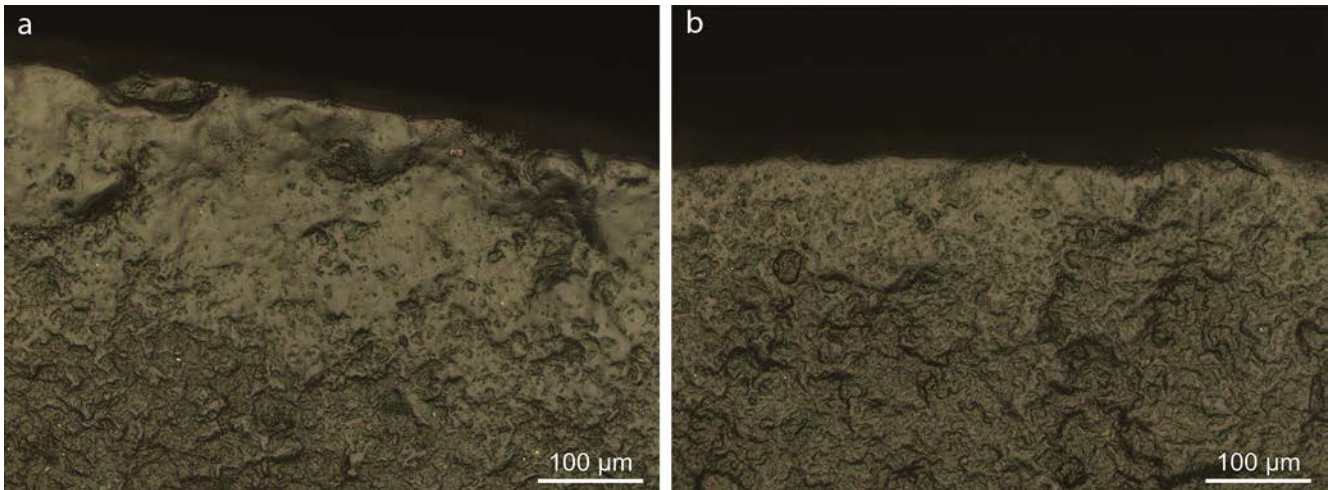


Fig. 9.2 'Polish 23' seen on find nr. 765.15/1. a) The smooth aspect of this enigmatic polish type; b) The rough side (picture made by metallographic microscope).

The *quartier d'orange* from Elsloo displayed three zones with highly distinctive 'polish 23'. This type of polish is characterised by two very different aspects which are always linked: one side of the AUA has a very rough, heavily striated polish that is distributed in a well-defined band and is associated with a very rounded edge. The other side has a much smoother and highly reflective polish, without any striations, also distributed in a band but less abrupt in its limits. This same polish type was seen on a blade (nr. 765.15, see below) (Fig. 9.2a, b). The two polish types are certainly correlated, as shown by several examples where the tool was turned around during use.⁴⁴¹ These tools never display any edge removals. Despite decades of experimental research by several researchers, it is still not known which activity was involved. We consider the most likely explanation the processing of plant fibres, like flax, but the traces do not fully match.⁴⁴² Its two extremities (the proximal and dorsal ends) displayed a faint gloss that may have been the result of holding the tool with both hands, possibly with a piece of cloth or soft leather in between.

9.3.4 Blades

A total of 18 blades was studied for traces of wear, only seven of which displayed traces of use. The most interesting tools were four unretouched blades (nrs. 518.13, 752.3 and

765.15/1 and 765.15/2) with lateral edges having an obtuse edge angle. Three of them displayed 'polish 23' on their obtuse edges, just like real *quartiers d'orange*, but the blades lacked the blocky shape that characterises this type of tool. Tool 518.13 had ochre on its proximal end and, in addition to 'polish 23', also had traces associated with cutting an unknown mineral material (Fig. 9.3a). Tool 765.15/1, a very long blade, seemed to have first been used to cut bast, after which it may have been hafted or handled as it has wear traces of contact with an unknown material at its two extremities (Fig. 9.3b). The activity causing 'polish 23' seemed to have been the secondary one. Spots of ochre residue were present on the entire surface of this blade. From the same grave derived another well-made blade on Light Grey Belgian flint (nr. 765.15/2). It was most likely used to cut a soft inorganic (mineral) material with one lateral edge, whereas the other edge was used to cut an unknown material (Fig. 9.3c). Like nr. 765.15/1 it had a lot of ochre on its surface. Another interesting blade was nr. 830.2: both of its edges were employed in a transverse motion on hide/plant (possibly bast, see above) (Fig. 9.3d). This was also the case with find nr. 776.1, a retouched blade, which was also used on hide/plant, as well as on soft mineral material, and also had a lot of ochre spots.

The use-wear polish on the blades generally displayed a longitudinal directionality, but a few blades were also used in a transverse motion, like those worked on the material causing 'polish 23'.

⁴⁴¹ Van Gijn 1990, fig. 48b.

⁴⁴² Van Gijn 2010, fig. 5.5.

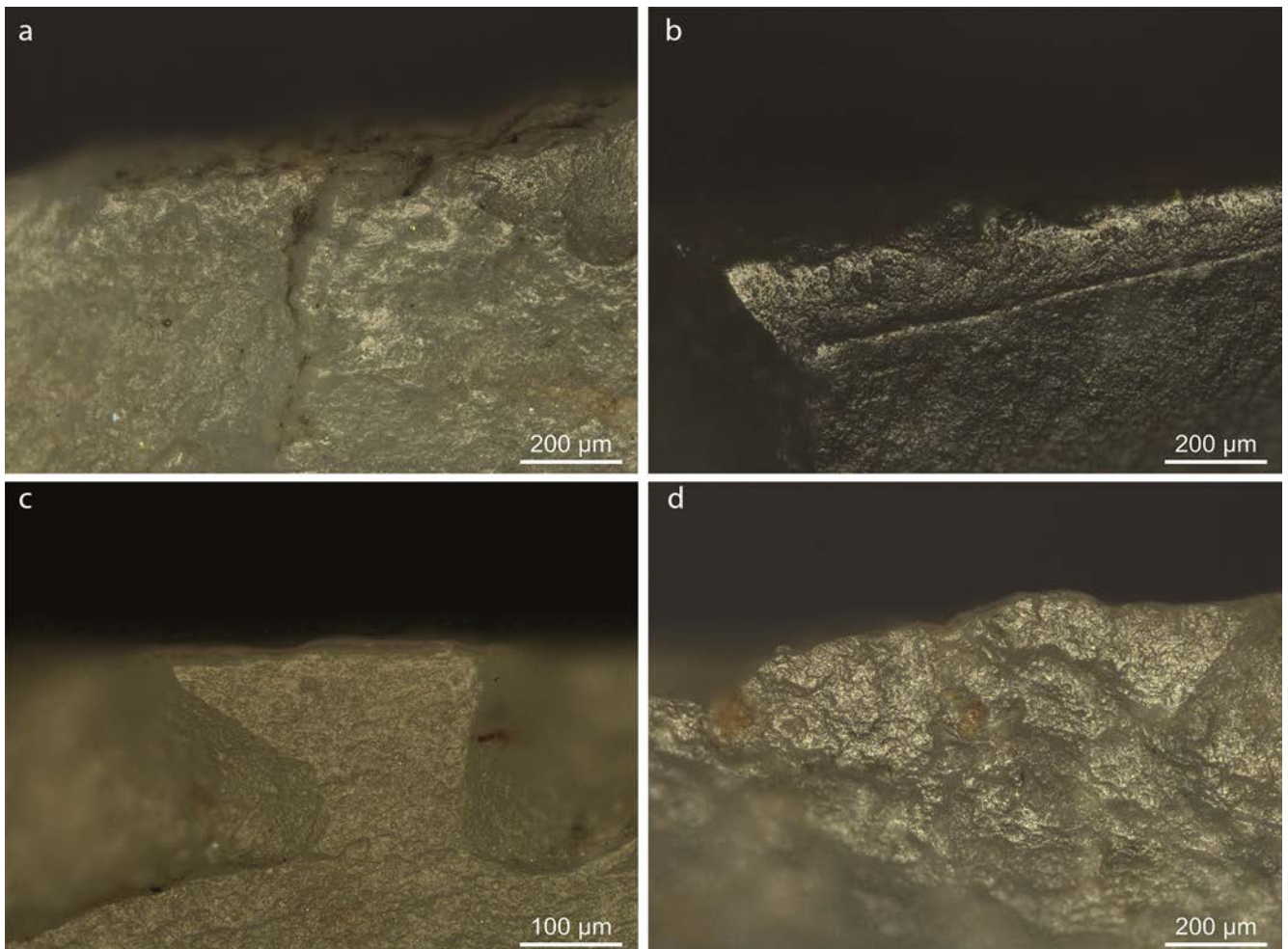


Fig. 9.3 Traces seen on blades examined by metallographic microscope. a) Traces interpreted as being the result of cutting a soft mineral material seen on find number 518.13; b) Possible hafting or handling traces seen on 765.15/1; c) Traces from contact with a soft mineral material seen on number 765.15/2; d) Polish displaying features from contact with both hide and soft plant material, tentatively interpreted as being the results of contact with bast, seen on find nr. 830.2.

Find number 809.34/3 was used in different motions, on a material that could not further be specified. Several blades could not be interpreted ($n=7$) due to having been burned or because of the abrasive effect of the cardboard bags they were stored in. Many blades therefore displayed the rough polish described above that highly complicated their functional interpretation.

9.3.5 Other tools

The round scraper (find nr. 793.11) displayed traces of battering on both its proximal and distal end. The shape of the many step fractures suggests the tool functioned as a wedge. The polish spots

did not display sufficiently characteristic features to allow a more detailed inference than 'unknown' but, in combination with the stepped features, the traces are most likely the result from contact with wood. One larger unretouched flake was used to shave a material that could not be further specified. The other flakes did not show any traces of wear, being small and irregularly shaped. Lastly, three artefacts, two of which flakes, could not be interpreted.

9.3.6 Discussion

The variety in observed traces of wear is very limited when compared to what we see in

Table 9.5 Inter-site comparison of inferred activities at LBK settlement sites from the Netherlands that have been studied for use-wear.

	Geleen-JKV		Elsloo Oldest-Middle LBK		Elsloo Late-Final LBK		Elsloo Riviusstraat		Beek-Molensteeg	
	N	%	N	%	N	%	N	%	N	%
Plant	6	2.1%	1	0.4%	3	2.7%	-	-	13	8.7%
Cereals	36	12.5%	15	6.0%	6	5.5%	17	18.1%	9	6.0%
Wood	13	4.5%	29	11.6%	6	5.5%	11	11.7%	23	15.4%
Reed	1	0.3%	-	-	-	-	-	-	-	-
Bark	2	0.7%	-	-	-	-	-	-	-	-
Hide	107	37.0%	124	49.6%	65	59.1%	39	41.5%	54	36.2%
Soft animal	7	2.4%	7	2.8%	-	-	-	-	2	1.3%
Bone/antler	1	0.3%	15	6.0%	3	2.7%	-	-	-	-
Clay/pottery	2	0.7%	-	-	-	-	-	-	-	-
Mineral other	7	2.4%	-	-	-	-	-	-	-	-
Polish 10	3	1.0%	12	4.8%	-	-	1	1.1%	-	-
Polish 23	8	2.8%	6	2.4%	4	3.6%	1	1.1%	6	4.0%
Hard material	2	0.7%	12	4.8%	6	5.5%	1	1.1%	2	1.3%
Soft material	6	2.1%	7	2.8%	3	2.7%	4	4.3%	4	2.7%
Wood/bone/antler	-	-	-	-	-	-	2	2.1%	4	2.7%
Unsure	52	18.0%	18	7.2%	14	12.7%	8	8.5%	32	21.5%
Hafting	36	12.5%	4	1.6%	-	-	10	10.6%	-	-
Total	289	100.0%	250	100.0%	110	100.0%	94	100.0%	149	100.0%

domestic, settlement contexts (Table 9.5).⁴⁴³ Whereas in settlements hide working tools predominate, and wood working is also very important, such tools are absent amongst the flint implements at the Elsloo cemetery. Notably absent too are the harvesting implements. Although it is difficult to draw conclusions, as not all the flint items originally found in the graves were accessible for study, it does seem that this absence is real and that not all domestic flint tool types were deemed appropriate for deposition in the graves. Instead, there seems to be a focus on points, clearly the most important flint item in the graves, followed by blades. It is interesting that some of the large blades displayed 'polish 23', a polish type that is unique to the LBK and which featured in small quantities in all Dutch LBK assemblages so far systematically examined (Table 9.5). Which

activity this polish type is associated with is still a mystery, but it is obviously something valued in one way or another by LBK people and considered a good item to give to their loved ones.

9.4 Hard stone tools

9.4.1 Introduction

A total of 76 hard stone finds were examined (Table 9.1) This included adzes, querns, hammerstones a grinding stone, nodules of hematite and a perforated bead of hematite, all of which were examined by both stereo- and/or metallographic microscope. Due to time

⁴⁴³ After Siebelink 2011; Schreurs 1988; Schallig 1995; Van Gijn & Mazzucco 2013.

Table 9.6 Inferred motion per stone tool type (nr. of AUA's).

	Chopping	Grinding	Milling linear	Milling indet	Pounding active	Pounding inactive	Pounding indet	Hafting in hide	Hafting indet	Hafting in wood	Handling	Transverse	Unknown	Total
Adze indet	-	1	-	3	1	-	-	-	-	-	-	-	-	5
Flat adze (type I)	5	2	3	4	6	-	-	-	-	-	-	-	-	20
Thick adze (type II)	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Slender thick adze (type III)	3	2	3	2	6	-	-	-	-	-	-	-	1	17
Hammerstone	-	-	-	-	-	-	2	4	2	1	1	-	-	10
Quern fragment	-	-	-	1	-	4	25	-	-	1	2	4	1	38
Grinding stone	-	-	-	-	-	-	-	-	-	-	2	1	-	3
Total	9	5	6	10	13	4	27	4	2	2	5	5	2	94

Table 9.7 Inferred contact material per stone tool type (nr. of AuA's).

	Soft wood	Wood	Hide	Hide / plant	Plant material	Cereals	Bottom quern	Hard stone	Handling	Medium hard material	Hard material	Unknown	Total
Adze indet.	1	3	-	1	-	-	-	-	-	-	-	-	5
Flat adze (type I)	-	10	3	4	1	-	-	-	-	-	-	2	20
Thick adze (type II)	-	1	-	-	-	-	-	-	-	-	-	-	1
Slender thick adze (type III)	2	6	3	2	1	-	-	-	-	-	-	3	17
Quern fragment	-	-	-	-	-	16	14	2	4	1	-	1	38
Hammerstone	-	-	-	-	2	-	-	1	-	3	2	2	10
Grinding stone	-	-	-	-	-	-	-	-	1	-	-	2	3
Total	3	20	6	7	4	16	14	3	5	4	2	10	94

constraints, the hematite nodules were only weighed, and the number of ground facets was counted; they were not subjected to a detailed microscopic examination. Apart from the 23 pieces of hematite 53 tools were examined of which 34 showed traces of use with a total of 94 actually used zones (AUA's) (Table 9.6, Table 9.7).

9.4.2 Querns

Eleven quern fragments and one handstone were examined. One of the quern fragments was possibly reshaped into a handstone, but this was not completely clear. All were made of sandstone or quarzitic sandstone. The quern fragments were shaped by means of percussion,

as flake negatives are present on both the bottom of the querns (like in the case of find nr. 518.11 and 757.11) and on the sides. This has been documented before.⁴⁴⁴ The grinding slabs had an elongated shape, and both querns with a round and a flat bottom are present. The handstone was of a more irregular, square shape. Previous research on LBK querns shows that fragmentation of the querns is a common feature in the Dutch LBK. Although the argument could be put forward that this could be due to recurrent resharpening by means of pounding, it was shown that very thick parts of the querns also were broken, something that is unlikely to occur unintentionally.⁴⁴⁵ This is also likely to have been the case with the quern fragments deposited in the Elsloo graves. In some cases the fragments were further

⁴⁴⁴ Verbaas & Van Gijn 2007; Verbaas 2014.

⁴⁴⁵ Verbaas & Van Gijn 2007; Carlier 2010.

Table 9.8 Inferred contact materials on querns (nr. of AUA's).

	Grinding	Milling linear	Milling indet	Pounding	Hafting in wood	Handling	Unsure	Total
Handling	-	-	-	-	-	4	-	4
Stone on stone	2	-	-	-	-	-	-	2
Cereals	-	3	13	-	-	-	-	16
Bottom quern	-	1	12	-	1	-	-	14
Unsure	-	-	-	-	-	-	1	1
Medium hard	-	-	-	1	-	-	-	1
Total	2	4	25	1	1	4	1	38

destroyed by additional flaking of the surface and sides.

Although the querns were not much affected by post-depositional or post-excavation modifications, the analysis was hampered by the presence of lots of ochre scattered all over the surfaces, as well as on the fractures. Some of the stones are also quite dirty, but because of the presence of ochre we did not use the ultrasonic tank to try to remove the dirt from the tools, for fear of also dissolving the ochre.

On the eleven quern fragments and the one handstone a total of 38 AUA's were observed. This means that all quern fragments have multiple areas with traces of wear. Traces of grinding cereals were observed most often, on a total of sixteen surfaces (Fig. 9.4a). Generally, the grinding slabs were used in a longitudinal fashion, parallel to the long axis of the tool. The handstone was used on both sides. This is also the case for some of the other fragments; in these cases it was not clear whether these were two-sided grinding slabs, or whether the fragment was re-used as a handstone. On thirteen locations the characteristic wear often visible on the bottom of the querns was seen. These traces are the result of contact with flour on the ground, which creeps underneath the stone during use, and the surface the quern was placed on, probably a piece of leather. This is a smooth, granular, but also greasy polish that spreads over both the higher and lower topography of the surface (Fig. 9.4b). Such wear traces were sometimes seen on more than one surface of the quern fragments, indicating the quern was used on both sides.

Another feature which is frequently observed on both grinding slabs and handstones is polish from contact with stone (Fig. 9.4c). This is logical as the two stone surfaces, that of the passive metate and the active mano, come into contact with each other when insufficient seeds (or other materials that need to be milled) are present. Handling traces are also seen, again a common feature on stone tools as the prolonged handling by greasy and dirty hands causes a sheen on the stones (Fig. 9.4d).⁴⁴⁶ This type of wear was not only present on the handstone, but also on some locations on the sides of quern fragments, suggesting that users also manually held on to the grinding slabs. It has been postulated before⁴⁴⁷ that the relatively small querns must have been somehow embedded during use, to keep them in place. The Elsloo cemetery assemblage has provided an indication for this for the first time, in the shape of some hafting traces, the result of contact with a wooden support (nr. 773.12). One small quern fragment (nr. 707.1) displayed traces of both handling and 'bottom of quern polish'. This artefact seems to have been placed on a cloth or skin and held with one hand during use.

Most of the quern fragments show traces from grinding cereals on the top surface, whereas the bottom has the 'bottom of the quern' polish. There are however some pieces with a different biography. The handstone nr. 755.31 displays only very lightly developed traces of use and has fresh rejuvenation marks from pounding. It does not have the levelled surface commonly seen on querns, suggesting this tool was used for a short period. On several locations the tool has a brown-greyish unknown residue, possibly ochre. It has been used to grind cereals, but there are some pounding traces visible as

⁴⁴⁶ Verbaas & Van Gijn 2007, fig. 13-2/h.

⁴⁴⁷ Verbaas 2005 (unpublished).

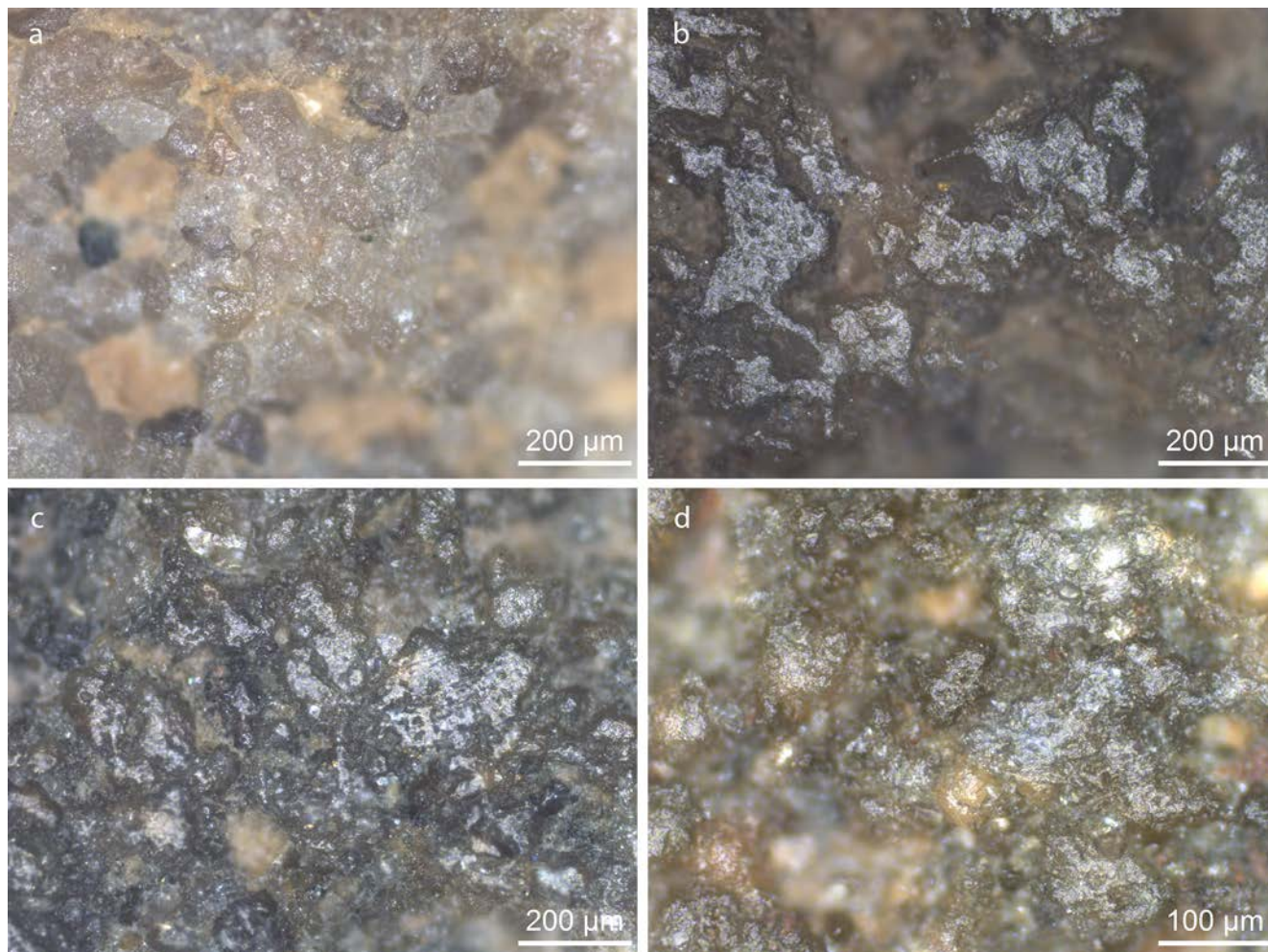


Fig. 9.4 Traces seen on querns documented by metallographic microscope. a) Polish interpreted as being the result of grinding cereals, seen on find nr. 707.1; b) Polish visible on the bottom of querns, related to the friction between the stone and the surface the quern was placed on (like a piece of cloth or leather) and the ground flour, seen on find nr. 773.12; c) 'Stone on stone' polish seen on find number 514.31; d) Polish from prolonged handling of a quern seen on find nr. 514.31.

well that do not seem to relate to the manufacture of the tool, possibly suggesting a previous use. This tool is a bit of an anomaly since querns generally have a long use-life. The possible handstone (nr. 757.11) actually is a re-used fragment of a quern. On one of its working surfaces and on one of the sides both traces of handling and the 'bottom of quern polish' are visible.

9.4.3 Adzes

Adzes constituted one of the most evocative LBK grave goods, often associated with male graves. Several types were represented.⁴⁴⁸ The flat Type I

adzes (n=16) were largely made on basalt. Slender, thick adzes (Type III) were also present (n=15), with amphibolite being the predominant raw material. Four adzes were classified as 'thick' (Type II) (Table 9.9). The amphibolite and lydite adzes were preserved much better than those of basalt.

A total of 43 used edges (AUA's) was seen on the 18 adzes that were sufficiently well preserved to allow a functional inference (Table 9.6). On several adzes the presence of polish from contact with wood gave an indication for the hafting arrangement of these tools (Fig. 9.5a, Table 9.6). The adzes were mounted onto a flat wooden handle with their butt end and were bound to it with pieces or string of either hide/

⁴⁴⁸ Bakels 1987, 1978; Arps 1978; Arps 1990.

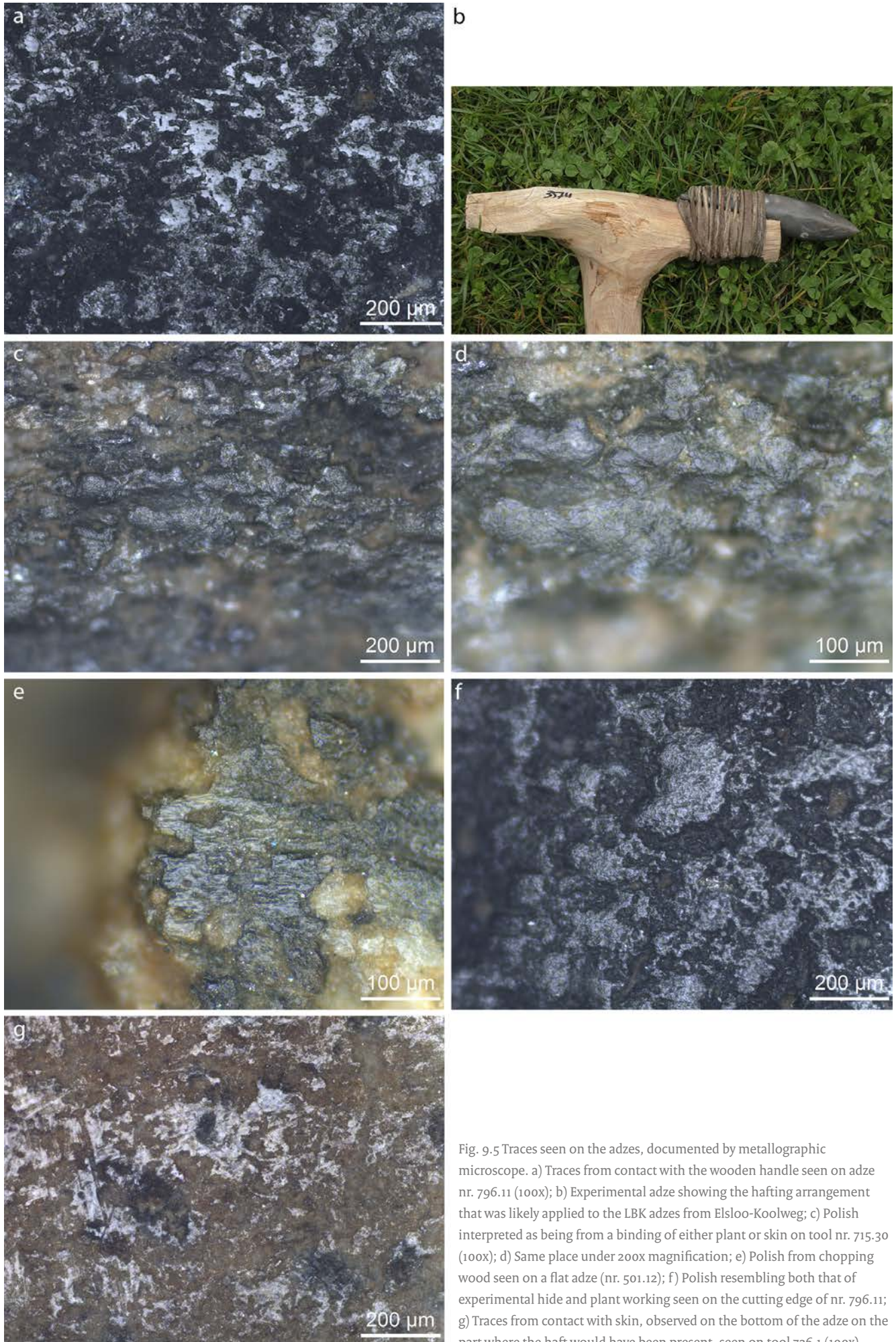


Fig. 9.5 Traces seen on the adzes, documented by metallographic microscope. a) Traces from contact with the wooden handle seen on adze nr. 796.11 (100x); b) Experimental adze showing the hafting arrangement that was likely applied to the LBK adzes from Elsloo-Koolweg; c) Polish interpreted as being from a binding of either plant or skin on tool nr. 715.30 (100x); d) Same place under 200x magnification; e) Polish from chopping wood seen on a flat adze (nr. 501.12); f) Polish resembling both that of experimental hide and plant working seen on the cutting edge of nr. 796.11; g) Traces from contact with skin, observed on the bottom of the adze on the part where the haft would have been present, seen on tool 726.1 (100x).

skin or plant material (Fig. 9.5b-d). A similar hafting arrangement, making use of hide/skin bindings, has also been observed at the site of Nitra.⁴⁴⁹ The distribution of the traces indicates that only a small portion of the stone was exposed, with c. 75 percent of the surface being covered by the hafting arrangement.

Where we could discern traces of wear on the flat Type I adzes, like on 501.12 and 734.38, they were mostly used to chop wood (Fig. 9.5e). On nr. 501.12 we could also discern evidence for resharpening: long, deep, striations parallel to the edge. The flat bottom side displays traces from hafting on wood, whereas on the top convex aspect a mixture of traces could be seen, interpreted as being from contact with both skin and plants. This mixture of contact materials suggests that the adzes may have been repaired and re-hafted, making use of bindings of different materials. The same configuration of hafting traces was seen on nr. 784.2, made of lydite, on which both polish from contact with skin and plants was discerned. This tool also displayed traces from chopping wood. We could not observe the very bottom of this tool, as it was sampled for stone determination.⁴⁵⁰ Last, one flat adze (nr. 796.11) displayed traces from working hide/plant material in a transverse motion (Fig. 9.5f). As discussed above in section 3.2, we occasionally encounter a type of polish which displays traces that resemble those from experimental use of both plants and hide. This type of polish may possibly be related to processing bast, but it cannot be ruled out that these adzes were involved in hide processing. At the site of Vedrovice in the Czech Republic, this type of adze displayed traces from hide processing with ochre added as an abrasive.⁴⁵¹

Many of the thick, slender Type III adzes also displayed traces of use. One such adze made of amphibolite (nr. 726.1) had been used for chopping wood. Only a few spots of polish

were visible because the edge was fragmented, possibly due to use. The butt end was heavily fractured as well. The direction of the negatives on this end suggests that these fractures may have been the result of impact, possibly from the haft during use. Traces of bindings were visible on its top surface. These were again of mixed materials, as traces from both skin and plant material were visible. On the bottom traces from contact with skin were seen (Fig. 9.5g). Using raw hide, which is very soft and pliable when wet but very hard when dry, could have increased the tightness of the bond between wooden handle and stone adze. This has previously been observed for the hafting of LBK scrapers.⁴⁵² Another large, thick and slender adze, nr. 736.15, was also used for wood chopping but here the bindings were limited to skin. This tool too was hafted with the aid of a piece of leather or skin that was placed between the adze's surface and the wood. Both adzes nr. 726.1 and 736.15 are large and heavy and the addition of the piece of skin may have helped to fix these tools more securely. A much smaller thick, slender adze (nr. 757.14) was very weathered, but a few spots of polish from contact with wood could be discerned along one part of the edge where this was less affected. The surface displayed a lot of ochre. No hafting traces could be discerned on this tool.

Therefore, the adzes seem very homogenous in their function and hafting arrangement. They do not display any evidence for a special treatment upon deposition, like intentional fragmentation, burning or other treatments sometimes observed in ritual contexts.⁴⁵³ Although many of the adzes displayed patches of ochre residue, frequently all across their surface, we could not discern a pattern in their distribution across the surfaces of the adzes (like only on the edge, or under the haft). We therefore consider most of this residue

⁴⁴⁹ Masclans Latorre *et al.* 2021.

⁴⁵⁰ Arps 1978.

⁴⁵¹ Masclans Latorre, Bickle & Hamon 2021.

⁴⁵² Van Gijn 1990.

⁴⁵³ Van Gijn 2010; Wentink 2020.

Table 9.9 Raw material per adze type (nr. of tools).

	Lydite	Amphibolite	Kwartsite	Basalt	Schist	Type unknown	Total
Adze indet	1	-	1	-	-	-	2
Flat adze (type I)	7	-	4	2	-	3	16
Thick adze (type II)	1	-	2	-	1	-	4
Slender thick adze (type III)	3	1	8	2	-	1	15
Total	12	1	15	4	1	4	37

to be secondary, related to the burial ritual (sprinkling with ochre), and most likely not with the individual adze biographies.

9.4.4 Other stone tools

Two hammerstones were present in the assemblage, nrs. 514.31 and 793.13. Nr. 514.31 displayed a total of eight AUA's, all related to dynamic actions like pounding, milling and grinding. It is a barely modified rolled pebble that was shaped by pounding. It is not clear whether the shaping is intentional. The pounding actions were connected to traces that were interpreted as being the result of contact with hard unspecified or generally unspecified materials. Such traces were present at several locations on the side and the flat surfaces of the stone. It was probably used both as a hammerstone and as an anvil. Both flat sides were used for grinding a plant material, possibly cereals, and handling traces are associated with it. There is also evidence for stone-on-stone contact associated with the cereal grinding traces as well. Other materials were also worked on this stone, but these could not be further interpreted. This was clearly a highly multi-functional tool. The other hammerstone, find number 793.13, was a bipolar hammerstone employed to pound unspecified medium hard material. The tool was not very intensively used, but displayed three locations of use.

One block-shaped grinding stone, made of fine-grained sandstone (find number 736.32), was shaped by means of pounding. Traces of wear are not visible, as such traces get removed by subsequent use: the quartz grains are removed by the harder contact materials, like stone or wood, that they are meant to grind. In contrast, intensively used tools such as this one often display handling traces, a greasy, shiny polish that is frequently seen on stones from intensive contact with people's hands. From the National Museum of Antiquities permanent display one grinding stone of fine-grained sandstone was examined. One of its surfaces had been used to grind ochre, considering the residue present and the long striations, running in different directions, associated with it. However, because repeated use wears away the quartz particles in the sandstone, polish was not

visible. The bottom of this find was pockmarked, but it was not clear whether this was related to use.

9.4.5 Hematite and the presence of ochre residue

Twentythree nodules of hematite were available for study, with a total weight of 1841 grams. Their weight varied from 0.5 grams to 252 grams. Most of them (n=18) had one or more facets from grinding, characterised by long, narrow striations oriented in a linear fashion. The maximum number of facets was 24, remarkably enough observed on one of the smaller nodules in the assemblage (weighing 136 gram). In addition, a rounded nodule of hematite and a perforated ornament were studied, both deriving from grave 47. As these pieces were studied in the National Museum of Antiquities, they were only cursorily investigated and their weight was not noted. The ornament (find nr. 720) displayed on one side the common combination of various grinding facets which characterises all the other hematite pieces. This aspect of the ornament was rounded, but again, this was seen on almost all the pieces of hematite. However, on the opposite aspect it was ground completely flat (Fig. 9.6). The grinding marks looked very fresh, as did the perforation. This biconical perforation displayed very regular inner striations and was certainly not made by means of a flint borer. The perforation had straight sides and lacked the characteristic V-shape associated with flint drills. On one side the direction of the perforation was shifted to meet the perforation from the other side, leaving a small concavity. This concavity has a rounded shape indicating that the drill did not have a very pointed shape. It also must have been made of quite a soft material. It likely was a drill made of antler or wood, with fine sand and water added as an abrasive. It may be that find nr. 736.17 was the kind of tool used for making this type of perforations. This tool was probably made of antler, a material which can be hardened by heating.

Spots of ochre were seen on many objects, both flint and hard stone. One unmodified blade, nr. 765.15, used intensively similar to a *quartier d'orange*, was covered with it, as were



Fig. 9.6 Perforated ornament of hematite (nr. 720).

many of the querns. We did not, however, map all the ochre as we did not scan the entire surface under high magnification. Often there did not seem to be any relation to the former use of the tool. Rather, the distribution of the ochre seemed to be random on many of the examined tools, suggesting that the graves were sprinkled with this material, landing on all items present. Still, there is some evidence on some of the querns that the ochre was applied intentionally to a surface, something that was already proposed before.⁴⁵⁴ The use of ochre is something very common in late Mesolithic burial rituals⁴⁵⁵ and its bright red colour has often been given a special meaning.⁴⁵⁶

9.5 Grave inventories

One objective of this renewed focus and detailed analysis of the material from the Elsloo-Koolweg cemetery was to examine the relationship between sex and the kind of grave goods deposited. Unfortunately, only a small number of graves could be studied (§7.3.1) and not in all cases could the sex of the person be determined. However, with respect to the graves with stone or flint grave goods, eight graves yielded results: five female graves, four of which with the addition 'possibly', and two possible male

graves. The composition of the grave inventories in terms of their stone and flint objects shows a surprising variability.

Grave 72, with a positive identification as female grave of an individual between 40-60 years old, produced two adzes, both hafted, one of which with traces from chopping wood. In addition, it contained an unretouched blade that was not interpretable in terms of use. Possible female grave 16 contained a metate that was used to mill cereals. Another possible female grave (nr. 20), of an individual aged 20-40 years, had an amphibolite adze of the slender, thick type, which was heavily used for chopping wood. It was also hafted and appeared to have been repaired or re-hafted considering the mix of binding types. Additionally, one unmodified flake without traces of use was present in grave 20. Grave 21, also a possible female grave of an individual aged 20-40 years, contained two points, one of which showing traces of use. A last possible female grave, number 7, produced a tiny unmodified flake. The age of this individual was between 40-50 years.

As to male graves, only two possible ones were identified: grave 62 and 66. The individual in grave 62 was estimated to have been between 30 and 50 years of age, the one in grave 66 as 18+. Grave 62 contained the one scraper that was found, used as a wedge, two core fragments, and a hammerstone that was used to

⁴⁵⁴ Verbaas & Van Gijn 2007; Carlier 2010.

⁴⁵⁵ Albrethsen & Brinch Petersen 1976.

⁴⁵⁶ Jones & MacGregor 2002; Taçon 2004.

pound a medium hard material that could not be further specified. From grave 66 one quern was retrieved, a fragment of a metate used for milling cereals. Additionally, an unmodified flint pebble was present.

A few graves could not be sexed but the age of the cremated individual could be determined. In grave 71, an individual of between 20 and 40 years old, three beautiful blades were found, all of which were burned, presumably in the funeral pyre, to such a degree that microwear analysis was not possible. This person also was given a slender, thick adze that had been used for chopping wood and which was hafted with skin bindings. Finally, the one grinding stone present in the assemblage came from this grave. Another grave with an 18+ individual of unknown sex is grave 113. This grave contained a *quartier d'orange*.

Three sets of grave goods deserve special mention, although no information is available about the biological sex of the dead in these graves. The first is find number 752 from grave 3, which contained an unretouched blade with obtuse angle with 'polish 23' and possible evidence for bast cutting (see above); a beautifully coloured flat axe of amphibolite used for chopping wood and probably hafted in wood; a grinding stone possibly used for grinding hematite; and six triangular points, all with the characteristic grinding traces just above their barbs and lacking any convincing traces of use. The second set, find nr. 765 from grave 87, contained two unretouched flint blades showing 'polish 23' and traces from cutting soft mineral material and bast; one lopsided point that was made on a blade previously used on bast; and two perfectly executed adzes. One was made of lydite with traces of wood chopping and one of amphibolite, also possibly used on wood. It is very interesting that the grave inventory of grave 87 (find nr.765) is highly comparable to that of grave 83 (find nr. 776). The lydite thick adze and the small flat adze of amphibolite in the latter are identical and virtually interchangeable with those from grave 87. Both amphibolite adzes almost seem to have been made of the same nodule, displaying such a similar mottling and colour. The lydite adzes have the same size and shape and display a very similar fracture at their butt end. Grave 83 also contained a small slender amphibolite adze with traces of contact with its wooden handle; its working edge was

not interpretable. Lastly, a retouched blade with traces of contact with a soft mineral material and bast was present; this tool was covered with lots of ochre. It would be interesting to see whether there are any other connections between grave 83 and 87, because the likeness in grave goods, especially the very close similarity of the two adzes, is certainly striking.

9.6 Conclusion

The use-wear study of the flint and stone grave goods from the Elsloo cemetery has produced a number of surprising results. First of all, it is clear that with respect to the flint items selected for deposition, there must certainly have been a clear preference for specific objects: most importantly arrowheads, secondly blades. Certain domestic items like hide scrapers, the most frequently encountered type of tool in settlement contexts, were avoided. What is present are tools used for the unknown activity which causes 'polish 23', a type of wear trace that is unique to the LBK and which has puzzled researchers for decades. Another contact material that was demonstrated repeatedly was that causing the enigmatic hide/plant type of polish, a polish which we have provisionally interpreted as being associated with bast. However, it should be stressed that this is very tentative. The addition of a number of small flakes without any traces of wear is in line with funerary ritual elsewhere, like in the Funnelbeaker and Beaker periods.⁴⁵⁷ The arrowheads do not show a homogeneous biography. The presence of large numbers of finds with abundant lacquer and other post-excavation modifications made their analysis very difficult. However, some traces stood out, such as the grinding of the areas just above the barbs, something that is surely connected to their way of hafting. Together with possible remains of adhesives on several points, this would suggest they were deposited in their hafts. None of them, however, show indisputable evidence for having been used as a projectile.

Adzes were also found in women's graves, something that is somewhat contradictory to our preconceived ideas about the association between certain kinds of tools and gender:

⁴⁵⁷ Van Gijn 2010; Wentink 2020.

querns and plant processing tasks as well as hide working are supposed to be connected with women, whereas adzes, used for butchering and warfare, are believed to be related to men. Large stone tools in which a lot of knowledge and expertise is invested, such as adzes, are commonly interpreted as typical male objects, especially if they were made of exotic materials. This is partially due to ethnographic parallels, for instance from Papua New Guinea, where the intimate connection between stone adzes and male individuals has been extensively documented.⁴⁵⁸ However, it is conceivable that the Elsloo adzes were also used as hide working tools, hide working often being considered women's work following analogies with Inuit and Siberian peoples. Experiments have shown them to be effective for such a task and in fact at the site of Vedrovice they were shown to have been used for such a purpose.⁴⁵⁹ In the case of Elsloo-Koolweg, however, all the adzes of which the function could be inferred were related to wood working, with one exception which had traces resembling those from hide and plants (see above).

Archaeologists have a tendency to focus on patterns which allow them to neatly classify

their data into categories. This often works for funerary contexts where traditional, circumscribed rituals determine what is placed in the grave. We also tend to associate the grave goods with the biological sex and age of the deceased, his or her social status or profession, or with the place he or she had in society. Surely, this is often the case, but not so, it seems, in the Elsloo cemetery. Here, adzes appear in female graves and a quern in that of a male. Maybe in this case we should abandon the idea that the grave goods have anything to do with the deceased: maybe the mourners gave an object that they themselves loved and treasured. Along that line we should bear in mind that most of the querns are fragmented. It has been shown before that this fragmentation was likely intentional.⁴⁶⁰ Such intentional fragmentation is linked to connecting different people across space (and time?) to consolidate social relationships.⁴⁶¹ By giving fragments of querns to different people as well as to the deceased, such ties are 'set in stone'. A last explanation for this lack of a consistent link between grave goods and biological sex is that there may have been a lot more fluidity in gender roles than we are aware of.

⁴⁵⁸ Hampton 1999; Pétrequin & Pétrequin 2000.

⁴⁵⁹ Masclans Latorre, Bickle & Hamon 2021.

⁴⁶⁰ Verbaas & van Gijn 2007; Carlier 2010.

⁴⁶¹ Chapman 2000.

10 The use of wood at the burial ground of Elsloo: charcoal analysis

J. van der Laan & I.M. van Wijk

10.1 Introduction

The presence of wood and its charred remains (charcoal) has been documented for a number of graves of the Elsloo-Koolweg cemetery.⁴⁶² In at least 39 graves burned wood fragments have been noted and/or gathered. These fragments were mostly excavated from the fill of the grave (36 graves), either from inhumation graves (25 graves) or cremation graves (18 graves). Four inhumation graves contained charcoal only at the bottom of the grave (graves 31, 92, 96 and 104).

One of the material categories that was not studied in detail 50 years ago is charcoal. The collected charcoal is highly fragmented, so analysis according to the methods used at the time was probably considered too labour-intensive. In recent decades, however, the use of the microscope with reflected light and dark field lighting has caused archaeological research to take off in archaeological studies, amongst others. The material does not require intensive pre-treatment anymore but can be viewed directly under the microscope with magnifications up to 400 times after creating a fresh fracture plane.

A total of 61 samples were gathered from the site of Elsloo-Koolweg, from both the cemetery and settlement. A selection of the 36 most promising samples was analysed. The preliminary research (including selection of material for ¹⁴C/AMS dating) was carried out by E.E. van Hees.⁴⁶³

10.2 Aims of the study

The primary purpose of the anthracological study is to determine which wood species are present in the samples and how they relate to each other. In addition to characterising the spectrum of species, it is determined which type(s) of wood are present in each sample. Do they originate from trees/shrubs with a large diameter (log) or a small diameter (branch wood and younger trees)? Furthermore, details in the material are recorded, such as presence of fungi or insect attack (see Material and methods).

Additional questions were asked in order to see if the samples were deteriorated after 50

years in storage, but the main questions relate to the burial ritual:

- Which wood species are present in the samples and how do they relate to each other?
- Is the charred material derived from (stem) wood with a large diameter, or are there also fragments of branch wood and/or young trees with a small diameter?
- Do the samples represent remains of pyres or could they have served a different purpose? Is there a possible settlement noise?
- Is there a conscious selection of wood types for combustion based on the composition of the charcoal assemblage?

10.3 Material and methods

A total of 61 individually packaged samples were selected for research. The samples come from 35 distinct features (Table 10.1). More than one sample has been collected from the same context. The packaging of the samples is a history in itself, which will probably be worth investigating in the future. The oldest 'generation' consists of makeshift packaging in the form of shag and cigar boxes, pharmacy jars, matchboxes, and peanut butter jars (Fig. 10.1). The second generation comprises pre-printed paper bags on which, systematically, the origin of the sample could be recorded. The last, current generation of packaging material consists of a plastic grip bag with a printed find card with a barcode.

The samples consist of small charcoal fragments, embedded in clumped loess, sand and iron corrosion. Each sample was flushed over a sieve column of three sieves with different mesh sizes: 3.15 mm, 1 mm and 0.16 mm. Only the residue of the largest sieve fraction is suitable for the determination method used. From each feature, the most promising sample was selected for analysis. Among other things, the results of the preliminary research were used.⁴⁶⁴ In order to be able to make a comparison with the charcoal found outside the cemetery context, additionally some samples from the settlement were analysed.

For the determination of wood and charcoal, the anatomical characteristics are examined. These

⁴⁶² This chapter is an abbreviated version of a full analysis carried out by J. van der Laan (Cambium botany). The full report (in Dutch) is deposited in the digital repository Dans-Easy.

⁴⁶³ Van Hees 2021.

⁴⁶⁴ Van Hees 2021.



Fig. 10.1 A selection of the packaging material used (photo: J. van der Laan).

characteristics are studied in three different areas: the transverse plane, the radial plane (parallel to the radius) and the tangential plane (at right angles to the radius). In the case of uncarbonised wood, thin slices, so-called 'coupes', are cut from the wood, from which a preparation is then made that can be viewed under a microscope with passing light. Because charcoal cannot be cut if it is not impregnated, it is viewed under a reflected light microscope. Due to erosion and dirt, the surface of charcoal has usually become 'illegible'. It is then necessary to create a fresh fracture plane, since it is not possible to cut the charcoal without destroying the cell structure. In order to be able to break the charcoal, without it being completely ruined, a certain volume of charcoal is required. Charcoal fragments of less than approx. 7 mm are difficult to break, so determination is not always possible.

It is common for at least 100 fragments per charcoal sample to be determined to get a reliable picture of the composition. However, this

quantity is not always available. In most cases, the Elsloo samples did not contain enough material to reach 100 determinations. A total of 886 charcoal fragments were analysed from 36 samples, with a total weight of only 82.83 g.

A random selection of up to 100 fragments was first obtained from each sample. When a new type of wood is identified at the end of this determination series, another 50 fragments are determined, as long as no new species are found, and the saturation curve flattens. In the case of the material from Elsloo, 100 determinations per sample were sufficient. The rest of the residue was scanned under a slight magnification, looking for fragments that seemed to deviate from the already determined material in terms of size, appearance or hardness. On this basis, it was decided whether additional determinations were meaningful or necessary and possible. This was not the case.

The charcoal has been identified using Schweingruber's determination key⁴⁶⁵ and Cambium Botany's comparison collection. A

⁴⁶⁵ Schweingruber 1990.

Table 10.1 Analysed samples with charcoal.

Feature	Grave nr	Type	Origin	Find number	Sample number
162	6	inhumation	cemetery	753.2	M-44
135	20	cremation	cemetery	715.32	M-46
133	21	inhumation	cemetery	714.31	M-13
133	21	inhumation	cemetery	714.32	M-34
227	34	inhumation	cemetery	814.1	M-05
206	35	inhumation	cemetery	816.30	M-47
142	42	inhumation	cemetery	754.1	M-06
144	47	cremation	cemetery	720.1	M-09
151	50	inhumation	cemetery	768.1	M-02
233	56	inhumation	cemetery	809.1	M-16
172	64	cremation (?)	cemetery	786.1	M-33
93	69	cremation	cemetery	740.1	M-15
185	78	inhumation	cemetery	779.1	M-11
99	84	inhumation	cemetery	775.1	M-57
107	90	inhumation	cemetery	772.2	M-01
1	92	inhumation	cemetery	506.31	M-17
36	96	inhumation	cemetery	505.33	M-37
32	98	inhumation	cemetery	501.33	M-26
38	99	inhumation	cemetery	512.1	M-25
34	100	inhumation	cemetery	504.33	M-22
30	102	inhumation	cemetery	502.30	M-23
13	104	inhumation	cemetery	519.30	M-24
25	106	inhumation	cemetery	1000.1	M-60
6	111	cremation	cemetery	464.31	M-36
204	114	cremation	cemetery	820.1	M-45
95	115	cremation	cemetery	771.1	M-14
88	116	cremation	cemetery	761.31	M-04
170		pit	cemetery	794.1	M-00
149		pit	cemetery	751.3	M-03
181		pit	cemetery	831.1	M-07
2.57		long pit	settlement	515	M-35
2.7		pit	settlement	505	M-48
2.12		long pit	settlement	503	M-49
7.237		long pit	settlement	809	M-51
7.235		long pit	settlement	803	M-52
7.236		long pit	settlement	815	M-56

striking light microscope (Zeiss) with dark field lighting and a magnification of up to 400 times was used. In addition to the wood species, the type of wood was also investigated. This refers to whether there is wood with a large diameter

(log wood), or with a small diameter (branch wood and young trees). For this purpose, the curvature of the annual rings is examined. Any other special deviations in the material were also noted. Examples of this are the presence of

fungi in the wood, which indicates the use of affected (freckle) wood, the presence of insect damage; an indication of the burning of secondary wood, and/or the presence of glazed or sintered fragments which may provide information on the combustion temperature.

10.4 Results

Of the 61 samples supplied (M-00 to M-60), 36 were analysed. This selection is based on the preliminary research by Van Hees in which the 13 most suitable samples are indicated. In addition, at least one sample was analysed from each of the different features.

10.4.1 Types of wood found

The species spectrum of the site Elsloo-Koolweg includes at least ten, but possibly more different types of wood (Table 10.3). Charcoal of the birch family is not counted because this can come from an alder, as well as from a birch, hazel or hornbeam and these species have all been found on the site. However, there are ‘at least’ ten species, as the taxa determined can include different species.

Oak (*Quercus* sp.) is present in fifteen of the 36 samples and is also the dominant type of wood in eleven features. In the Netherlands, three species of this genus occur naturally, namely the summer oak (*Quercus robur*), the winter oak (*Quercus petraea*) and a hybrid of these species (*Quercus x rosacea*).⁴⁶⁶ These oaks cannot be determined to a species level on the basis of the wood anatomy.⁴⁶⁷ A total of 372 fragments with a weight of 28.29 g were identified as oak. In four cases, this was charcoal that probably comes from oak, but in which not all determination characteristics were demonstrably present (cf. *Quercus* sp.; 0.345 g). It is quite exceptional that these fragments could not be determined with certainty since oak is one of the most recognisable types of wood in the Netherlands, but the wood was so fragmented and brittle that the cell structure could not be clearly visualised.

Oak wood is characterised by an annular spread of the vessels in combination with wood rays of both one and several cells wide. In some

charcoal fragments, only uniseriate rays (rays of one cell wide) have been widely observed. The cell structure of the wood of the sweet chestnut (*Castanea sativa*) has strong similarities with oak, with the difference that in chestnut wood there are no wide rays. In theory, these single fragments from Elsloo where the broad rays have not been observed could therefore come from a chestnut. However, this is not very likely during this period. The chestnut was introduced in the Netherlands in Roman times. In addition, in young oak the wide marrow rays can be missing and the fragments from Elsloo were so small that they could represent fragments that lay between two wide rays.

Ash wood (*Fraxinus excelsior*) occurs in eleven or twelve samples. In four samples ash wood is the dominant type of wood, in one sample the charcoal is ‘similar to’ ash wood (cf. *Fraxinus excelsior*) the only type of wood present (and therefore the dominant taxon). Only the ‘common ash’ is indigenous.⁴⁶⁸ Overall, 99 fragments of ash were found, weighing 16.52 g, and another four fragments of probable ash charcoal (0.13 g).

Hazel charcoal (*Corylus avellana*) occurs in ten samples and is the most common type of wood in four samples. This is also an indigenous tree species that grows mainly on somewhat richer, moist soils.⁴⁶⁹ 66 fragments weighing 7.755 g have been identified as coming from hazel, alongside two fragments probably of the same species (0.03 g).

While the above taxa were divided into two groups, wood of the *Malinae* was divided into three, as in one sample remains of the type apple, pear, hawthorn (*Malinae*, type *Malus*, *Pyrus*, *Crataegus*) were present, providing four fragments of 0.655 g. In five samples there was wood of an *Malinae*, but the type could not be determined with certainty. In one case, *Malinae* trees were the only –and therefore dominant– species in the sample. In total, this includes 48 fragments weighing 8.14 g. Finally, in three samples charcoal similar to *Malinae* was present. In one sample only this species was present, and therefore the dominant species. Together, this comprises seven fragments weighing 0.75 g.

Charcoal from a cherry (*Prunus* sp.) occurs in one sample in small numbers and in another sample charcoal similar to cherry is the only taxon present. The first includes two fragments weighing 0.045 g and the second 33 fragments

⁴⁶⁶ Maes 2013, 216.

⁴⁶⁷ Schweingruber 1990, 144.

⁴⁶⁸ Maes 2013, 148.

⁴⁶⁹ Maes 2013, 119.

Table 10.2 Overview of the taxa found.

Species	Species (Latin)	Presence (NR features)	Dominant (NR features)	Fragm. (NR)	Fragm. (%)	Weight (g)	Weight (%)
Oak	<i>Quercus sp.</i>	15/36	11	372	42	28.29	34.2
Oak?	<i>cf. Quercus sp.</i>	2/36	0	4	0.5	0.345	0.4
Ash	<i>Fraxinus excelsior</i>	11/36	4	99	11.2	16.52	19.9
Ash?	<i>cf. Fraxinus excelsior</i>	2/36	1	4	0.5	0.13	0.2
Hazel	<i>Corylus avellana</i>	10/36	4	66	7.5	7.755	9.4
Hazel?	<i>cf. Corylus avellana</i>	1/36	0	2	0.2	0.03	0
Apple like. type apple. pear. hawthorn	<i>Malinae. type Malus. Pyrus. Crataegus</i>	1/36	0	4	0.5	0.655	0.8
Apple like	<i>Malinae</i>	5/36	1	48	5.4	8.14	9.8
Apple like?	<i>cf. Malinae</i>	3/36	1	7	0.8	0.75	0.9
Cherry	<i>Prunus sp.</i>	1/36	0	2	0.2	0.045	0.1
Cherry?	<i>cf. Prunus sp.</i>	1/36	1	33	3.7	1.38	1.7
Elm	<i>Ulmus sp.</i>	1/36	0	27	3	4.295	5.2
Elm?	<i>cf. Ulmus sp.</i>	1/36	1	5	0.6	0.115	0.1
Beech	<i>Fagus sylvatica</i>	1/36	0	5	0.6	0.655	0.8
Hornbeam	<i>Carpinus betulus</i>	1/36	0	3	0.3	0.29	0.4
Hornbeam?	<i>cf. Carpinus betulus</i>	2/36	0	3	0.3	0.22	0.3
Alder	<i>Alnus sp.</i>	3/36	0	3	0.3	1.01	1.2
Willow	<i>Salix sp.</i>	1/36	0	2	0.2	0.03	0
Willow?	<i>cf. Salix sp.</i>	1/36	0	2	0.2	0.04	0
Maple	<i>Acer sp.</i>	1/36	0	1	0.1	0.235	0.3
Birch family	<i>Betulaceae</i>	4/36	1	25	2.8	3.18	3.8
Indet.	<i>Indet.</i>	27/36	9	169	19.1	8.72	10.5
Totals			34*	886	100	82.83	100

* Two samples did not contain any charcoal and therefore have no dominant taxon

weighing 1.38 g. In the latter, the charcoal is fragmented in such a way that not all determination characteristics could be observed. It is probably the sweet cherry (*Prunus avium*) or the common bird cherry (*Prunus padus*). These are native taxa in the Netherlands, and these cannot be distinguished from each other on the basis of wood anatomy.⁴⁷⁰

Elm charcoal (*Ulmus sp.*) definitely occurs in one sample weighing 4.295 g and probably in a second sample in which these five fragments, weighing 0.155 g, were the only identifiable fragments. Four species of elm occur naturally in the Netherlands: the smooth elm or field elm (*Ulmus minor*), the wych elm or Scots elm (*Ulmus glabra*), the European white elm or fluttering elm (*Ulmus laevis*) and the English elm (*Ulmus procera*).⁴⁷¹ These are also indistinguishable from

each other.⁴⁷²

In one sample there is a small amount of beech wood (*Fagus sylvatica*) totalling five fragments of 0.655 g. This is an indigenous tree species and the only one of this genus in the Netherlands in the period in question.⁴⁷³

The hornbeam (*Carpinus betulus*) which, contrary to what the Dutch name (haagbeuk) suggests, is not related to the beech (called beuk in Dutch), is also native.⁴⁷⁴ This species occurs in at least two and possibly four samples with three fragments each, respectively weighing 0.29 g and 0.22 g.

After oak, alder wood is one of the most common types of wood in archaeological contexts, both in terms of frequency of occurrence and in terms of quantities. In Elsloo this type of wood is demonstrably present in

⁴⁷⁰ Schweingruber 1990, 140.

⁴⁷¹ Maes 2013, 320.

⁴⁷² Schweingruber 1990, 162.

⁴⁷³ Maes 2013, 143.

⁴⁷⁴ Maes 2013, 106.

only three samples, together yielding three fragments with a combined weight of 1.01 g. Of the alder, the black alder (*Alnus glutinosa*) and the white alder (*Alnus incana*) occur naturally in the Netherlands.⁴⁷⁵ These cannot be determined to the species level.⁴⁷⁶

For willow (*Salix* sp.), there are more than 20 native species that cannot be distinguished on the basis of the wood anatomy.⁴⁷⁷ In one sample, two fragments weighing 0.03 g and two probable fragments of this taxon are present.

Maple wood (*Acer* sp.) occurs in one sample. It is only one fragment weighing 0.235 g. Three maple species are known in the Netherlands: the common maple or sycamore maple (*Acer pseudoplatanus*), the Norway maple (*Acer platanoides*) and the field maple (*Acer campestre*). In some cases, these three species can be distinguished based on the width of the rays.⁴⁷⁸

Four samples yielded charcoal that comes from a species of the birch family (*Betulaceae*), but that could not be further identified. This concerns a total of 25 fragments weighing 3.18 g. In one sample, this taxon is dominant. Since the presence of different species of this family is plausible – and species such as alder, hazel and hornbeam are also present across different samples – it is not possible to determine these fragments more specifically at this time.

The number of fragments that could not be identified (indet.), even at the family level, is particularly high compared to ‘usual’ percentages of unidentifiable material in anthracological research. This mainly has to do with the fact that the charcoal from Elsloo is highly fragmented in most samples. In many cases, it was not possible to arrive at the minimum number of determinations of 50 fragments and certainly not the recommended number of 100 fragments. In order to get the most reliable picture possible of the species spectrum, even very small fragments were selected for analysis. As a result, however, the number of unidentifiable fragments increased. Also, the condition of the wood seems to have deteriorated in recent decades. Although charcoal does not in principle deteriorate further in quality, because it is not subject to organic or chemical decay, it is sensitive to mechanical decay: breakage, erosion and wear. This has been limited by the storage in hard (glass, tin, wooden and cardboard) containers, but there

still seems to be ‘internal’ decay. One of the most important determination characteristics in species of the birch family, for example, is the shape of the perforation plates. These are ‘simple’ or ‘scalariform (resembling a ladder)’, the number of ‘rungs’ being an important feature in the latter case. The scalariform perforation plates were broken and incomplete in practically all charcoal fragments. At best, edge fragments of this have been observed in the samples.

10.4.2 Burial pits

During the excavations at the burial ground the presence of charcoal was documented within the fill and at the bottom of a number of inhumation graves. In most graves random scatters of charcoal were found, but in several cases charcoal was present in high quantities. Sometimes these concentrations were found in dense layers in the fill, just above the pit base, as a presumed cover for the corpse, or on the floor of the pit as a ‘bed’ for the deceased.⁴⁷⁹ The charcoal analysis offered some insights into the types of wood used and can therefore shed some light on the observations made in the field.

Grave 3 (no sample)

In inhumation grave 3, considerable quantities of charcoal were found over the entire area of the pit \pm 20 cm above its base (Fig. 10.2). The grain of the charred wood ran parallel to the direction of the pit. Along the long SSW side, the charcoal strip was partly \pm 0.18 cm thick.⁴⁸⁰ Although a sample was taken, this has unfortunately been lost over time.

Grave 21 (samples M-12, M13 and M-34⁴⁸¹)

In inhumation grave 21, at 25 cm above the bottom of the pit, a charcoal layer was found diagonally across the pit.⁴⁸² Two samples were sieved from this grave. One yielded 0.555 g of residue (M-13, find nr. 714.31), the other 16.795 g (M-34, find nr. 714.32). Of these, 0.465 g and 1.08 g respectively come from the 3.15 mm fraction sieve. From the first sample (M-13) 2 fragments were analyzed. One may have come from an *Malinae*: it contains scattered porous deciduous wood with two cell wide, homogeneous rays. The other turned out to be too small for

⁴⁷⁵ Maes 2013, 92.

⁴⁷⁶ Schweingruber 1990, 74.

⁴⁷⁷ Maes 2013, 272; Schweingruber 1990, 154.

⁴⁷⁸ Schweingruber 1990, 70.

⁴⁷⁹ Modderman 1970, 69.

⁴⁸⁰ Modderman 1970, 47.

⁴⁸¹ Samples that were used for analysis are highlighted in bold.

⁴⁸² Modderman 1970, 50.



Fig. 10.2 Plan of grave 3 with the position of the charcoal layers (source: Modderman 1970, tafel 123).



Fig. 10.3 Plan of the bottom of grave 64 (source: Modderman 1970, tafel 139).

determination. The second sample (M-34) yielded slightly more material. Of the determined charcoal, thirteen fragments weighing 0.3 g come from hazel. Three ash fragments totaling 0.365 g are present and oak is represented by one fragment of 0.015 g. Two fragments with a combined weight of 0.05 grams were too small for determination. The charcoal layer consists of different kinds of species: *Malinae*, hazel, ash and oak. This rules out the possibility that the charcoal was derived from a single piece of wood which was used as a cover of some kind.

Grave 34 (sample M-05)

In the centre of the fill of inhumation grave 34 a layer of charcoal was found.⁴⁸³ The sample yielded 2.245 g of residue (M-05, find nr. 814.1), of which 0.190 g remained in the 3.15 mm sieve.

Eight fragments were selected for analysis. Of these, five fragments weighing 0.115 g come from a suspected ring-porous wood with three to six cells wide rays and spiral thickenings. The charcoal is similar to elm wood, but the transverse plane is difficult to judge because the wood easily crumbles. The taxon cannot be determined from the three fragments (0.05 g) present.

Grave 64 (samples M-28 – M-33 and M40 – M43)

The sides of grave 64 (a presumed cremation grave) were completely covered with charcoal (Fig. 10.3) as if a fire had burned within the pit.⁴⁸⁴ A large sample was taken and yielded no less than 122.530 g of residue (M-33, vnr. 786.1), of which 70.545 g from the largest sieve fraction. This sample also yielded slightly larger fragments of charcoal, so that 100 pieces could

⁴⁸³ Modderman 1970, 52.

⁴⁸⁴ Modderman 1970, 55.

be determined. Ash wood is dominant in the sample with 61 fragments weighing 14.94 g. Oak is represented by seven fragments (1.755 g), hazel by six fragments (1.435 g), alder by one fragment (0.905 g) and hornbeam by one fragment of 0.18 grams. Of the selection, seventeen fragments have been determined as coming from the birch family. Since the last three taxa mentioned above all belong to this family, it cannot be determined to which type of wood these belong. In some cases, remains of scalariform perforation plates have been observed. In these cases, therefore, it is probably hazel or alder wood. In two fragments with slightly curved annual rings, remains of the bark are present. The charcoal was too fragile to determine the last growing season. Four fragments of *Malinae* trees, weighing 0.655 g, are present in the sample. Wood from a maple (0.235 g) may also be present, but it could not be identified with certainty. In two cases, the wood could not be determined. These fragments together weigh 0.175 g.

It is clear that various kinds of wood were used but it remains uncertain if the pit was intentionally covered with charcoal and if a fire had burned within the pit, the walls of the pit had no other signs of a fire burning inside the pit.

Grave 84 (sample M-57)

In the top of the fill of inhumation grave 84 a large concentration of charcoal was discovered. A sample yielded 36.565 g of residue (M-57, find nr. 775.1), of which 0.37 g in the largest sieve fraction. On the basis of the determined charcoal, only one type of wood is present. The

48 fragments weighing 4.505 g for which the type of wood could certainly be determined as oak. In two cases, no broad rays were observed, but given the date of the burial ground, it is very unlikely that this would be chestnut instead of oak. Also, in two of the three pieces of charcoal that have been classified as 'similar to' oak, only uniseriate cells have been observed. Four fragments weighing 0.495 g could not be identified.

Grave 90 (sample M-01)

In the north-western part, ca. 25 cm above the bottom of this inhumation grave, a layer of charcoal was documented.⁴⁸⁵ The residue of the sample from this layer weighs 10.340 g (M-01, vnr. 772.2). Of these, 0.555 g comes from the 3.15 mm sieve. The sample contains four fragments of oak with a weight of 0.05 g, two fragments of ash weighing 0.03 g and one fragment hazel of 0.03 g. A fragment of 0.015 g could not be identified. It could only be established that it is of deciduous wood.

Grave 96 (samples M-18 – M-20 and M-37)

On the bottom of the inhumation grave pit a high concentration of charcoal was found (Fig. 10.4).⁴⁸⁶ Imprints of branches were clearly visible. The sieved sample selected from this context yielded 14.88 g of residue (M-37, 505.33), of which 0.1 g from the sieve with the largest mesh size (3.15 mm). The fragmentation rate contributed to the fact that only one fragment could be assigned to a taxon. This is a fragment of charcoal of the birch family weighing 0.005 g. Of the three unidentifiable fragments, two



Fig. 10.4 Plan of the bottom of grave 96 (source: Modderman 1970, tafel 154).

⁴⁸⁵ Modderman 1970, 60.

⁴⁸⁶ Modderman 1970, 61.

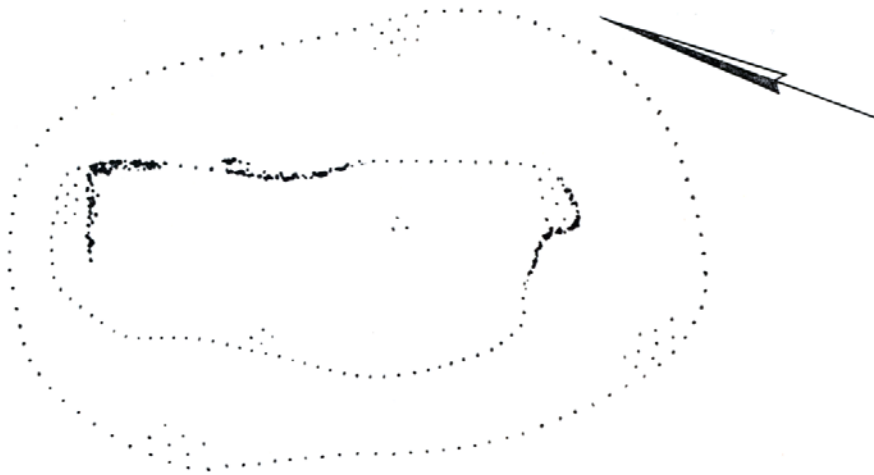


Fig. 10.5 Plan of the bottom of grave 98 (source: Modderman 1970, tafel 156).

consist of scattered porous deciduous wood, one with uniseriate, heterogeneous rays and large dotted beams in the vessels (possibly willow wood) and one with one to three cells wide rays.

Grave 98 (samples M-26, M-27, M-38 and M-39)

Two sides of the burial pit of inhumation grave 98 were covered with charcoal, as if wooden boarding had been placed in the burial pit (Fig. 10.5), of which parts had been charred.⁴⁸⁷ A sample yielded exactly 9 g of residue (M-26, find nr. 501.33). Of these, 0.375 g remained on the sieve with the largest sieve fraction. The composition of the charcoal from this grave also consists exclusively of oak with a weight of 0.185 g. This supports the idea that a boarding of some kind, made out of oak wood, was actually placed in the burial pit.

Grave 99 (sample M-25)

In the northern half of the pit of inhumation grave 99 a large concentration of charcoal was found.⁴⁸⁸ The grain of the charred wood ran parallel to the longitudinal direction of the pit. After sieving, 9.045 g of residue remained (M-25, find nr. 512.1). Of these, 0.57 g comes from the 3.15 mm sieve. Also in this sample, the charcoal

could only be determined to a family level. It comprises five fragments of the birch family weighing 0.105 g. The two fragments that could not be identified consist of 0.1 g of gnarled wood. Where there are knots in the wood, the structure of the wood is often so different that the anatomical characteristics cannot be determined.

Grave 100 (samples M-21 and M-22)

In inhumation grave 100, charcoal was also found at the bottom of the pit. Close to the pit floor, traces reminiscent of bundles of wood were observed.⁴⁸⁹ The residue from this sample weighs 6.265 g (M-22, vnr. 504.33). Unfortunately, the charcoal is so fragmented that the 3.15 mm sieve did not yield any material.

Grave 102 (sample M-23)

The fill of grave 102 contained a layer of charcoal. The sample yielded 16.425 grams of residue (M-23, no. 502.30). On the sieve with a mesh size of 3.15 mm, 0.065 g of charcoal remained. The five determinable fragments consist of oak with a weight of 0.035 g.

⁴⁸⁷ Modderman 1970, 62.

⁴⁸⁸ Modderman 1970, 62.

⁴⁸⁹ Modderman 1970, 62.

Table 10.3 Species and samples per context.

No.	M-	NR det.	Weight. Det.	Quercus sp. (NR)	Quercus sp. (g)	cf. Quercus sp. (NR)	cf. Quercus sp. (g)	Fraxinus excelsior (NR)	Fraxinus excelsior (g)	cf. Fraxinus excelsior (NR)	cf. Fraxinus excelsior (g)	Corylus avellana (NR)	Corylus avellana (g)	cf. Corylus avellana (NR)	cf. Corylus avellana (g)	Malinae, type M, P, C (NR)	Malinae, type M, P, C (g)	Malinae (NR)	Malinae (g)	cf. Malinae (NR)	cf. Malinae (g)	Prunus sp. (NR)	Prunus sp. (g)
1	33	100	23.290	7	1.755			61	14.940			6	1.435			4	0.655						
2	13	2	0.440																	1	0.415		
3	34	19	0.730	1	0.015			3	0.365			13	0.300										
4	25	7	0.205																				
5	36	27	1.180					5	0.130									8	0.410	1	0.045		
6	24	8	0.140																				
7	0	47	3.060									4	0.360					6	1.125	5	0.290		
8	16	11	0.625	10	0.595																		
9	26	7	0.185	7	0.185																		
10	35	53	2.285	45	2.090			2	0.035														
11	4	15	0.660	9	0.310							2	0.180										
12	23	5	0.035	5	0.035																		
13	37	4	0.025																				
14	57	55	5.290	48	4.505	3	0.290																
15	14	100	5.205	100	5.205																		
16	15	48	8.070	6	1.940							30	5.235										
17	17	4	0.095																				
18	22	0	0.000																				
19	2	11	0.580																				
20	45	45	2.705	39	2.240			5	0.390														
21	47	5	0.210					4	0.150														
22	51	0	0.000																				
23	1	8	0.125	4	0.050			2	0.030			1	0.030										
24	9	30	5.300															30	5.300				
25	11	41	3.025	3	0.390							3	0.060					3	1.290				
26	46	12	0.365					9	0.265														
27	3	42	3.815	25	2.480	1	0.055															2	0.045
28	6	6	0.210									2	0.085	2	0.030								
29	52	6	0.160					4	0.135														
30	56	3	0.120							3	0.120												
31	5	8	0.165																				
32	44	8	0.860									3	0.035										
33	48	10	0.255					3	0.060														
34	49	6	0.095					1	0.020	1	0.010	2	0.035				1	0.015					
35	7	33	1.380																				
36	60	100	11.940	63	6.495																		
Totals		886	82.830	372	28.290	4	0.345	99	16.520	4	0.130	66	7.755	2	0.030	4	0.655	48	8.140	7	0.750	2	0.045
NR mnstr.		2		15		2		11		2		10		1		1		5		3		1	
NR dom.		2		11		0		4		1		4		0		0		1		1		0	

10.5 Discussion and conclusion

During the archaeological research of the settlement and burial site of Elsloo-Koolweg, a large number of samples were collected. Of these, 36 were selected for anthracological research. The charcoal in these samples is highly fragmented. Loess and iron corrosion penetrated deep into the vessels of the wood (Fig. 10.6). Furthermore, it is noticeable that certain cell structures, such as the perforation plates in wood veins, are fragmented in almost all cases. On the other hand, spiral thickenings in the wood vessels are well preserved, while in the case of uncharred wood they are often affected over the centuries. The pits, small openings in vessels, are also clearly visible in most cases. The shape and dimensions of the rays were also easy to determine in almost all cases.

Charred remains of at least ten different types of wood have been found at the site. Wood of the birch family is not counted because it can come from an alder, as well as from birch, hazel or hornbeam, and these species have all been found on the site. However, there are 'at least' ten and possibly eleven species, as the taxa determined up to the genus level can include different species. The taxa identified are: oak (*Quercus* sp.; 42.5%), ash (*Fraxinus excelsior*; 11.7%), hazel (*Corylus avellana*; 7.7%), *Malinae* (6.7%), cherry (*Prunus* sp.; 3.9%), elm (*Ulmus* sp.; 3.6%), beech (*Fagus sylvatica*; 0.6%), hornbeam (*Carpinus betulus*; 0.6%), alder (*Alnus* sp.; 0.3%), willow (*Salix* sp.; 0.4%) and possibly maple (*Acer* sp.; 0.1%). The rest of the material consists of wood of the birch family (*Betulaceae*; 2.8%) and unidentified fragments (indet.; 19.1%). As far as can be established on the basis of the identified fragments, only native species are present at Elsloo. The majority of the charcoal analysed

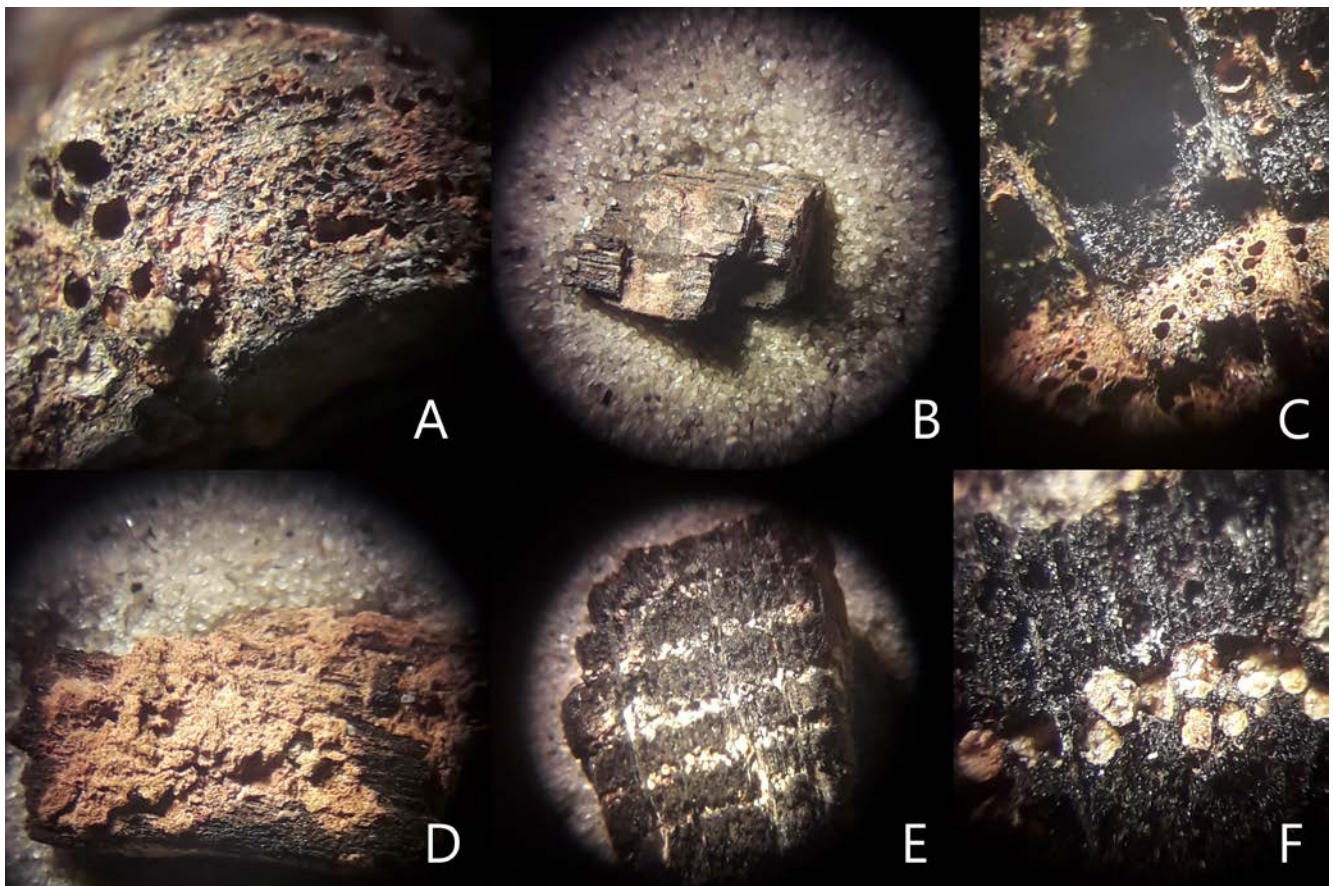


Fig. 10.6 Some examples of charcoal with traces of iron corrosion (A to D), lime and loess that penetrated deep into the veins of the wood (E and F). (photo: J. van der Laan).

consists of logs. The proportion of branch wood in the samples is very low. It should be noted, however, that in the smallest fragments the curvature of the annual rings cannot be determined.

The relatively low number of fragments that could be identified per context indicates that no far-reaching conclusions can be drawn about the interrelationships of taxa within a single sample. Nevertheless, the anthracological examination at presence/absence level certainly provides new information concerning the site. Only 3 of the 36 samples analysed had sufficient material to reach the desired 100 determinations (M-14, M-33 and M-60). The first two come from cremation graves (graves 64 and 95), while the latter comes from an inhumation grave (grave 106). On average, the amount of charcoal in the cremation graves is also significantly higher than in the inhumation graves (respectively on average about 50 versus approx. fifteen fragments per sample). The average number of fragments from samples from the settlement is also slightly higher at about 25 pieces.

What is particularly striking is the enormous diversity of wood species in the different burial contexts and in the settlement. The seven cremation graves contain an average of 2.4 types of wood per sample, ranging from one to no less than six different taxa. The inhumation graves contain on average 1.5 types of wood per sample, ranging from one to a maximum of three species. In the other samples, the average is 1.8 species per sample: from one to four.

In five out of seven cases, oak was used in the cremation graves during the combustion and in four of the seven cases ash wood, which suggests that a selection was made regarding the choice of wood for the pyre. Oak and ash are both types of wood with good fire characteristics. They can reach high temperatures and burn for a relatively long time, which is necessary for burning a body. They are supplemented with species that were available in the immediate vicinity, such as hazel, *Malinae*, hornbeam and alder. The charcoal from the inhumation graves is probably material that comes from activities not related to the burial and/or from settlement noise, although the concentration of charcoal in some samples is quite high.

Some inhumation graves were reported to contain layers of charcoal at the bottom of the burial pit or about 20-30 cm above the pit floor, as if they were covering something. Some pit sides were also covered with charcoal, an indication that the pits were boarded. Most layers consist of various wood species, which indicates that the charcoal does not derive from a single piece or single species of wood. The presumed boarding in grave 98 is solely made out of oak, supporting the idea of a boarding. The presence of charcoal in inhumation graves, even in large concentrations, therefore remains an interesting topic. Clearly, the dense charcoal layers in the pit fills indicate various depositions when closing the burial pit and cannot be explained as remainders of charcoal scattered around the surface of the burial ground. Charcoal layers on the pit floor suggest intentional deposition during the burial ritual. The assumption that twigs or branches were used as part of the flooring could not be upheld as most of the charcoal derives from logs.

A final remark can be made about the composition of the total charcoal assemblage represented within the graves and in the long pits near houses in the settlement. During the Atlantic Period the natural vegetation associated with the maritime climate was a deciduous forest filled with lime, elm, ash, oak, alder and hazel. Together they would form a mixed oak forest; *Quercetum mixtum*.⁴⁹⁰ The most dominant trees were lime, oak, elm and ash. After the first farmers settled at (the edges of) the loess-covered plateaus, pollen and charcoal analysis show that their clearings and settlements had an impact on the vegetation. First elm declined, followed by the decline of lime, while ash and oak increased.⁴⁹¹ Together with the increase of oak this evokes the image of a gradually more open forest. The absence of lime within the assemblage for both settlement and burial ground is remarkable, although pollen analysis documents its presence.⁴⁹² The absence of lime is also noted at other settlements and presumably related to the fact that lime wood is not good firewood and therefore played no role in the burial ritual; at least not as wood for the pyre.⁴⁹³

⁴⁹⁰ Bakels 2009, 89.

⁴⁹¹ Bakels 2009, 89.

⁴⁹² Bakels 2011.

⁴⁹³ Bakels 2009, 94.

11.1 Introduction

The use of food offerings within the burial ritual is known from various sites with bone preservation where animal bones were found in burial pits.⁴⁹⁴ Moreover, many burial pits contain ceramic and wooden vessels in an upright position. The question is whether these vessels were used as a container to store food as part of the burial ritual or (once) served a different purpose. Organic matter rarely survives (macroscopically) in acidic conditions and in order to investigate if traces are still present, we therefore used lipid residue and pollen analysis on the ceramic vessels and possible remains (i.e. food crusts) within these vessels.

While stylistic and typological analyses of pottery are crucial for understanding diachronic patterns as well as social relations, the primary function of pottery is linked with preparation and storage of food, and this cannot be investigated through the sole applications of these methods. During the processing of commodities in pottery, lipids (i.e. fats, waxes and resins) from foodstuffs are transferred to the clay matrix. These lipids can be preserved through archaeological timescales, extracted and characterised using state-of-the-art analytical methods, to gain information on ancient cooking practices, but also past farming crops and animal husbandry, ritual behaviour and exotic trade.⁴⁹⁵

Archaeological degraded animal fats are identified using their molecular composition and fat types ascertained using the isotopic composition of the main fatty acids detected in those residues ($C_{16:0}$ and $C_{18:0}$). Ruminant and non-ruminant fats, as well as dairy and carcass fats are distinguishable based on the $\delta^{13}C$ values of their fatty acids.⁴⁹⁶ Lipid residue analyses have provided crucial insights into the early exploitation of milk and dairy products⁴⁹⁷ with the oldest milk residue being detected in 7th millennium BC sherds from Anatolia, but also the exploitation of aquatic resources⁴⁹⁸ (e.g.) and bee products.⁴⁹⁹ The earliest evidence for milk use from lipid residues in the Netherlands is known from the LBK settlements of Geleen-Janskamperveld, Maastricht-Cannerberg, Maastricht-Klinkers and Stein-Heidekampweg.⁵⁰⁰ Lipids extracted from multiple vessels from these sites yielded many animal fats (ruminant and non-ruminant fats as well as

ruminant dairy fats), beeswax, and aquatic fats; demonstrating the use of a wide range of terrestrial and aquatic resources at the sites.⁵⁰¹ In recent years, a novel method has been developed at the University of Bristol and the Bristol Research AMS (BRAMS) facility enabling the direct ^{14}C dating of lipids preserved in pottery sherds.⁵⁰² This method is proving crucial to obtain accurate and precise ^{14}C dates to refine chronologies at sites where other dateable material is lacking, but also to verify typochronologies or directly date specific foodstuffs.

11.2 Lipid analysis

M. Roffet-Salque, C. Maule and I.M. van Wijk

11.2.1 Aims of the study

The analyses of lipids from pottery sherds from the Elsloo cemetery provide the opportunity to investigate the preservation of such organic residues at the site, determine whether it is possible to trace diverse funerary practices through selective use and deposition of pottery within graves, and finally, select appropriate residues for ^{14}C dating.

A total of 38 sherds from the cemetery of Elsloo-Koolweg were selected from 23 different features. Lipid residue analyses were carried out by the Organic Geochemistry Unit, School of Chemistry, University of Bristol, Bristol, UK to (1) assess the preservation of lipids, (2) investigate vessel use and (3) detect sherds with archaeological extracts (animal fats) suitable for ^{14}C dating. A total of 14 soil samples were also provided as part of this study, of which four were analysed. Most samples originated from soil within ceramic containers while two samples were fatty layers sampled within the grave. We hypothesised that the fatty layers (§6.5.2) contain human-derived lipids that could also be directly ^{14}C -dated.⁵⁰³

11.2.2 Methods

Pottery vessels

A total of 38 sherds from Elsloo-Koolweg were analysed for lipid residues. Table 11.1 lists the

⁴⁹⁴ Arbogast 2013.

⁴⁹⁵ Evershed 2008; Roffet-Salque *et al.* 2017.

⁴⁹⁶ Copley *et al.* 2003.

⁴⁹⁷ Evershed *et al.* 2008; Salque *et al.* 2013; Debono Spiteri *et al.* 2016.

⁴⁹⁸ Craig *et al.* 2011; Cramp *et al.* 2014.

⁴⁹⁹ Roffet-Salque *et al.* 2015.

⁵⁰⁰ Casanova *et al.* 2020; Casanova *et al.* 2021.

⁵⁰¹ Roffet-Salque & Van Wijk in prep.

⁵⁰² Casanova *et al.* 2020.

⁵⁰³ Modderman 1970, 69-70.

Table 11.1 Sherd and soil sample details and results for the site of Elsloo Koolweg.

Sample name	Object Number	Context	Lipid concentration (µg/g)	"Interpretation (molecular composition) cont. is DBT plasticiser unless otherwise stated."	δ ¹³ C _{16:0} (‰)	δ ¹³ C _{18:0} (‰)	Δ ¹³ C (‰)
ELS7301	1.83	501.11	669	cont.			
ELS7302	1.85	509.31	908	Animal fats + cont.	nd	nd	nd
ELS7303	1.84	509.32	1151	cont.			
ELS7304	1.86	509.32	115	cont. + animal fats (traces)			
ELS7305	1.87	509.32	90	cont.			
ELS7306	1.74	513.31	3679	Animal fats	-28.0	-30.1	-2.1
ELS7307	1.82	515.1	791	cont.			
ELS7308	1.81	515.31	321	cont.			
ELS7309	1.66	519.2	775	cont.			
ELS7310	1.65	519.31	281	cont. + animal fats (traces)			
ELS7311	1.52	704.1	291	cont. + animal fats (traces)			
ELS7312	1.54	704.3	160	cont.			
ELS7313	1.67	714.34	208	cont.			
ELS7314	1.68	714.36	311	cont.			
ELS7315	1.69	714.38	297	cont. + animal fats (traces)			
ELS7316	1.70	714.38	470	cont. + animal fats (traces)			
ELS7317	1.44	725.12	4288	cont.?			
ELS7318	1.46	725.12C	4235	cont.?			
ELS7319	1.45	725.12D	726	cont.?			
ELS7320	1.48	736.33	176	cont. + animal fats (traces)			
ELS7321	1.51	736.34	1555	cont. + animal fats (traces)			
ELS7322	1.62	744.11	913	Animal fats + cont.	-28.9	-32.3	-3.4
ELS7323	1.60	744.12	41	cont. + animal fats (traces)			
ELS7324	1.31	754.13	783	Animal fats + cont.	nd	nd	nd
ELS7325	1.38	757.17	676	cont. + animal fats (traces)			
ELS7326	1.01	765.23	9763	Animal fats	-27.8	-29.3	-1.5
ELS7327	1.10	767.33	2725	cont.			
ELS7328	1.06	769.2	162	cont. + animal fats (traces)			
ELS7329	1.12	772.4	1178	cont.			
ELS7330	1.57	781.19	96	cont. + animal fats	nd	nd	nd
ELS7331	1.56	781.3	106	cont. + animal fats			
ELS7332	1.90	798.3	187	cont.			
ELS7333	1.101	807.4	714	Animal fats + cont.	-28.3	-30.6	-2.3
ELS7334	1.99	809.36	816	cont.			
ELS7335	1.111	820.5	58	cont. + animal fats (traces)			
ELS7336	1.109	822.11	206	cont.			
ELS7337	1.110	828.31	6084	Animal fats + cont.	-30.2	-33.1	-2.9
ELS7338	1.108	834.11	45	cont.			
ELS7339		502	112	cont. (erucic acid + erucylamide)			
		503	not analysed				
		505	not analysed				
ELS7378		506	1667	cont. (DBT with erucic acid + erucylamide)			
		508	not analysed				
		509	not analysed				

Sample name	Object Number	Context	Lipid concentration (µg/g)	"Interpretation (molecular composition) cont. is DBT plasticiser unless otherwise stated."	δ ¹³ C _{16:0} (‰)	δ ¹³ C _{18:0} (‰)	Δ ¹³ C (‰)
		510	not analysed				
		513	not analysed				
ELS7340		515	515	cont. + animal fats (traces)			
		517	not analysed				
		518	not analysed				
		767	not analysed				
		776	not analysed				
ELS7379		807	1549	cont. + fatty acids and terpenes (plant matter)			
ELS7380			4756	Rosin			
ELS7381			1904	Modern animal fat traces			
ELS7382			524	N/A			
ELS7383			1	N/A			
ELS7384			3494	cont. (erucic acid + erucylamide)			
ELS7385			146	cont. (erucic acid + erucylamide)			

Key: cont., modern contamination; nd, not determined.

pottery sample details and the results. When possible, rim and upper body sherds were selected as analyses of replica cooking and ethnographic vessels used to process foodstuffs showed a preferential absorption of lipids near the rim.⁵⁰⁴ Sherds which showed signs of possible food crusts were also selected for analysis. Vessels that were on permanent display in a museum were left out of the selection, as were complete vessels.⁵⁰⁵

The selection comprises sherds from 23 different graves, of which three were cremation graves. The sherds were found in either the top, fill or bottom of the various burial pits (Table 11.2). Fifteen sherds can be attributed to undecorated coarse ware and 23 sherds belong to decorated fine wares. A broad coverage regarding grave type, vessel position was attained.

Most samples were taken from (nearly) complete but fragmented vessels (19 vessels). A number of sherds showed signs of weathering or secondary burning. Twenty-three vessels (fine ware) were decorated, of which seventeen with a single-dented spatula, two with a two-dented spatula and another two with a four-dented spatula. These last two can be dated to the youngest phase. The decoration on the wall is executed either with use of the stab-drag-technique (*Furchenstich*), a combination of lines and dots, or the use of hatches. All these vessels had rim decoration. Fifteen samples were taken from undecorated coarse vessels, some of them belonging to complete vessels (eight vessels). Most of them were round bottomed with a

slight 's' profile and a high rim (cat.3). Lugs were present on most of these vessels (58.3).

Soil samples

Out of the 14 samples provided, four samples were analysed in this study (ELS7339: grave 102, ELS7340: grave 94, ELS7378: grave 92, and ELS7379: grave 31). The samples from grave 94 (ELS7340) and grave 102 (ELS7339) were taken from a 'fatty' layer from the bottom of the burial pit. These layers are believed to be caused by water accumulation and could be an indication that these graves were left open for a longer period of time.⁵⁰⁶ But other origins have to be considered as well. The sample from grave 94 for instance was taken right next to the right armpit: this could be an indication that something was deposited there or originates from the decomposing corpse. The samples from grave 31 and 92 were taken from the soil which was still present within decorated ceramic vessels. The samples were taken to see if any organic substance were present and preserved within these vessels. The sample details and results are listed in Table 11.1.

Other materials

After preliminary analyses of sherds and soils, samples of paper bag (from the 1958 excavations), plastic bag (used for shipping to the Organic Geochemistry Unit laboratory in Bristol) and glue (to re-fit sherds) were added. A soil sample, a sherd and adhering soil, all coming from the 2006 excavations⁵⁰⁷ at the Elsloo settlement (100 m away from the cemetery), were also analysed.

⁵⁰⁴ Charters *et al.* 1993.

⁵⁰⁵ At the request of the museum, these vessels were left intact to keep their appearance.

⁵⁰⁶ Modderman 1970, 69.

⁵⁰⁷ Van Wijk & Porreij-Lyklema 2015.

Table 11.2 Selection of pottery.

Grave	type	location finds	decoration	coarse / fine ware	Modderman date	remarks
1	inhumation	fill	undecorated	coarse	Ic-IId	
1	inhumation	fill	decorated	fine	Ic-IId	weathered
5	inhumation	bottom pit	undecorated	coarse	Ic	complete vessel
5	inhumation		undecorated	fine	Ic	
5	inhumation	bottom pit	decorated	fine	Ic	complete vessel
5	inhumation	top pit	decorated	fine	Ic	
14	inhumation	bottom pit	decorated	fine	Ic	complete vessel
21	inhumation	fill	decorated	fine	Ic-IId	
21	inhumation	fill	decorated	fine	Ic-IId	
21	inhumation	top pit	decorated	fine	Ic-IId	complete vessel, weathered/secondary burn?
21	inhumation	fill	decorated	fine	Ic-IId	
24	inhumation	bottom pit	undecorated	coarse		complete vessel
25	inhumation	bottom pit	undecorated	coarse		weathered/secondary burn?
31	inhumation	bottom pit	undecorated	fine		complete vessel
41	inhumation	bottom pit	decorated	coarse	Ic-IId	complete vessel
42	inhumation	bottom pit	undecorated	fine		complete vessel
56	inhumation	bottom pit	decorated	fine	Id-IIb	complete vessel
65	inhumation	bottom pit	undecorated	coarse		complete vessel, weathered/secondary burn?
71	cremation	fill	undecorated	coarse	Ila-IIb	
71	cremation	fill	decorated	fine	Ila-IIb	
73	cremation	fill	undecorated		I Ib-IIc	
73	cremation	fill	decorated	fine	I Ib-IIc	with manganese
73	cremation	fill	decorated	fine	I Ib-IIc	
81	inhumation	fill	undecorated	coarse		complete vessel
82	inhumation	bottom pit	decorated	fine	Ila-IIb	complete vessel
87	inhumation	bottom pit	undecorated	coarse	I Ic-IIId	complete vessel
90	inhumation	bottom pit	decorated	fine	I Id	complete vessel
94	inhumation	top pit	undecorated	coarse		
94	inhumation	top pit	decorated	fine		with manganese
98	inhumation	top pit	decorated	fine		weathered
104	inhumation	bottom pit	undecorated	coarse	I Ib	
104	inhumation	bottom pit	decorated	fine	I Ib	
109	inhumation		undecorated	coarse		complete vessel, weathered/secondary burn?
112	inhumation	bottom pit	decorated	fine	I Ib	complete vessel
112	inhumation	bottom pit	decorated	fine	I Ib	complete vessel
112	inhumation	bottom pit	decorated	fine	I Ib	complete vessel, weathered/secondary burn?
112	inhumation	bottom pit	decorated	fine	I Ib	
114	cremation	fill	decorated	fine	Id-IIb	complete vessel

	thickness (mm)	shape	bottom	silt	grog	sand	organic	finishing	lugs	spatula	structure	motif	incrustation	lipid sample nr	Modderman 1970 tables
	7	open	round		2			smooth	none					ELS7322	
	4	open				1		smooth		1 dented	recti	indet		ELS7323	
	6	high rim	round		2	1		coarse	band					ELS7330	127-11
	6	open		1		1		smooth						ELS7312	
	4	low rim	round	1				smooth	none	1 dented	curvi	spiral		ELS7331	126-2
	4					1		smooth	knobble	1 dented	curvi	indet		ELS7311	126-8+1
	5	open	round		1	1		smooth		1 dented	curvi	spiral		ELS7325	128-1
	4	open		1	1			smooth	knobble	1 dented	recti	spiral		ELS7316	131-9
	5	open	round	1				smooth	none	1 dented	curvi	indet		ELS7315	131-8
	4	open	round			1		eroded	none	1 dented	curvi	indet		ELS7313	130-6
	4	open	round	1				smooth	none	1 dented	recti	indet		ELS7314	131-7
	8	high rim	round	1	1	1		smooth	knobble					ELS7337	132-1
	6	open		1	1			eroded	knobble					ELS7338	133-1
	6	high rim	round		2			polished	band					ELS7333	133-1
	3	open	round		1	1		smooth	knobble	1 dented	curvi	spiral		ELS7336	135-1
	4	open	round	1	2			smooth	band					ELS7324	135-1
	4	low rim	round		1	1		polished	none	2 dented	curvi	wave		ELS7334	137-1
	6	open	round			3	2	coarse	vertical					ELS7332	140-1
	6	open			2	1		coarse	on rim					ELS7321	143-1
	5	open		1				smooth		1 dented	indet	indet		ELS7320	143-8
	4			1					knobble					ELS7318	145-4
	7			1				smooth		1 dented	recti	wave		ELS7319	145-3
	4	low rim				1		smooth		2 dented	curvi	indet		ELS7317	145-2
	7	high rim	flat	1	2			smooth	none					ELS7327	146-1
	4	open	round	1		1	1	smooth	knobble	1 dented	recti	spiral	bone	ELS7328	146-1
	8	open	round		2	1		smooth	on rim	none				ELS7326	148-2
	4	low rim	round	1				polished	none	4 dented	curvi	spiral		ELS7329	152-1
	6	open			2	1		coarse	none					ELS7307	
	3	low rim		1				smooth	none	indet	indet	indet		ELS7308	154-1
	4	open	round	1				smooth		indet	indet	indet		ELS7301	156-1
	4	open			2	1		smooth	on rim					ELS7309	158-2
	4	open		1				smooth		1 dented	recti	wave		ELS7310	158-1
	4	high rim	flat		1	1		coarse	vertical					ELS7306	162-1
	4	low rim	round	1				smooth	none	1 dented	curvi	wave		ELS7304	164-3
	4	high rim	round	1				smooth	vertical	1 dented	curvi	wave		ELS7302	164-1
	5	low rim	round	1				smooth	vertical	1 dented	curvi	wave		ELS7305	164-2
	4	low rim		1				smooth	none	4 dented	indet	indet		ELS7303	
	5	open		1				smooth	none	1 dented	curvi	indet		ELS7335	

Solvent extraction of lipid residues

Lipid residue analyses and interpretations were based on established protocols.⁵⁰⁸ Briefly, analyses proceeded as follows: approximately 1 to 2 g ceramic fabric samples were taken and their surfaces cleaned using a modelling drill to remove any exogenous lipids (e.g. soil or finger lipids due to handling). The samples were then ground to a fine powder in a glass mortar using a pestle. For the samples of the paper and plastic bag, solvent-cleaned scissors were used to cut ca. 3 mm² samples (totalling 139 mg for the paper bag and 45 mg for the plastic bag). The glue sample (23 mg) was removed from sherd ELS7383 using a solvent-cleaned scalpel. The powdered sherd (or 1–3 g of soil sample or other samples) was transferred to a glass culture tube and an internal standard was added for quantification (*n*-tetratriacontane, 20 µg) alongside an acidified methanol solution (H₂SO₄/MeOH, 4% v/v, 5 mL, 70 °C, 1 h). The lipids were then extracted from the aqueous phase with hexane (4 x 3 mL). The solvent was evaporated under a gentle stream of nitrogen to obtain the total lipid extract (TLE). Aliquots of the TLE (generally one quarter aliquots) were trimethylsilylated using *N,O*-bis(trimethylsilyl)

trifluoroacetamide containing 1 percent trimethylsilyl chloride (20 µL, 70 °C, 1 h) and re-dissolved into hexane for analysis by gas chromatography (GC).

Combined GC/MS analyses were also performed on trimethylsilylated aliquots of the lipid extracts enabling the elucidation of structures of components not identifiable on the basis of GC retention time alone. The samples where animal fats were detected were submitted to GC-combustion-isotope ratio mass spectrometry (GC-C-IRMS) in order to distinguish non-ruminant from ruminant fats, and dairy from adipose fats.⁵⁰⁹ The detection of potential aquatic biomarkers (ω -(*o*-alkylphenyl)alkanoic acids (APAAs) and isoprenoid fatty acids) was achieved using GC-MS operated in selected ion monitoring (SIM) and full-scan (FS) mode using a polar capillary column.⁵¹⁰

11.2.3 Results and discussion

Soil samples

A total of three of the four analysed soil samples from Elsloo were dominated by modern

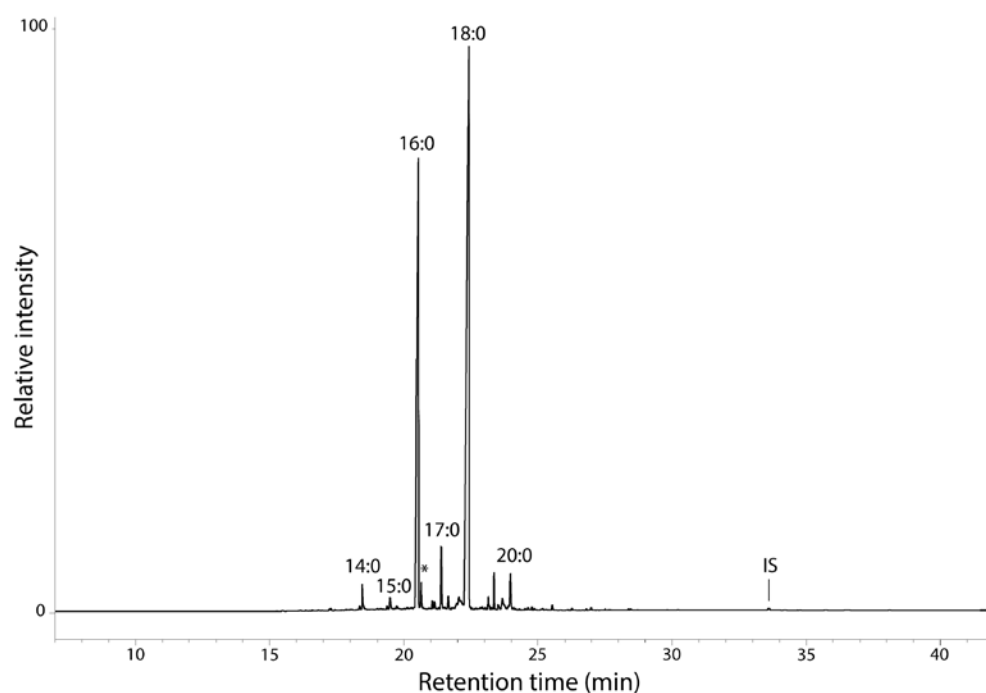


Fig. 11.1 Partial gas chromatogram of lipid extract from ELS7326 characteristic of animal fats. Key: n:o – free fatty acids with n carbon atoms and no unsaturation; IS – internal standard; * – plasticiser (dibutyl phthalate).

⁵⁰⁸ Evershed *et al.* 1990; Correa-Ascencio *et al.* 2014.

⁵⁰⁹ Copley *et al.* 2003.

⁵¹⁰ Cramp *et al.* 2014 for a review.

contamination (mainly dibutyl phthalate, commonly used as a plasticiser), with one sample (ELS7379) containing fatty acids and terpenes possibly indicative of plant matter.

Sherd samples

The lipid assemblages from 28/38 sherds (74%) were dominated by plasticisers (mainly dibutyl phthalate) and *n*-alkanes and interpreted as modern contamination. Of those, twelve sherds also contained low abundance of C_{16:0} and C_{18:0} fatty acids that could be interpreted as animal fats. However, due to the predominance of modern contamination in the extracts, the type of animal fats could not be determined and was not further investigated. Extracts from three sherds (ELS7317 to 7319; all from context 725.12) presented an unusual lipid distribution that is likely linked to modern contamination. Further analyses were carried out on potential sources of contamination and are presented below.

A total of seven sherds (18%) were dominated by C_{16:0} (palmitic) and C_{18:0} (stearic) fatty acids and interpreted as archaeological animal fats (Fig. 11.1). The main C_{16:0} and C_{18:0} fatty acids were accompanied by odd-carbon number fatty acids (C_{17:0}), biomarkers of bacterial populations from the rumen and characteristic from ruminant fats.⁵¹¹ Concentration of lipids in those sherds range between 0.7 and 9.8 mg per g of sherd (mean: 3.3 mg g⁻¹). These lipid concentrations are extremely high. Five of those samples do also contain low abundance of plasticisers (mainly dibutyl phthalate) indicative of modern contamination. A total of two samples (ELS7306 and ELS7326) do not contain any traces of modern contamination and the concentration of lipids in the sherds is 3.7 and 16.5 mg.

The δ¹³C values of the individual *n*-alkanoic acids, C_{16:0} and C_{18:0} acids were determined by GC-C-IRMS in order to identify the sources of the animal fats extracted from five of those sherds (Fig. 11.2). The δ¹³C values of C_{16:0} and C_{18:0} fatty acids are ranging from -30.2 to -28.0‰ and -33.1 to -29.3‰, respectively. Comparison of the δ¹³C values obtained from the sherds to the reference fats from animals raised on a pure C₃ diet⁵¹² shows the values of archaeological fats to be consistent with pure animal fats or mixtures of animal fats from animals raised on a C₃ diet (Fig. 11.2a). Δ¹³C (= δ¹³C_{18:0} - δ¹³C_{16:0}) values range between -3.4 and -1.5‰. The δ¹³C and Δ¹³C

values of animal fats are largely consistent with ruminant fats (dairy or adipose) or mixtures between ruminant adipose fats and non-ruminant adipose fats (Fig. 11.2b).

A total of eight extracts (including six identified as arising from animal fats) were screened for aquatic biomarkers. No APAAs were detected in the extracts. A total of five extracts possibly contained traces of 4,8,12-trimethyltridecanoic acid (TMTD) that could be indicative of aquatic resource processing.

Investigating the source of contamination in the sherd and soil samples

Sherds and soil samples (from early excavations) both contained similar contamination, dominated by dibutyl phthalate which is commonly used as a plasticiser. In order to identify the potential source of contamination, a paper bag (in which the samples were stored following excavation in 1958), a plastic bag (in which the sherds and soil samples have been stored for shipping from Leiden to Bristol), and glue (used for refitting potsherds) were analysed. A sherd excavated in 2006 in the Elsloo settlement, ca. 100 m south of the cemetery, and two soil samples (soil sample and soil adhering to the sherd) were also analysed to investigate whether contamination (from early excavations) was linked to pre- or post-excavation processes. All sample details are listed in Table 11.1.

The lipid extract from the **paper bag** contained dehydroabietic acid (DHA), abietic acid (AA) and pimaric acid interpreted to be resin used to treat the paper bag. Lipid extract from the **plastic bag** was dominated by C_{16:0} and C_{18:0} fatty acids alongside alcohols, unsaturated fatty acids and cholesterol; these substances likely arise from modern animal (human) fats contaminating the bag through handling. The extraction of **glue** (from sherd sample ELS7382) did not yield appreciable lipids. None of the bags nor glue seem thus to be the source of the dibutyl phthalate contamination in the Elsloo sherds.

Analysis of the settlement **sherd** (2006 excavations) did not yield any lipids, including dibutyl phthalate that was absent from the lipid extract. Furthermore, samples ELS7384 and ELS7385 representing soil from the Elsloo settlement (100 m away from the cemetery) were dominated by erucic acid and erucamide,

⁵¹¹ Keeney, Katz & Allison 1962.

⁵¹² Copley et al. 2003.

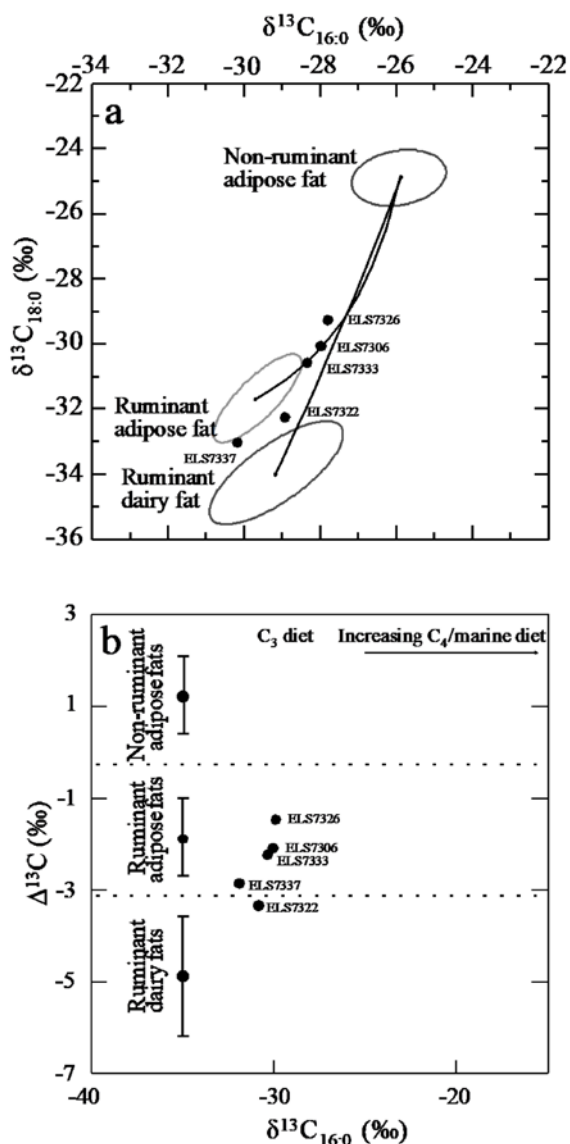


Fig. 11.2 (a) $\delta^{13}C$ values for the $C_{16:0}$ and $C_{18:0}$ fatty acids prepared from sherds from Elsloo Koolweg. The three fields correspond to the $P = 0.684$ confidence ellipses for animals raised on a strict C_3 diet in Britain (Copley *et al.* 2003). The $\delta^{13}C$ values obtained for the modern reference fats were adjusted for post-Industrial Revolution effects of fossil fuel burning by the addition of 1.2‰ (Friedli *et al.* 1986).

(b) Difference in the $\delta^{13}C$ values of the $C_{18:0}$ and $C_{16:0}$ fatty acids ($\Delta^{13}C = \delta^{13}C_{18:0} - \delta^{13}C_{16:0}$) obtained for the same archaeological fats. The ranges represent the mean ± 1 standard deviation of the $\Delta^{13}C$ values for the global database comprising modern animal fats from different locations including: Britain (pure C_3 environment; Copley *et al.* 2003), Kazakhstan (Outram *et al.* 2009), and Kenya and Libya (Dunne *et al.* 2012). Analytical precision is $\pm 0.3\text{‰}$.

likely to be modern contamination. Crucially, none of the sherds/soil from the settlement (2006 excavations) contained the dibutyl phthalate identified as modern contamination in the sherds and soil samples from the Elsloo cemetery. We thus hypothesise that the contamination in the Elsloo sherds (early excavations) is related to post-excavation, possibly as a result of storage in a facility where chemicals were used for the preservation of dead animals.

11.2.4 Conclusions

The analyses of 38 sherds from the site of Elsloo-Koolweg have demonstrated that lipids can be successfully extracted from the sherds (recovery rate: 18%). However, the recovery rate is low, as lipid extracts are dominated by modern contamination. Three of the four soil samples analysed in this study were also heavily contaminated by plasticisers, the other contained plant biomarkers. By analysing some potential sources of modern contamination, it is hypothesised that the contamination in the sherds originated during post-excavation.

The determination of fat types using isotopic analyses provided information regarding pottery use at the cemetery. The presence of animal fats in the ceramics ($n = 7$) at high concentration suggest that pottery was used to process foodstuffs extensively before it was deposited in the graves. In the absence of bone remains at the site, isotopic analyses on animal fats extracted from the pottery sherds provide information about the type of animals that were exploited (both ruminants: cattle, sheep, goats; and non-ruminants: pigs). No strong evidence for aquatic resource processing were detected in the extracts.

Two extracts identified as arising from pure animal fats (ELS7306: 174, 513.31 and ELS7326: 101, 765.23) would be suitable for the direct radiocarbon dating of their lipids using AMS at the Bristol Research AMS (BRAMS) facility.⁵¹³ There is no evidence for aquatic-derived animal fats in those two sherds (although there might be very little evidence for other sherds), and thus the ^{14}C date should reflect a purely terrestrial signal (no freshwater or marine reservoir effect). We are currently planning this ^{14}C dating work at

⁵¹³ Casanova *et al.* 2017, 2018.

the BRAMS facility (University of Bristol).

Despite the contamination present in most samples, as many as twenty samples contained (traces of) animal fats. Fourteen of these samples arise from sherds belonging to decorated fine-ware vessels (61% of all sampled fine ware) and six from sherds of undecorated coarse vessels (40% of all sampled coarse ware). This suggests that most vessels (53%), decorated or undecorated, contained (traces of) animal fats. A more precise classification of the animal fats was only possible for five samples where contamination was absent or occurred at low concentration.

These five samples were taken from sherds belonging to complete but fragmented vessels from the base or fill of as many burial pits (inhumation graves 1, 24, 31, 87 and 109). All were undecorated vessels of which four can be classified as coarse ware with mainly clay pellets or grog as temper, and one as fine with hardly any added temper. Only one vessel was flat-bottomed, the other four were round-bottomed.

Lipid analysis showed that the ceramic vessels, decorated and undecorated, were not only used as storage containers but have been (intensively) used during the cooking process. During this process, representing either a single use or an accumulation of cooking events over a vessel's lifetime, absorbed organic residues (i.e. ruminant and non-ruminant animal fats) were preserved in these ceramic vessels. However, it remains the question whether these vessels were particularly selected for the burial ritual, and in what way, or if they are echoes from earlier use with no ties to the burial ritual.

11.3 Pollen analysis

Y.F. van Amerongen

11.3.1 Aims of the study

A total of seven samples from the contents of vessels were taken by the former excavators. Since then, no research had been carried out on these contents and they were left in storage. These contents were tested to see if they showed potential for pollen analysis and whether any pollen was preserved. Normally,

pollen is not preserved in the decalcified loess unless submerged or in peat layers. Samples had already been tested for the presence for charred macro botanical remains but none were found which initially would suggest that the preservation of pollen was not to be expected.⁵¹⁴ Fortunately, in one of the pots from one of the graves pollen was found that was of good enough preservation and high enough concentration and diversity for an analysis: a milestone.

The analysis is directed towards the study of the contents of the vessel from the grave and how these contents can be related to the grave.

11.3.2 Material, methods, and data analysis

Material

The investigated find is v.506. This LBK pot was found upside-down in the grave and contained a dried-up layer of silt inside the body of the pot (Fig. 11.3). Of the silt layer, 1 cm³ was sampled for palynological research.

It is not certain that the sampled silt layer is related to the original contents of the pot. The layer could also consist of surrounding soil entering the vessel when it was placed in the grave. The pollen can therefore have derived from remains that were deliberately placed inside the pot, but also from the surrounding landscape during the time that the grave was closed. These two possibilities will be considered during the discussion of the results.

Methods and data analysis

The sample (1cm³) was processed for palynological research using a standard pollen preparation acetolysis method and mounted in glycerine by Mrs. A. Philip from the Institute for Biodiversity and Ecosystem Dynamics (IBED) of the University of Amsterdam.⁵¹⁵ The pollen slide was studied using a transmitted light microscope with magnifications of 400-1000x and microfossils were identified and counted.⁵¹⁶ The total pollen sum reached was 270. Even though this is a low total pollen sum, there were no new taxa added to the spectrum upon reaching the end of the pollen count. Therefore, it is assumed that the pollen spectrum is representative. All pollen types were included in

⁵¹⁴ Personal comment C.C. Bakels.

⁵¹⁵ Samples are treated with 10% potassium hydroxide for deflocculation and removal of humic acids, fine sieving to remove large particles, 10% chloric acid to remove calcium carbonate, centrifuging to remove mineral particles, and acetolysis to remove cellulose.

⁵¹⁶ According to Beug 2004.



Fig. 11.3 The sampled LBK pot v.506 (left), the orientation of the pot during excavation (above right) and the dried silt layer (below right) from which the pollen sample was taken.

the pollen sum. The relative contributions (percentages) of the different pollen types and other microfossils were calculated based on this total pollen sum. Subsequently, the taxa were divided into groups based on ecological group.⁵¹⁷

Plant-specific pollen characteristics

Different aspects of pollen affect the interpretation of the openness of the landscape. Among these aspects are the quantity of pollen a plant produces, how and how easily the pollen is distributed, how well the pollen is preserved in the soil and how well the pollen can be recognised during analysis. One example of a tree which produces and distributes many pollen is the pine (*Pinus*).⁵¹⁸ By means of air pockets attached to the pollen grain this pollen can spread up to several hundred kilometres from the tree.⁵¹⁹ Presence of pine pollen, especially in lower percentages, can therefore not be directly related to the presence of pine in the immediate surroundings. Other trees, like alder (*Alnus*), also produce many, well distributing pollen grains that are easily recognisable during analysis, even after partial decomposition of the grain. Therefore, alder is often overrepresented in pollen samples. Even though this overrepresentation of alder exists, at certain percentages the results are indicative of its presence in the (near) surroundings.⁵²⁰ In contrast, some plant (group)s produce a low amount of pollen that is poorly distributed. The presence of pollen of these plants can indicate local growth of these taxa. Amongst these are the trees beech (*Fagus*) and lime (*Tilia*), but also the herbs belonging to the Apiaceae family, the Ericaceae family and the Cyperaceae family. These plant-specific characteristics will be taken into consideration during interpretation of results.

⁵¹⁷ Tamis *et al.* 2004.
⁵¹⁸ This also applies, albeit less, to *Abies* (fir) and *Picea* (spruce).
⁵¹⁹ e.g. Lindgren *et al.* 1995.
⁵²⁰ Douda *et al.* 2014: values of less than 0.5% indicate an absence of alder in the surroundings; values of 0.5-2.5% show a supply from further away or a sporadic regional occurrence; values of 2.5-10.0% mean that alder is present in the region; values of more than 10% indicate local occurrence of alder around the researched location; Huntley/Birks 1983; Montanari 1996; Lisitsyna, Giesecke & Hicks 2011.

11.3.3 Find number 506: silty layer from LBK pot

The ratio between arboreal and non-arboreal pollen is almost equal in find number 506 (AP, 48.0% en NAP, 52.0%; Fig. 11.4). Arboreal pollen consists mainly of pollen of hazel (*Corylus avellana*; 35.3%), with smaller contributions of alder (*Alnus*; 4.1%), lime (*Tilia*; 4.8%), elm (*Ulmus*; 1.9%), oak (*Quercus*; 1.1%) and pine (*Pinus*; 0.7%).

The non-arboreal pollen spectrum comprises pollen of grasses (Poaceae; 13.4%) and miscellaneous herbs such as the Asteraceae family (Asteraceae liguliflorae; 4.5%; Asteraceae tubuliflorae; 4.1%), and dropwort (*Filipendula vulgaris*). Smaller additions to the spectrum

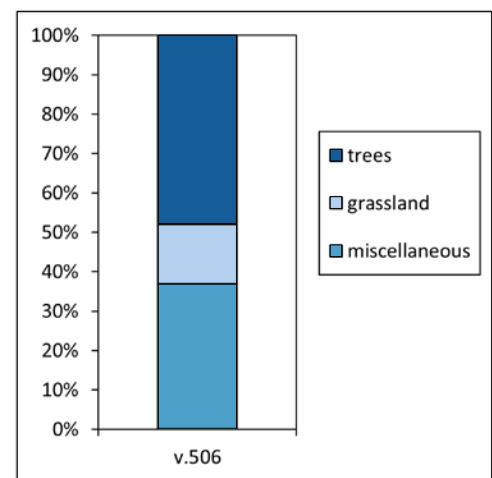


Fig. 11.4 Main diagram of pollen sample v.506. In dark blue: percentage 'arboreal pollen' (AP; trees); in other colours: percentage 'non-arboreal pollen' (NAP; grasses and miscellaneous herbs); together these groups form the total pollen sum.

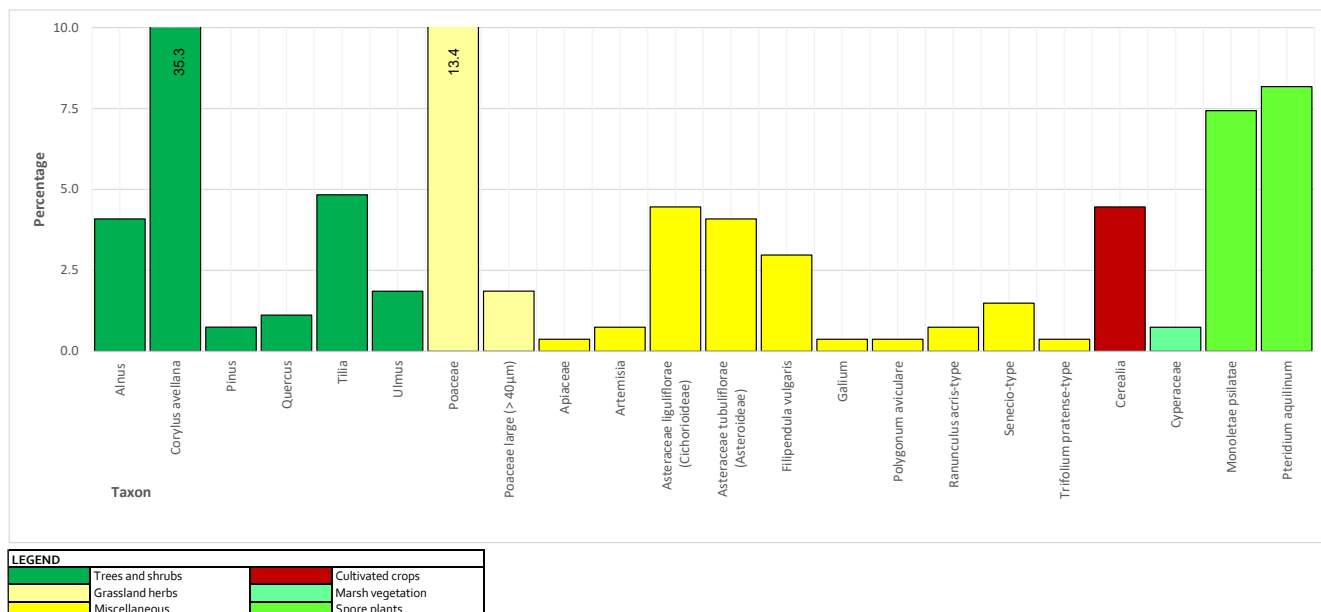


Fig. 11.5 Bar graph of the results of the pollen analysis of sample v.506. To increase legibility, the highest bars were cut off; in those cases, the percentages are indicated as a number at the end of the bar. The pollen sum reached is n=270.

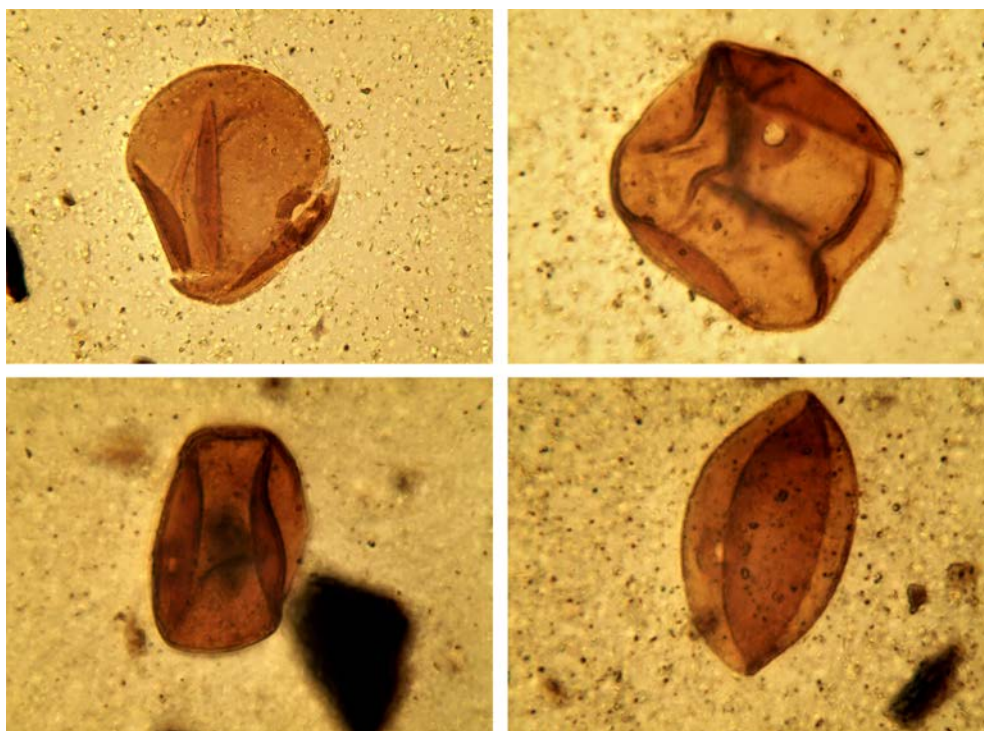


Fig. 11.6 Examples of the encountered cereal pollen grains in find number 506 (glycerine slides). Sizes: top left = 64 µm, top right = 52.5 µm, bottom left = 42.5 µm, and bottom right = 55 µm.

derive from taxa such as the Apiaceae family (0.4%), mugwort (*Artemisia*; 0.7%), bedstraw (*Galium*; 0.4%), common knotgrass (*Polygonum aviculare*; 0.4%), meadow buttercup-type (*Ranunculus acris*-type; 0.7%), ragwort-type (*Senecio*-type; 1.5%) and red clover-type (*Trifolium pratense*-type; 0.4%) (Fig. 11.5).

Large pollen grains were encountered among the grasses, which could either derive

from large wild grasses or cultivated cereals. The dimensions of the large pollen grains vary from 42.5 to 64 µm. Together with the size and definition of the pore and the surface of the pollen grain it can be concluded that these pollen grains derived from cultivated cereal species such as einkorn (*Triticum monococcum*), emmer wheat (*Triticum dicoccum*) or spelt wheat (*Triticum spelta*) (Fig. 11.6).

11.3.4 Discussion

The silty layer was presumably formed during the placement of the pot in the grave. This formation most likely occurred under damp to wet conditions, which caused the silty top layer of the soil to be fluid during deposition, but it cracked due to subsequent drying inside the pot. Based on the pollen grains found in the silty layer, we can reconstruct an image of a forest consisting of oak, elm, lime and hazel in close vicinity to the grave. The percentage of alder pollen (4.1%) indicates regional presence of alder carrs. The absence of beech (*Fagus*) pollen in the spectrum confirms a date within the Atlantic pollen zone, which encompasses the Mesolithic/ Early-Middle Neolithic (7000 -3750 BC): beech only starts arriving back in the south-eastern Netherlands around the middle Neolithic after having gone extinct during the last Ice Age. This date shows that the contents of the pot are unlikely to be the result of more recent intrusions, which is strengthened by the fact that the pot was found upside-down, forming a time capsule.

Hazel occurs at a higher percentage than is to be expected based on the general ratios of trees in the Atlantic pollen zone. This can indicate that hazel occurred locally around the grave site. Hazel often grows at edges of forests and could therefore be related to the edges of the forest clearing in which the grave site was presumably located. In an LBK pollen diagram from a stream valley in Sittard, located ca. 12 km to the north-east of Elsloo, a similarly high percentage of hazel is observed.⁵²¹ In this case, hazel probably grew alongside the stream valley. Hazelnuts were also often gathered for consumption in the LBK, so it is possible that the LBK farmers intentionally created forest edges with more hazel.⁵²²

More open vegetation near the grave is indicated by the presence of herb taxa such as grasses, Asteraceae, bedstraw, meadow buttercup-type, red clover-type, dropwort, ragwort-type and common knotgrass. These herbs occur in a varied grassland in which no clear evidence for grazing is present.⁵²³ The absence of dung-related fungal spores reinforces this idea. The pollen grains could have derived from harvesting practices in the surroundings of the grave site, during which large amounts of pollen are released into the air.⁵²⁴ Other explanations could include the use of chaff, straw or cereals at the time of the burial ritual. Finally, remains of possible grave goods inside the pot could have been mixed with the pollen that were present in the silty layer during burial. It is not possible to decide between these scenarios, but it is clear that cereals or cereal products were present in the (near) surroundings when the grave was closed. The most likely species of cereal for the LBK are einkorn or emmer wheat, which both fit with the measurements of the encountered grains.

11.3.5 Conclusion

A pot that was found upside-down in a grave yielded pollen from a silty layer that was preserved inside. The pollen derives from trees that can be related to the Atlantic pollen zone and confirms the date within the LBK. Apart from tree pollen, pollen from lower vegetation is preserved, which indicates a varied grassland around the grave site. There is no evidence for grazing or livestock nearby, but several cereal pollen grains betray the processing or presence of einkorn or emmer wheat in or near the grave. It was not possible to ascertain the provenance of the cereal pollen from either the pot itself or the surroundings.

⁵²¹ Bakels 2021.

⁵²² Bakels 2015, 167.

⁵²³ Hjelle 1999.

⁵²⁴ Liu et al. 2018.

12.1 Introduction

This chapter focusses on the aforementioned results and verifies if chronological and spatial patterns exist within the burial ground of Elsloo-Koolweg. Based on the various analyses carried out, conclusions have been drawn regarding the number and types of graves (§6.5), grave inventories (§6.6.1) and the use of the different grave goods (§8.3, §9.5, §11.1.4). The physical anthropological analysis provided much needed information on age and sex of the deceased (§7.3). A chronological framework was set up based on the decorated pottery and ¹⁴C dates (§8.4).

A word of caution has to be repeated when looking at distribution patterns. This is mostly because of taphonomic reasons. Doubts have been raised about the preservation of the cremation graves. Because of this it cannot be stated whether the assemblage of grave goods belonging to cremation graves can be considered complete –apart from the obvious lack of organic remains– and this therefore hampers statistical comparisons with inhumation graves. For instance, in cremation graves less “complete” vessels have been found (Fig. 6.13) which undoubtedly is the result of disturbances in the topsoil (e.g. ploughing). In turn, attributions of sex and age are limited for inhumations graves where bone other than tooth enamel was preserved. A final remark has to be made concerning the two different excavation strategies, which may have resulted in different observations being made in the field while documenting the archaeological level due to the use of the mechanical excavator, but there were also differences in the documentation of the individual graves. The second campaign surely would have benefited from the lessons learned from the first campaign. Interestingly, during the second campaign more graves were examined, but fewer with human remains or body shadows. This could have been caused by a difference in preservation or other circumstances (bad weather, use of less experienced students, etc.).

12.2 Distribution of graves and lay-out of the burial ground

12.2.1 Distribution of inhumation and cremation graves

The burial ground of Elsloo is particularly known for its many cremation graves. By carefully comparing all the gathered data the originally published number of graves and grave types has been revised (§6.5). The burial ground consists of 113 graves of which 63 are inhumation graves and at least 34 cremation graves; potentially there are 50 cremation graves (Table 6.5). The inhumation graves are dispersed over the entire burial ground, while the cremation graves seem to cluster in the western part and seem to be absent in the south-eastern part. The latter may or may not be the result of the use of the mechanical excavator (dragline), which was too aggressive for the removal of the topsoil in which the cremation graves were already present. Natural erosive processes have affected the visibility of these graves as well. Still, in comparison with other burial grounds the absolute and relative number of cremation graves are startling.

In the southern part there seems to be an area where no graves were dug (Fig. 12.1). Additionally, the layout of the burial ground appears as if it was marked above ground in some way (palisade, fence, ditch, shrubs, etc.), but no features supporting such a claim have been found, meaning no such markings were present or that these are not archaeologically visible anymore. Several shallow ditches have been observed within the settlement of Elsloo which were hardly visible when excavated and could be traced only partially. It is unsure what purpose they served apart from their potential use as a demarcation. At the settlement of Sittard-Mgr. Claessenstraat larger sections of a ditch system remained, some parts even accompanied by a large palisade and double ditch. These ditches enclosed larger areas, thought to be parts of different phases of the settlement.⁵²⁵ A demarcation of the burial ground therefore could have existed (Fig. 12.1) and especially the angular western border of the burial ground may justify such claims.

⁵²⁵ Modderman 1958/59; Van de Velde & Van Wijk 2014.

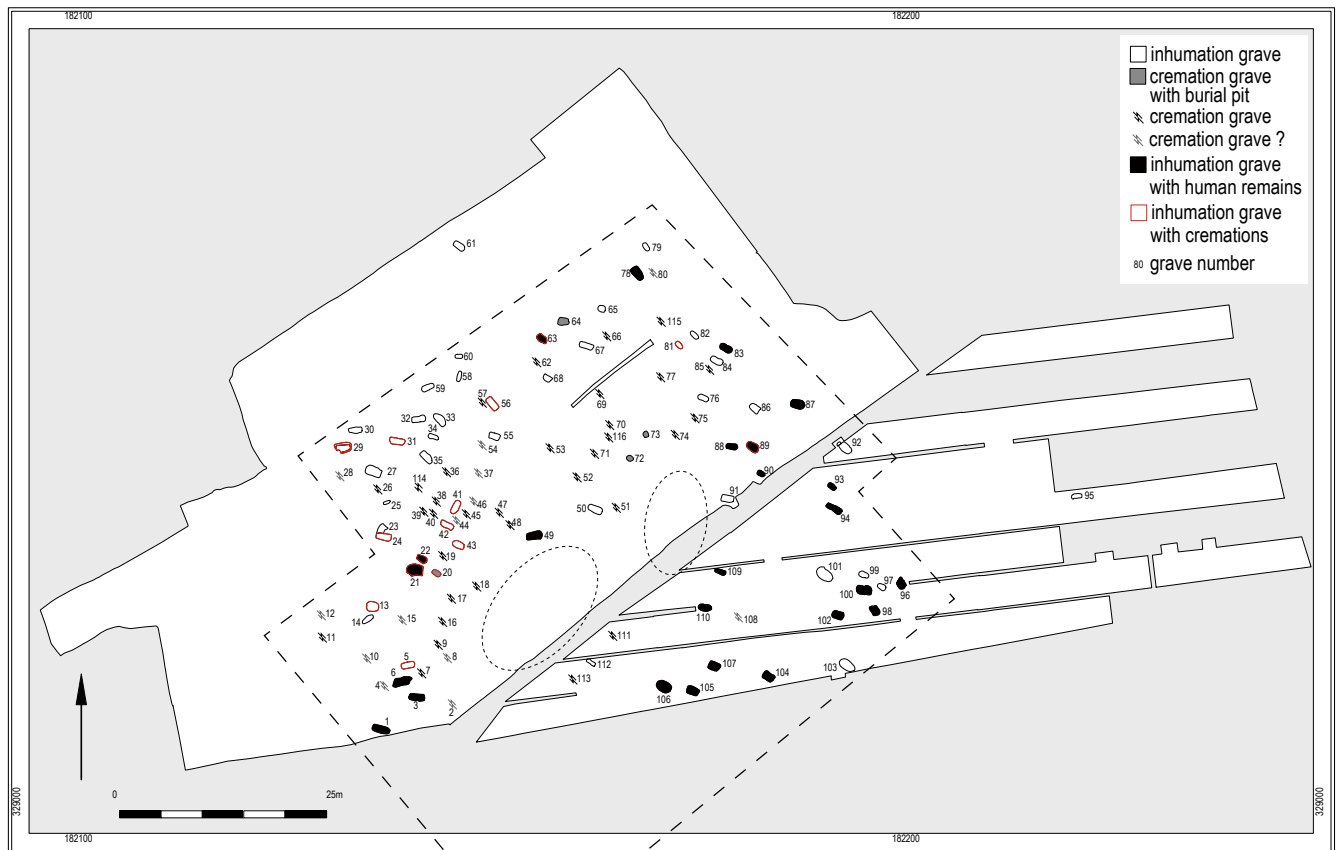


Fig. 12.1 Lay-out of the burial ground with potential demarcation on the edges of the grounds as well as central zones without graves.

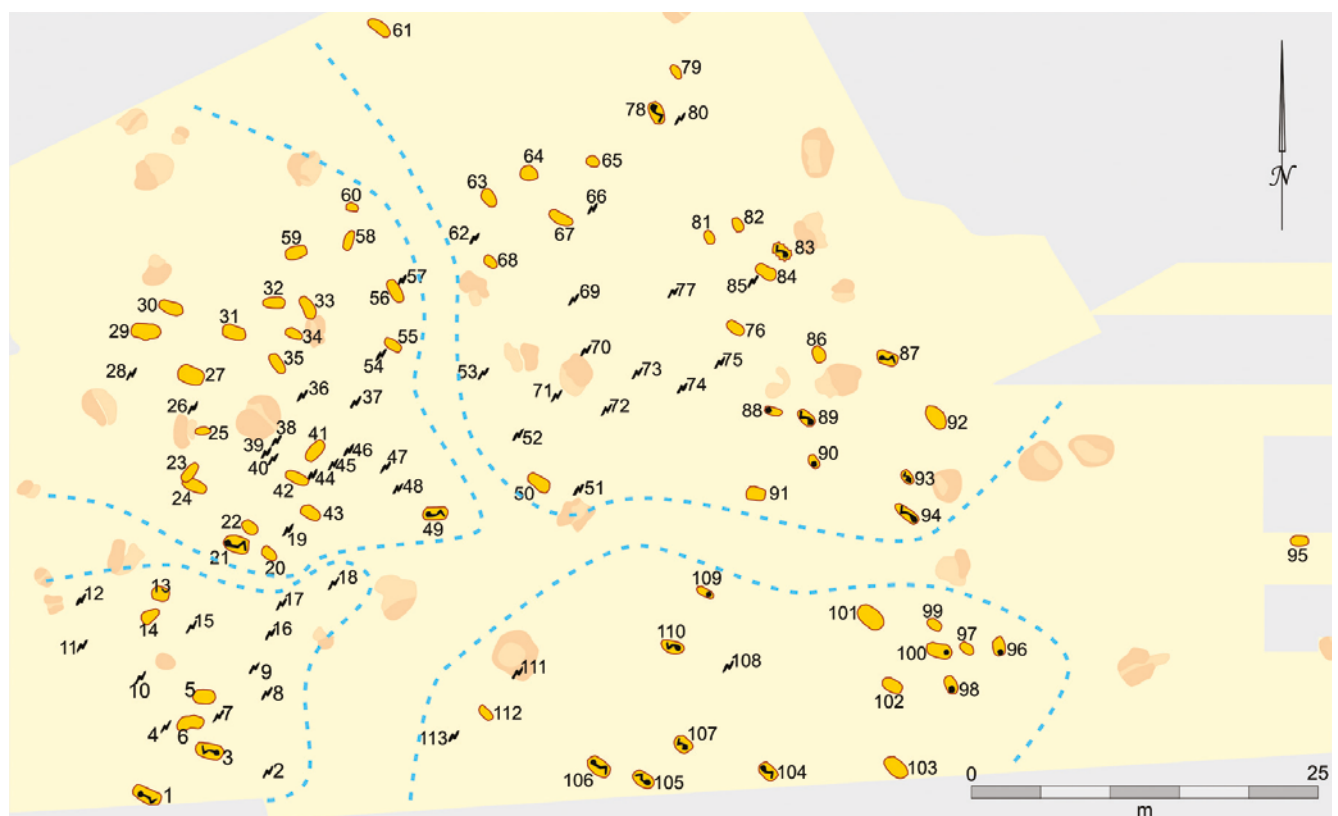


Fig. 12.2 Social spacing within the burial ground of Elsloo (source: Van de Velde 2011, Fig. 42).

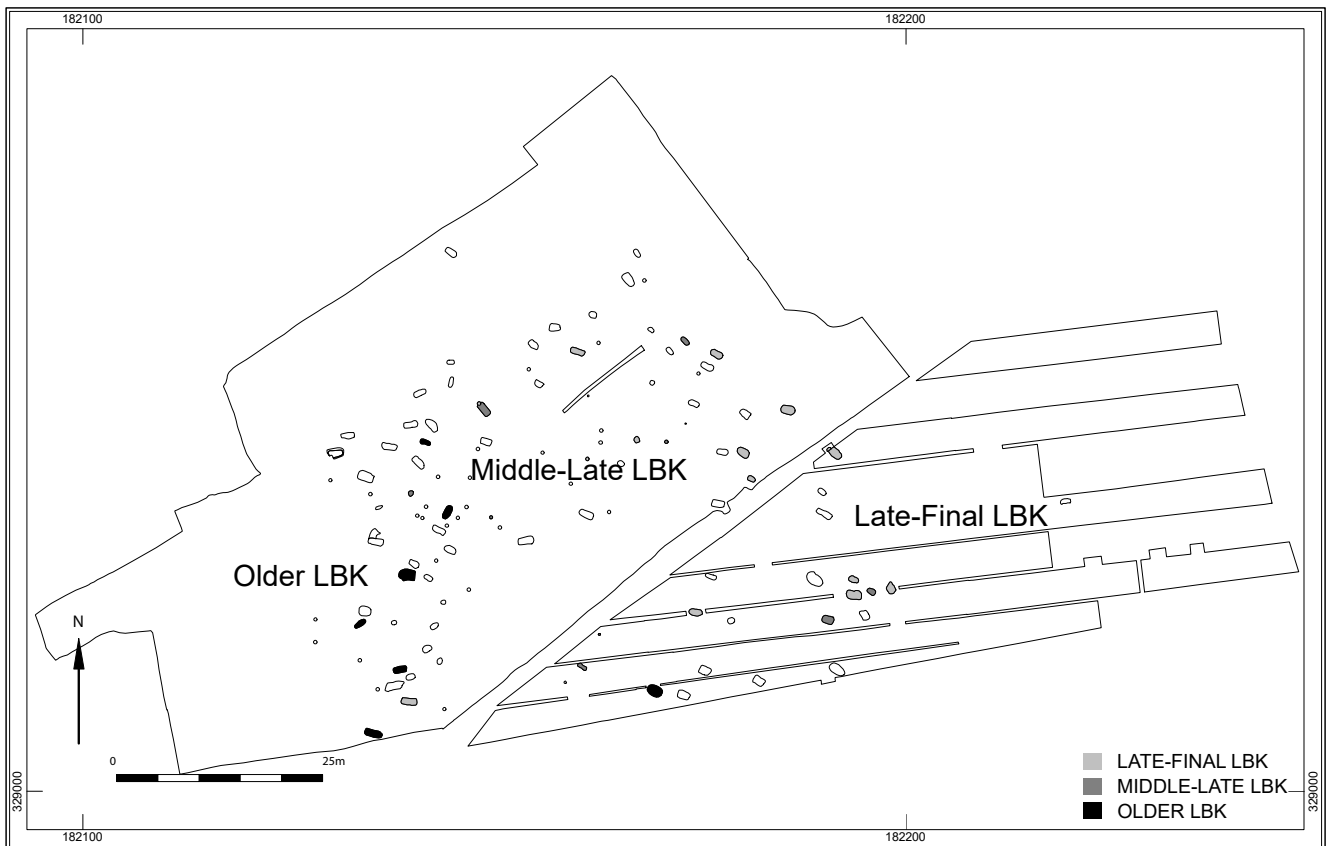


Fig. 12.3 Schematic chronological distribution of the graves.

As to the inner lay-out of the burial ground, four grave clusters have been identified by Van de Velde.⁵²⁶ The clusters are quite different in size, and the amounts of grave good categories vary from clusters to clusters, even when taking the size of these clusters into account. These clusters supposedly belong to different lineages or kin groups who had different rituals concerning the burial rites.⁵²⁷

12.2.2 Chronological distribution

The analysis regarding the chronological distribution of the graves (Table 8.3) was carried using pottery with diagnostic decorations, ¹⁴C dates from cremation graves and lipids, as well as intercutting of some graves. The oldest graves were probably dug during the Older or Middle LBK, not much later than when the settlement was founded. They are found in the south-western part of the burial ground, while the youngest graves can be found in the north-western part. This showed (Fig. 8.5) that the used area of the burial ground gradually shifted over time (Fig. 12.3). There are no indications

that cremation graves were being added during the last phases of use of the burial ground. The burial ground was kept in use until the Final LBK and therefore coexisted with the settlement throughout most of the latter's existence.

12.2.3 Distribution of body positions

The main orientation of the inhumation graves is NW-SE. Most graves (34 graves) are oriented NW-SE and 25 more graves have a slightly divergent orientation either towards the north (NNE-SSW: eleven graves) or the west (WNW-ENE: fourteen graves and E-W: eight graves). Three graves are oriented in the opposite direction (NE-SW). The orientation of the oldest graves seems to be more E-W or NE-SW, while the youngest graves are almost all oriented NW-SE.

The most common position was crouched on the left side, which has been documented in thirteen graves. Two burials seem to have been placed in a right crouched position. Only one burial seems to have been placed in an extended (supine) position (grave 100). There seems to be

⁵²⁶ Van de Velde 2011, Fig. 42.

⁵²⁷ Van de Velde 2011, 61.

no chronological pattern with respect to body position.

Based on the body shadows and the dental enamel the position of the head could be documented in several cases. The head was most often oriented towards the south-east (nine graves) or north-west (eight graves). Twice it was oriented towards the east and one time

towards the west. From this it can be stated that the deceased were buried with their faces pointing either north (seven graves) or south (seven graves) and one time facing east. The oldest graves –or any other dated graves– share no common orientation towards any cardinal direction.

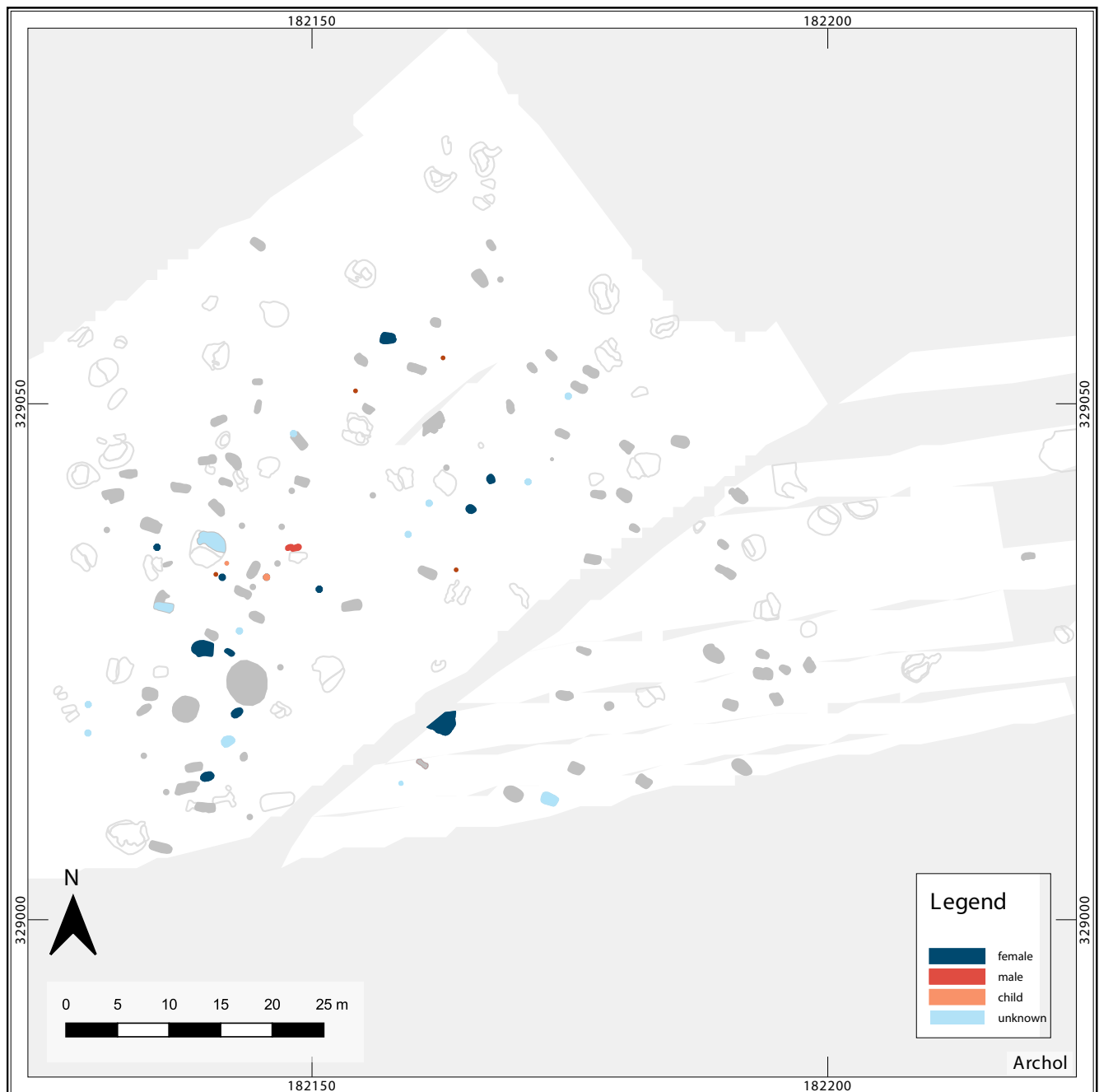


Fig. 12.4 Distribution of male, female and (presumed) child graves within the burial ground.

12.2.4 Distribution of sexed and aged graves

When skeletal remains survive the taphonomic processes, the determination of the sex of a buried corpse may seem hardly problematic. A fundamental problem with sex attribution even when skeletal remains have been preserved is that the sex of a burial is a biological category. The socially defined gender role could be (partly) independent.⁵²⁸ In order to make any assumptions about the social life of the deceased it is still important to firstly establish a base regarding the biological sex and age using bioarchaeological analysing methods. In chapter 7 the results of the only preserved skeletal remains from the Elsloo burial ground are presented.

The analysis of the calcined bone fragments enables us to see whether specific choices were made during the burial ritual regarding the distribution of biological male or females sexed graves within the burial ground. The sex of sixteen individuals could be determined (Table 7.5). The sex of the calcined bone remains of 26 cremation graves could not be determined. Among the sixteen burials, eleven could be classified as female and five as male. All of these were adults with ages ranging from 18+ (adult) to 60 years (mature/senile) old. Two potential juveniles were also cremated and although hard data is missing it is presumed that also two child graves were present. There are no biological indications whatsoever towards the sex of the deceased who were buried in inhumation graves due to the absence of any organic remains apart from poorly preserved dental enamel. Although nothing is consequently known about the age or sex of the inhumations, some smaller grave pits might suggest younger or shorter individuals.⁵²⁹ Most cremation graves cluster in the western part of the burial ground, which is also reflected in the number of graves of which the sex could be determined. However, there seems to be no distinction regarding areas where females and males were buried. As to the burial pits themselves, there seems to be a distinction to be noted. Most cremation pits are very shallow, which has implications regarding the preservation and visibility of the cremation graves. Trautmann already noted that –if

present– child cremation graves were particularly shallow, which might explain why no child cremation burials have been found in Elsloo.⁵³⁰ But where burial pits were present, all of the deeper pits belong to female graves. These deeper pits contain the remains of adult females ranging in age from 18+ to 60 years old and are spread evenly over the burial ground.

12.3 Distribution of grave goods

Burial goods or the furnishing of a grave have always generated the most attention from researchers, especially regarding their function within the burial rite and implied indication of the sex and gender of the deceased. The presence of many furnished inhumation and cremation graves therefore offers a lot of potential for different kinds of approaches. The dissertation of Van de Velde is an example of three approaches based on the distribution of burial goods in combination with the position of the burial pits within the burial ground. With the discovery and excavation of many more burial grounds in surrounding countries since Van de Velde's dissertation in 1979, as well as the possibilities which science-based analysis offers, re-interpretations of past approaches towards the role of burial goods have been offered. Science-based analysis focuses primarily on the objects themselves and the *chaîne opératoire*, while other studies are more focused on the position of the goods within the grave. Source criticism is therefore of utmost importance. A word of caution regarding taphonomy has already been given, as has the obvious caveat regarding preservation of organic materials. A second word of caution concerns the position –and its documentation– of the grave goods themselves. For example, if an adze is found in the fill of the grave, clearly above the bottom of the pit where the deceased is laid to rest, several assumptions are possible regarding the burial rite. But it is of importance to know for certain if the adze was deposited (by accident or deliberately) into the pit when it was filled, or was standing on a ledge created by an unrecognised incline of the pit wall. Or was it part of a cremation grave which cut through an earlier fill? An arrowhead found at the exact location where remains of the skull should be

⁵²⁸ Van de Velde 2011, 58.

⁵²⁹ When buried in a crouched position, the matter of an individual's height becomes less clear.

⁵³⁰ Trautmann 2006.

could also indicate that it was lodged in the head and therefore the likely cause of death. Should it therefore be considered as a grave good or not? Many reservations have also been made regarding finds in the fill of the pit and whether they are primarily or secondarily deposited. And finally, especially for the shallow cremation graves there are some restrictions regarding the composition of the assemblage and its intactness, in particular when reworking an older excavation like Elsloo where almost all the information is based on previously made

interpretations and analysis. That is why it was of the utmost importance to have access to primary field reports as well as original photographs and drawings.

With respect to distribution maps of grave goods we have chosen to focus on the furnishings that are believed to be directly related to the primary disposal of the deceased. Finds in and at the 'top of the fill' are therefore left out in the distribution maps presented in this chapter.⁵³¹ Also, we have to consider that the grave inventory of the cremation graves is not

⁵³¹ As we know that ground disturbing processes like ploughing and erosion have been taken place, "top of the fill" of burial pits is without any value as most of the upper part of the fill is already vanished.

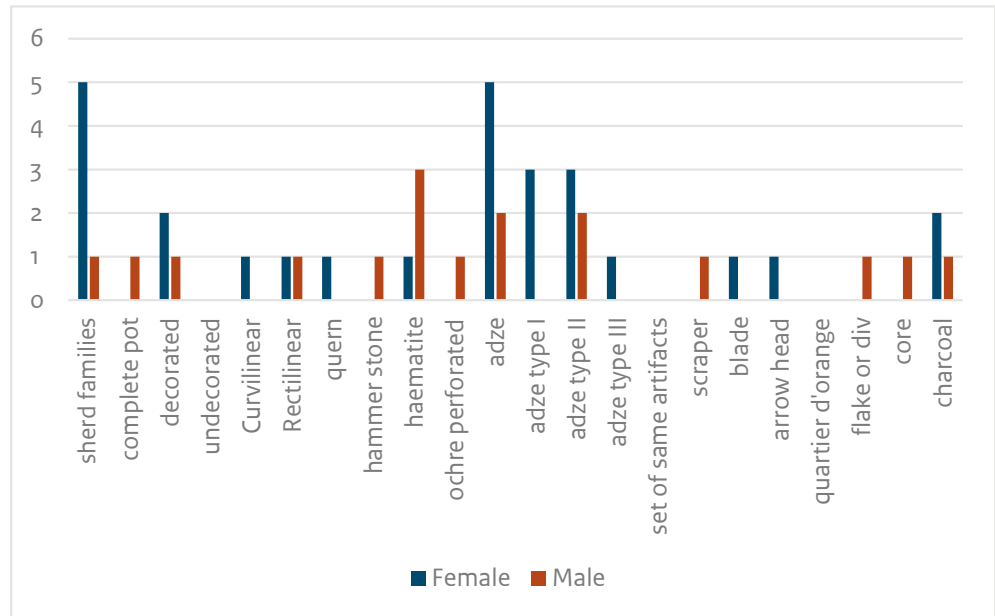


Fig. 12.5 Diagram of total number of grave goods per grave.

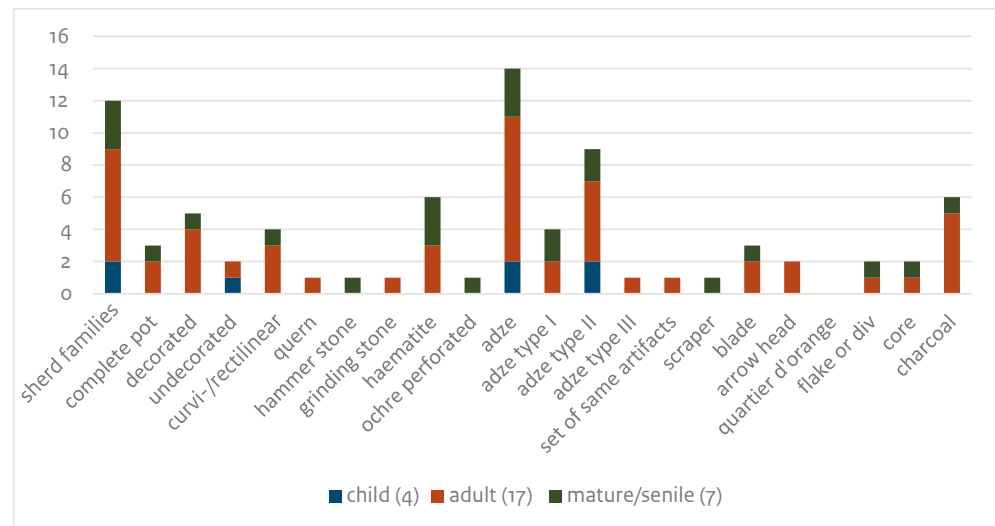


Fig. 12.6 Diagram of number of grave good categories per grave.

complete (see §6.6.6). We therefore incorporate primarily grave goods from the bottom of the inhumation graves before the burial pit was filled in.

12.3.1 Composition and distribution of the grave goods

Grave goods (Appendix III and Fig. 6.11) were present in 32 cremation graves and 54 inhumation graves (total 86 graves). This means that over 76 percent of the graves were furnished with grave goods of some kind. The majority of the inhumation graves contain grave goods (87%) and of the cremation graves at least 64 percent, but presumably more, contained grave goods. A division can be made between the furnishing of (inhumation and/or cremation) graves both by looking at the total amount of grave goods present within a grave and also with respect to the composition of the assemblage (pottery, stone and flint tools, and organic goods).

The total number of grave goods per grave varies from zero (30 graves) to a maximum of eighteen objects. Most of the graves have one to four grave furnishings (62 graves), while having five or more is restricted to 16 graves. But this image is skewed by the cremation graves. As expected, cremation have less grave furnishings whereas only nine inhumation graves contain no goods at all. More than half (38 graves, 60%) of the inhumation graves contain at least one to four goods, and 16 graves have five or more grave furnishings. Inhumation graves without any (archaeologically preserved) furnishings are distributed evenly throughout the burial ground (Fig. 12.5). A similar distribution is apparent for graves with up to four, or even nine grave goods, even when the aspect of time is included. Older graves contain no more or less grave goods than younger graves. However, three graves which presumably date to the oldest phase in the south-west corner of the burial ground contain the most furnishings and are clustered together. In the last phase there are no such “rich” graves apart from one cremation grave (grave 71) which is positioned centrally in the burial ground and also inhumation grave 87, which is located on the eastern edge.

The composition of the assemblage provides a slightly different picture regarding the

presence of “rich” graves. This richness can also be expressed in the number of different material categories. There is an almost even distribution (Fig. 12.6) of graves with zero grave goods (30 graves), one or two types of grave goods (both represented by 27 graves), and three types of grave goods (23 graves). There are only six graves with all four categories (pottery, stone tools, flint tools, and organic artefacts including charcoal). Without charcoal only the aforementioned cremation grave 71 contains three different kind of grave goods. It is also one of the nine graves which has a set of the same type of artefacts. These sets consist of several blades (graves 1, 57, 67 and 71), several arrowheads (graves 1, 3, 5 and 55), multiple nodules of ochre (grave 14), or a set of adzes (grave 83). Grave 1 is the only grave which carries several sets. These sets seem to be present only in the western –presumably older– part of the burial ground. In conclusion, it may be stated that the best equipped graves, in terms of numbers as well as composition, are present in the western and older part of the burial ground.

In the next sections we will look at the distribution of specific grave goods, where relevant. We will therefore analyse the most commonly present grave goods.

12.3.2 Ceramics

Pottery is present in 56 graves, of which 41 are inhumation graves (65% of the total amount of inhumation graves) and 15 cremation graves (29%). Thus half of the graves contains pottery, a number which originally was most likely to be higher, given loss due to post-depositional processes particularly in cremation graves. The most common grave good for inhumation graves is pottery, which in more than half of the instances consists of almost complete vessels. Both inhumation and cremation graves with pottery are evenly distributed within the burial ground, not only with respect to presence or absence but also regarding the numbers of vessels per grave. The same goes for the distribution of decorated and undecorated pottery. When looking at the fashion in which way the motifs are executed (recti-/curvilinear) there is a slight dominance of rectilinear motifs in the western part of the burial ground. During

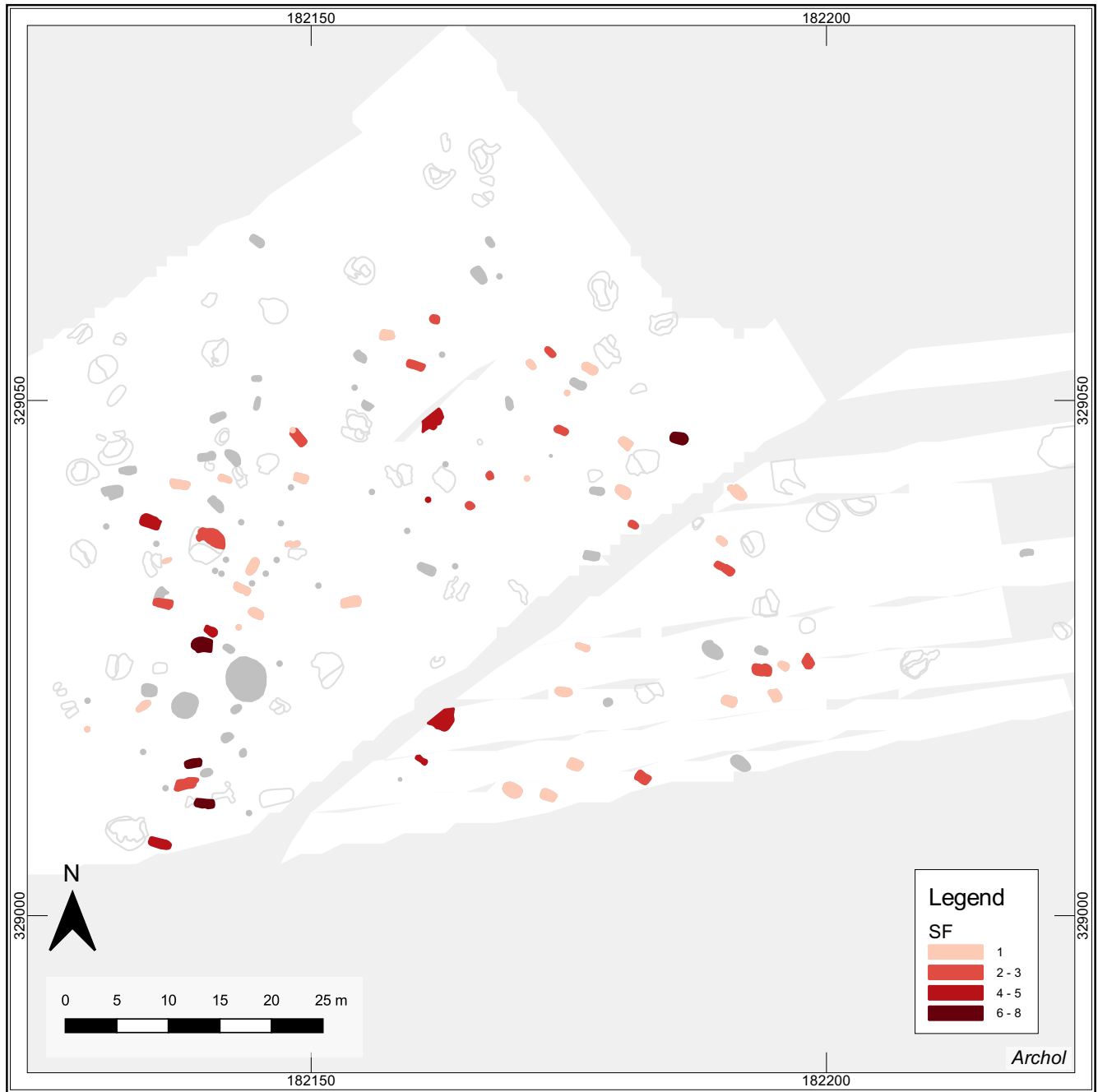


Fig. 12.7 Distribution of pottery per inhumation and cremation grave (SF = Sherd Family).

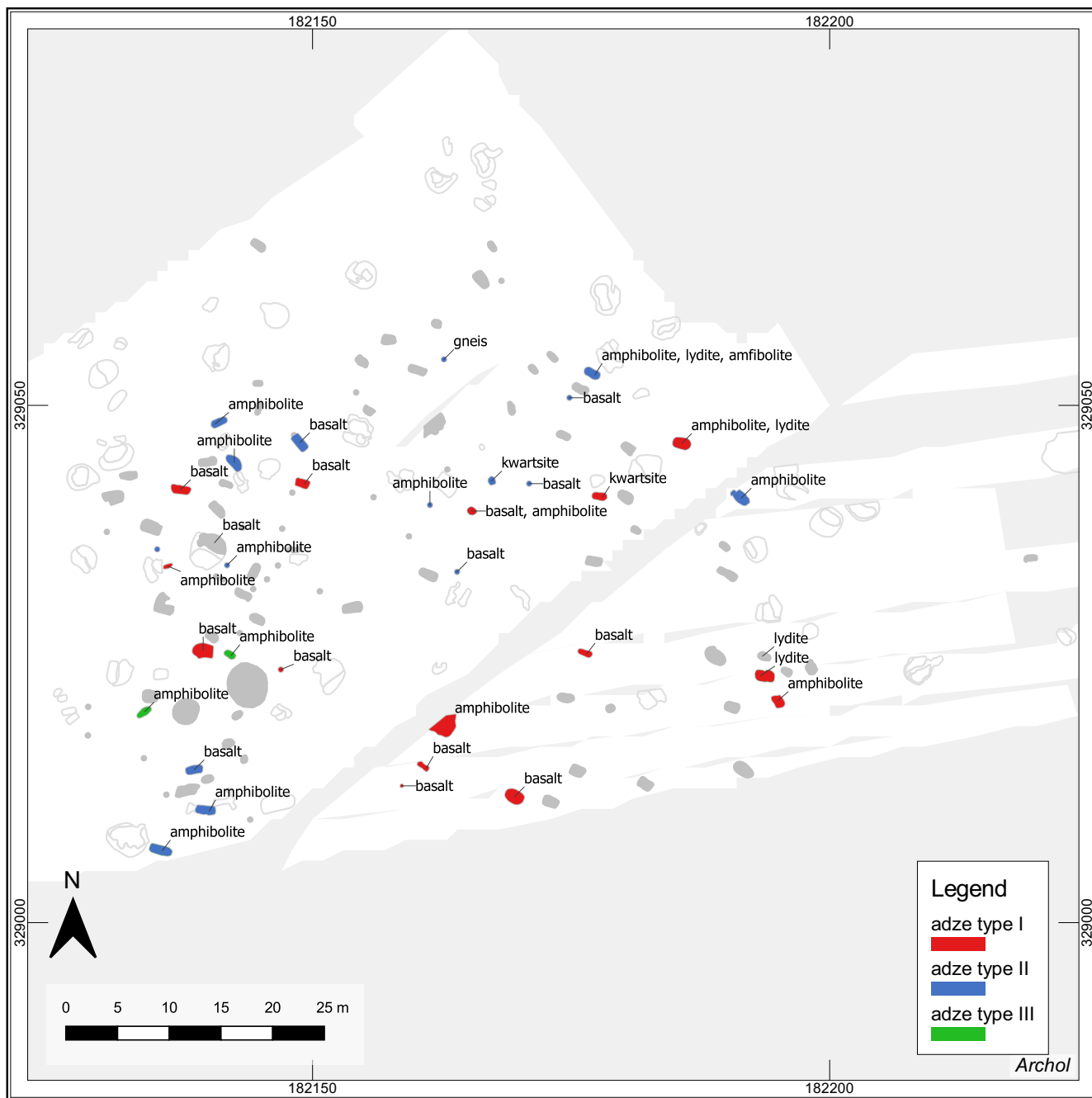


Fig. 12.8 Distribution of adzes according to type and raw material.

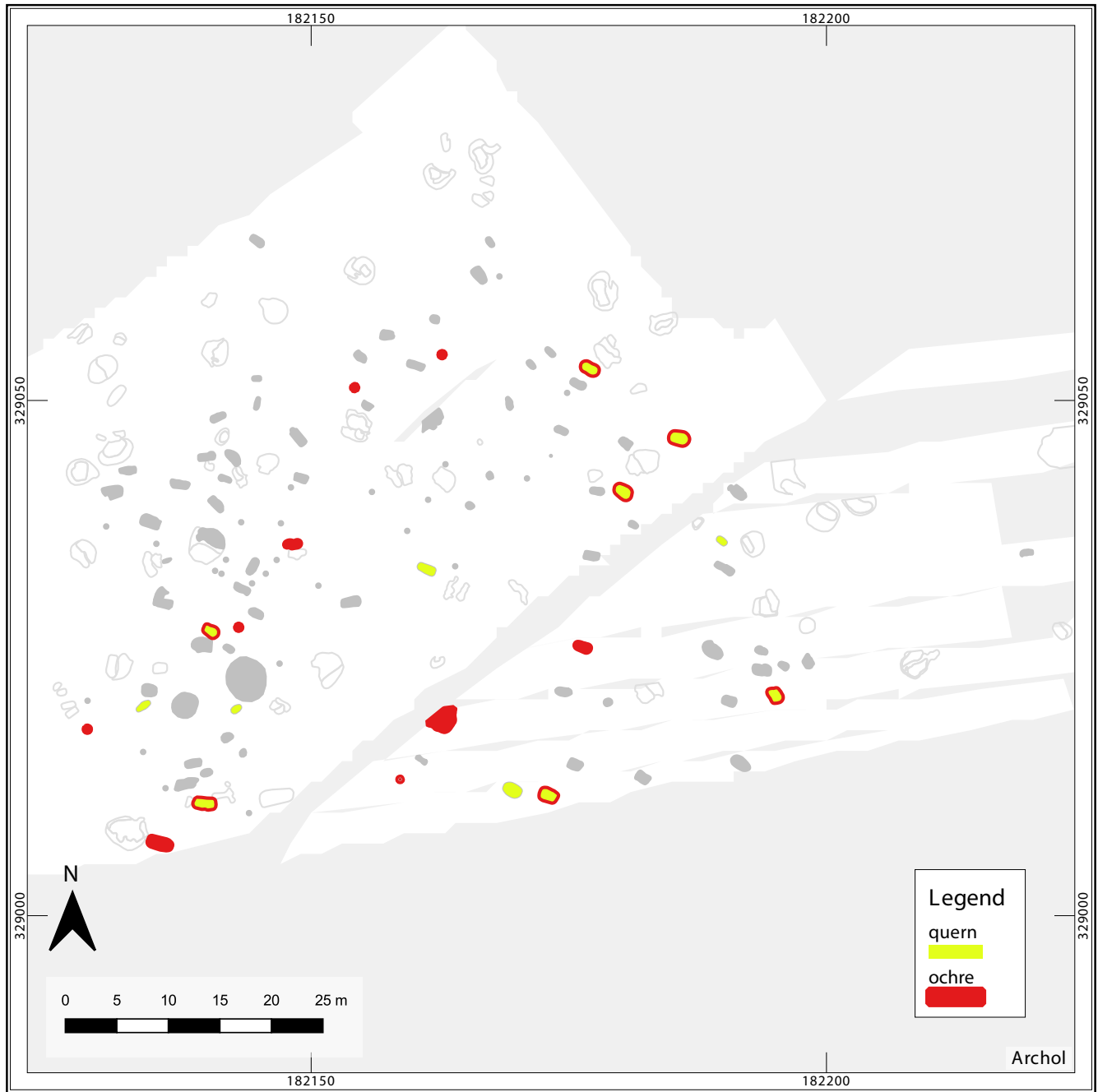


Fig. 12.9 Distribution of querns and red ochre.

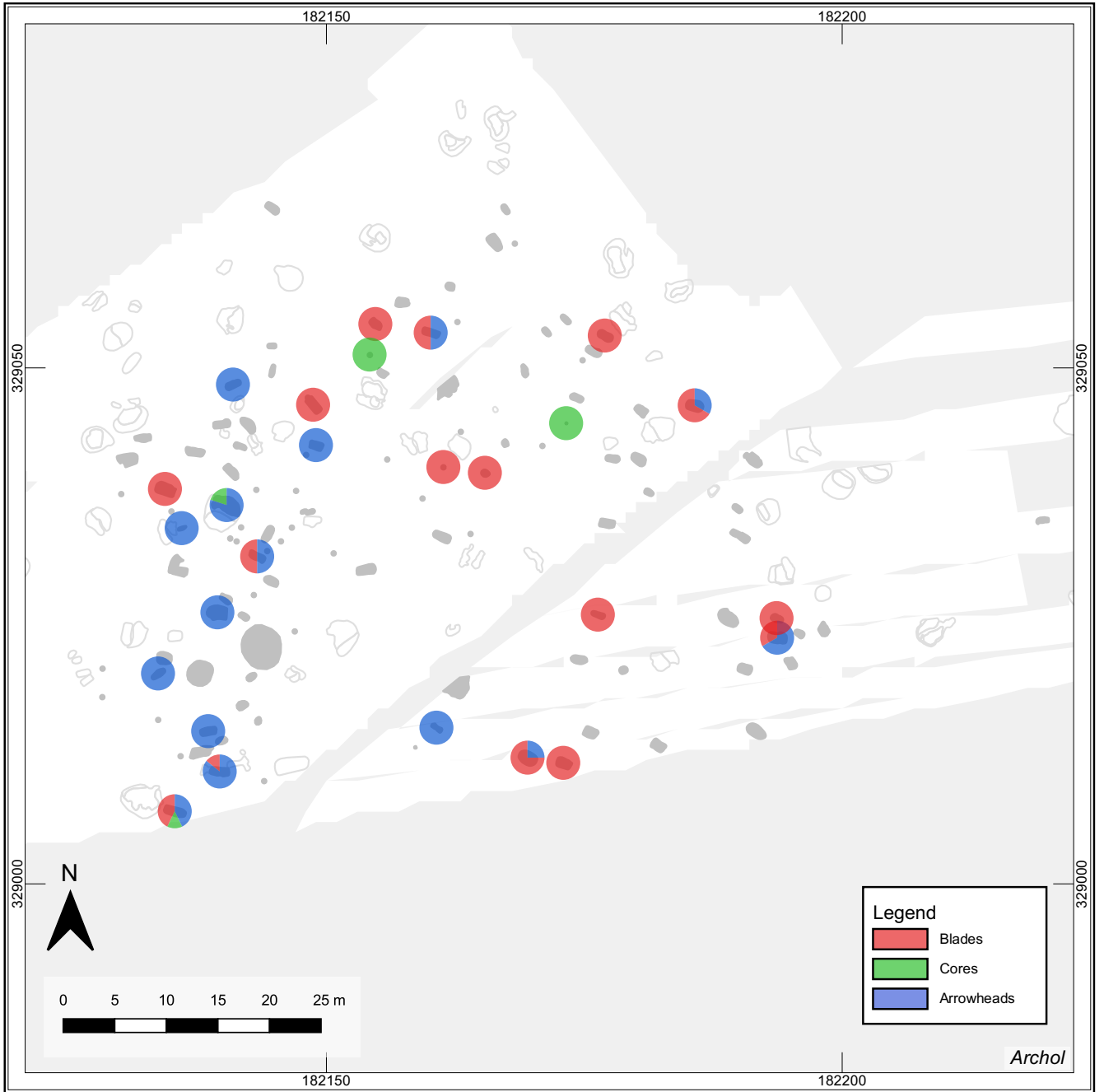


Fig. 12.10 Distribution of flint blades, cores and arrowheads.

the final stages of the burial ground this type of motif therefore seems less used or present.

12.3.3 Stone tools

Stone artefacts are almost as frequently present as flint, but are distributed over a larger number of graves (48 graves). The adze is the most common grave good and present within 42 graves (Fig. 12.8). Most graves (n=31) contain one adze, while four graves contain two adzes and one grave has three. As expected, the adzes are evenly distributed within the burial ground. Graves with more than one adze are located on the edges of the burial ground, apart from cremation grave 72, which is centrally located. Flat adzes (type 1) and thick adzes (type 2) are distributed more or less evenly in the central, eastern and western parts of the burial ground. Flat adzes are not present in the southern part. Slender thick adzes (type 3) were only found in

two graves located in the western part of the cemetery. As to the source of the raw material a division can be made between lydite, gneiss and quartzite adzes and those made from basalt and amphibolite. The latter are found across the whole burial ground, whereas the lydite, gneiss and quartzite adzes are found only in the (south-)eastern and youngest part.

Such a difference in spatial as well as chronological distribution is also apparent for the other stone artefacts: querns and red ochre (Fig. 12.9). Apart from one grave, all quern stones (n=12) were found in the eastern part of the cemetery. Red ochre, present within seven cremation graves and ten inhumation graves, is found evenly distributed throughout the burial ground. Ochre powder, observed on the grave bottom while excavating or during the use-wear analysis, is found in graves across the whole burial ground as well.

Table 12.1 Relation between grave goods.

	Ceramics	Complete vessel	Decorated	Not decorated	Curvi	Recti	Quern	Stone various	Ochre	Adze	Adze type I	Adze type II	Adze type III	Set of same artefacts	Blade	Arrow head	Charcoal
Ceramics	x	60%	47%	28%	33%	23%	23%	7%	26%	40%	23%	12%	7%	16%	28%	30%	42%
Complete vessel		x	69%	38%	50%	31%	31%	8%	31%	50%	23%	27%	12%	19%	35%	38%	46%
Decorated		90%	x	25%	70%	45%	30%	5%	35%	55%	20%	35%	10%	30%	35%	45%	45%
Not decorated		83%	42%	x	25%	8%	25%	8%	25%	50%	25%	33%	8%	25%	42%	33%	50%
Curvilinear		93%	93%	21%	x	29%	21%	-	-	50%	7%	36%	14%	36%	29%	29%	43%
Rectilinear		80%	90%	10%	40%	x	20%	10%	20%	50%	30%	20%	20%	20%	30%	50%	60%
Quern	89%	89%	67%	33%	33%	22%	x	11%	89%	67%	33%	33%	11%	22%	56%	44%	22%
Stone various	100%	67%	67%	33%	-	67%	33%	x	67%	67%	33%	33%	-	33%	67%	67%	33%
Haematite	100%	73%	55%	36%	36%	18%	73%	18%	x	64%	27%	36%	18%	27%	55%	36%	18%
Adze	77%	59%	50%	27%	32%	23%	27%	9%	32%	x	50%	41%	14%	27%	41%	55%	36%
Adze type I	91%	55%	36%	27%	9%	27%	27%	9%	27%		x	9%	9%	9%	36%	64%	36%
Adze type II	78%	78%	78%	44%	56%	11%	33%	11%	44%		11%	x	11%	44%	56%	56%	33%
Adze type III	100%	100%	67%	33%	67%	33%	33%	-	67%		33%	33%	x	67%	67%	100%	33%
Set of same artefacts	100%	71%	86%	57%	71%	14%	29%	14%	43%	86%	14%	57%	29%	x	57%	86%	29%
Blade	86%	64%	50%	36%	29%	21%	36%	14%	43%	64%	29%	36%	14%	29%	x	50%	43%
Arrowhead	93%	71%	64%	29%	36%	29%	29%	14%	29%	86%	50%	36%	14%	43%	50%	x	29%
Charcoal	72%	48%	36%	24%	24%	24%	8%	4%	8%	36%	16%	12%	4%	8%	24%	16%	x

Percentage indicates the presence of two different kinds and types of grave goods in the same grave, for both cremation and inhumation graves. Bold percentages point towards a strong relationship between both grave goods, - indicates no relationship.

12.3.4 Flint tools

Thirty-six graves were furnished with one or more flint artefacts, especially arrowheads and blades. In several graves multiple flint artefacts were deposited as part of a tool set. A set of arrowheads could indicate a bundle of arrows. Arrowheads are primarily deposited in inhumation graves. Only cremation grave 114 yielded a set of four arrowheads. Arrowheads are found in inhumation graves spread throughout the burial ground, although most are positioned in the western and oldest part of the site. A more even distribution is observed for graves which are furnished with blades or cores (Fig. 12.10).

12.4 Relations between graves based on grave goods

The presence of different kinds and types of grave goods has been documented in the previous sections. The spatial distribution of these furnishings shows interesting patterns which indicate that certain rules applied for the burial ritual (see chapter 13). Already, it has been noted for many burial grounds that various combinations of artefacts were deposited within the graves.⁵³² Using the aforementioned restrictions regarding the dataset, possible combinations were newly identified in order to get a firmer grip on the burial ritual at Elsloo.

Table 12.1 shows the correlation of the various kinds of grave goods (ceramics, stone and flint artefacts, charcoal) and also incorporated the different subtypes of artefacts (ceramic style, adze type, and set of artefacts). The results of this (basic) analysis shows that pottery, most common within the grave assemblage, is accompanied by almost all the grave goods of any kind. The combination of pottery and adzes is most frequent (present within 40% of all graves). Less present in graves with ceramics are type 3 adzes and stone tools like hammerstones. Seen the other way around, there are stronger correlations with ceramics. In graves with either (various) stone artefacts, pieces of ochre, type 3 adzes, and sets of the same artefacts, there are always ceramics present (complete vessels or sherds). Also, querns, adzes in general, or more specifically

Table 12.2 Sex attribution of the cremation graves.

Grave nr	Grave type	Baetsen 2021	Trautmann 2009	Van de Velde 1979
7	cremation	female?	18+	female?
9	cremation	unknown		
11	cremation	unknown		female
12	cremation?	unknown		male?
16	cremation	female?		female
19	cremation	unknown		female
20	cremation	female?		male?
26	cremation	female?		male
38	cremation	child?		male
39	cremation	male?	18+	female?
40	cremation	female?	18+	female?
45	cremation	child?		
47	cremation	male		female
48	cremation	female?		male?
51	cremation	male?	male 18+	male
52	cremation	unknown		
57	cremation	infant?		female?
62	cremation	male?		female
64	cremation?	female?		female
66	cremation	male?	female 18+	female
71	cremation	unknown		male
72	cremation	female		male
73	cremation	female?	male 8+	male
74	cremation	child?	inf juv	male
85	cremation	unknown	inf juv	male?
111	cremation	female?		female
113	cremation	unknown		female
114	cremation	unknown		

Comparable determinations between researchers are shown in bold.

type 1 and type 3 adzes, blades, and arrowheads are almost always accompanied by ceramics. Type 3 adzes are also found together with nearly complete vessels and arrowheads. The frequently mentioned combination of adzes with arrowheads is also present in the Elsloo assemblage (86%) but strangely enough the inverse is not the case: just over half the graves with arrowheads also contain adzes. There is also a strong relation between ochre fragments and querns (89%). A non-correlation is only given for various stone tools (i.e. hammerstones) in combination with curvilinear pottery and type 3 adzes. There are no indications that curvi- or

⁵³² i.e. Modderman 1970; Van de Velde 1979; Jeunesse 1997; Bickle & Whittle 2013; and many others.

rectilinear pottery, or decorated or undecorated pottery, was included in any special kind of combination with any other grave goods. Apparently the decoration type made no difference for the burial ritual, regarding the purely typological distribution of graves.

Most important is the notion that all different combinations between various kinds and types of artefacts were represented within the graves. But some combinations seem to have been preferred. Factors like sex, gender, etc. could have played a role causing these different as well as preferred combinations.

12.5 Distribution of sexed grave goods

12.5.1 Comparing analysis on sexed graves

The osteological research carried out by Baetsen (chapter 7) and Trautman provided the necessary results to attribute the biological sex of the buried to—at least—the cremation graves; and therefore, also the grave goods deposited in a single grave could be analysed in relation to sex.⁵³³ Poor bone preservation prohibited the sex determination of the inhumation graves. Lacking any physical anthropological research, Van de Velde carried out a principal component analysis in order to make statements about the gender of the people buried.⁵³⁴ Back then only a few burial grounds with some level of bone preservation had been discovered to which he could compare his results.⁵³⁵ The correlation between grave goods, assumptions about division of labour and paring of graves showed that according to his analysis 16 children, 32 females and 38 males were laid to rest at the Elsloo burial ground.

A comparison between the PC analysis by Van de Velde and the physical anthropological analysis showed that there is one match between the three studies (grave 51). A match between Van de Velde and Baetsen can be counted for six graves (graves 7, 16, 40, 51, 64 and 111), ten times there is a mismatch, and twice there is a match between Van de Velde and Trautmann (Table 12.2). There is only one match between Baetsen and Trautmann and two mismatches, which is caused by the lack of sexed individuals in Trautmann's study.

Looking at the division of grave goods in

the six graves for which Van de Velde's and Baetsen's assessment matched may provide some insights as to whether the composition of grave goods can indicate sex for the cremation graves. Unfortunately, graves 7 and 40 held no grave furnishings. Grave 16 held a stone artefact, an adze was deposited in graves 51 (type 2) and 111 (type 1). Grave 111 also held a piece of ochre and four SFs. A single sherd was found in grave 64. The different assemblages show that it is unlikely that grave goods alone could be an indication of the sex of the deceased.

12.5.2 Grave assemblage for sexed graves

The various material analyses can be combined with the results of physical anthropological research to get a better insight into which grave goods were deposited according to biological sex and age. However, there are reservations concerning the attribution of sex and age by physical anthropology due to fragmented state of most of the cremations (§7.4). Still, a division by age and sex instead of gender as Van de Velde undertook offers a more objective view on the furnishing of the graves. This is not only valid for the cremation graves but also for the inhumation graves, as the composition of the grave goods is rather similar (see §6.6.6).

Fig. 12.11 shows the total amount and division of grave goods attributed to male or female cremation graves, regardless of age. The figure clearly shows that female graves were furnished with more pottery and adzes than male graves. Male graves yielded more ochre fragments. But all three categories are present in male and female graves. Type 1 and type 3 adzes have only been found in female graves. Other stone artefacts and blades were also absent in male graves.

Fig. 12.12 shows the division of grave goods according to age. Most grave goods were found in mature/senile graves (seven graves). Graves thought to belong to infants and/or children (four graves) contained some (undecorated) pottery as well as type 2 adzes. Type 1 and 3 adzes seem to have been reserved for adults (possible only females), as were most of the other artefact categories. There seems to be no difference with respect to the various grave goods for adult versus mature/senile graves.

⁵³³ Trautmann 2006.

⁵³⁴ Van de Velde 1979.

⁵³⁵ Flomborn (Richter 1968/69); Aiterhofen (Reinecke 1978); Nitra (Pavuk 1792); Sengkofen (Osterhaus 1975); Niedermerz

(Dohm-Ihmig 1983)

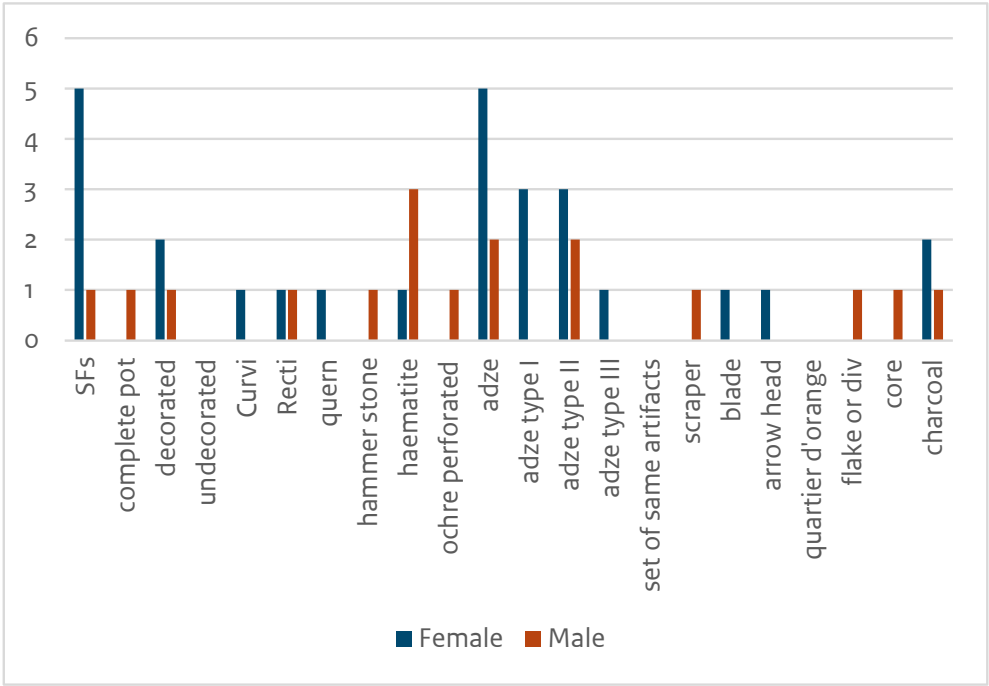


Fig. 12.11 Distribution of grave goods per female or male cremation grave.

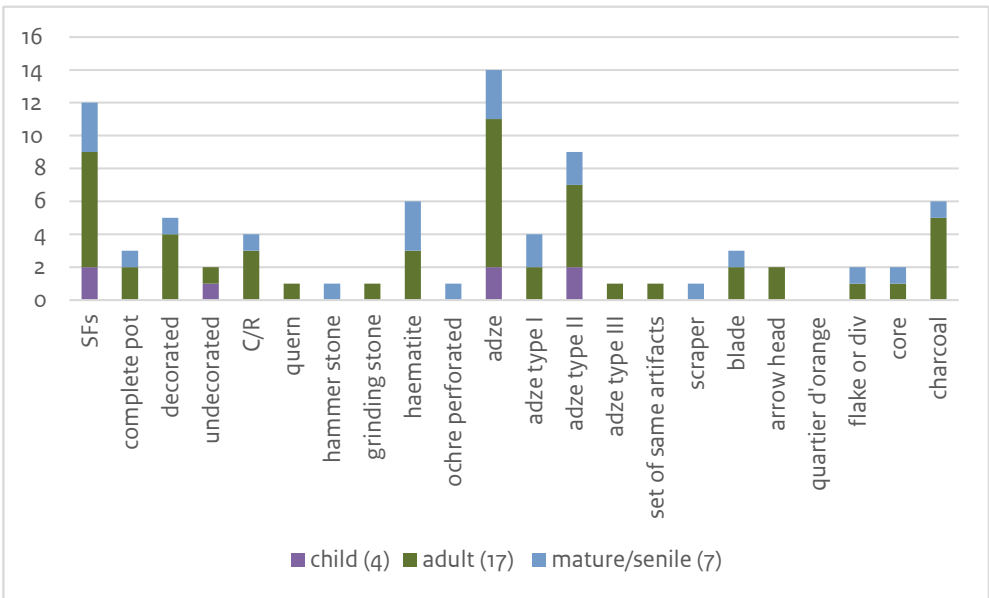
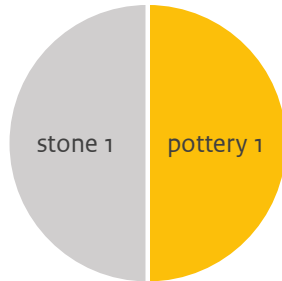
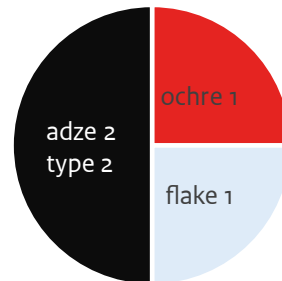


Fig. 12.12 Distribution of grave goods per cremation grave according to known age of the buried individual.

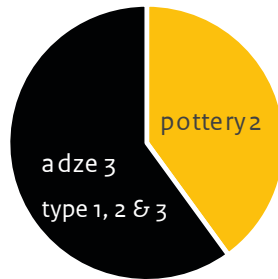
Female 18+ (3 graves)



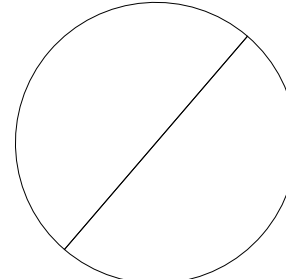
Male 18+ (2 graves)



Female 20-40 (3 graves)



Male 20-40 (0 grave)



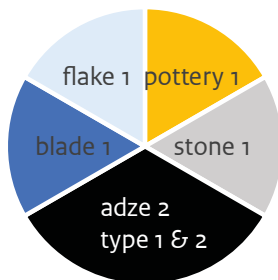
Female 30-50 (3 graves)



Male 30-50 (1 grave)



Female 40-60 (1 grave)



Male 40-60 (1 grave)

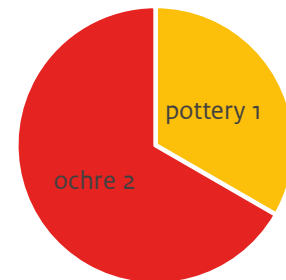


Fig. 12.13 Division of female- and male-associated grave goods. Total number of goods for selected graves are given behind each category.

A final comparison can be made when combining sex and age as has been done in Fig. 12.13. Interestingly, adzes are present in female graves regardless of age. Especially young adult males seem to be furnished with adzes. The amount of burial goods appears to increase with age for female graves. For male graves there seems to be no such difference. The number of graves to which both sex and age could be attributed to is fairly low (fourteen graves), about 10 percent of the graves present within the burial ground. While less attention should be paid to the absence and/or presence of the grave goods –also keeping in mind that the cremation grave furnishings are probably incomplete– a trend is visible: grave goods are not restricted to a single age category and sex, and adzes are not restricted to age and/or sex. This implies that attributing a single type of grave good to either sex or age does not seem feasible, at least for the Elsloo cremation graves.

12.6 An alternative approach to grave goods

Most approaches towards LBK burial ritual are based on the division of grave goods per (sexed or aged) individual. These studies primarily focus on the material category and typology of the furnishings.⁵³⁶ Most attention has been accorded to adzes, arrowheads and querns as presumed indicators for gender. Ultimately these studies assume –one way or another– that burials reflect the structure of the living society, for example in terms of socio-economic status, gender relations or age groups.⁵³⁷ Palaeopathological and bioarchaeological work provided a (much) needed addition to the discussion.⁵³⁸ Besides, we have to consider that the burial rite was more open-ended and less restricted than previously thought where funerary rites included the extended interference with the dead.⁵³⁹

Grave goods remain the primary focus also for this study, but aspects concerning the way of disposal of the body in a pit (or not), cremated or inhumed, and functional studies of the artefacts provide new approaches for our understanding of the burial ritual. Of interest are the composition of the grave goods assemblages in terms of different kind of furnishings per grave. At Elsloo, 29 graves held no grave goods at the bottom or in

Table 12.3 Division of grave goods in terms of use.

Category	Activity	Items
Domestic		decorated pottery
	food gathering, storage and preparation	undecorated pottery
	clothing	sickle blades
	harvesting	querns
		quartier d'orange
Craft		scrapers (hides)
	wood working	adzes
	making of tools	cores
		grinding stones
		hammer stones
		blades
		ochre
		flakes
		scrapers
	Hunting	hunting equipment
butchering		arrowheads
Ornaments	personal items	animal teeth/bones
		perforated ochre
No furnishings	-	-

the fill of the burial pit (most of them cremation graves), 36 graves contained one grave good and 44 graves held two or more grave goods (up to seven). This division changes when the composition of grave goods is not merely looked at in terms of single items (i.e. sherd, adze, quern, arrowhead, etc.), but when goods are grouped according to their raw material (i.e. ceramics, stone, flint, organic). This slightly different classification shows that 27 graves have one kind of raw material, two different kinds were found in 27 graves, three different kinds were found in 23 graves and all four classes were found in just six graves. The rather limited choice (available or archaeologically preserved) of raw materials shows an interesting pattern, regardless of how many items were present in a single grave. It might be possible that a combination of various tools could have been desired in the burial ritual.

A different approach regarding the composition of the grave goods assemblage has been carried out by Wilhelm-Schramm, who also noticed the combination of grave goods and who made a division, based on (presumed) use⁵⁴⁰, into:

⁵³⁶ i. e. Augereau 2021; Hedges *et al.* 2013; Modderman 1988; Van de Velde 1979; Farruggia 1992; Nieszery 1995; Jeunesse 1997; Zvelebil & Pettitt 2008.

⁵³⁷ Hofmann 2020a, 16.

⁵³⁸ Hofmann 2020a, 16; Bentley *et al.* 2012.

⁵³⁹ Hofmann 2020a, 17; but also Hofmann 2015; Hofmann & Bickle 2011; Wilhelm-Schramm 2009.

⁵⁴⁰ Wilhelm-Schramm 2009.

Table 12.4 Division of grave goods categories.

Category	Graves		Inhumation		Cremation	
	N	%	N	%	N	%
Domestic	59	52%	44	70%	15	30%
Craft	23	20%	12	19%	1	2%
Hunting	18	16%	16	25%	2	4%
Ornaments	3	3%	1	2%	2	4%
No furnishings	39	35%	13	21%	26	52%
Combination						
Domestic-Craft-Hunting	7	6%	6	10%	1	2%
Domestic-Craft	18	16%	11	17%	7	14%
Craft-Hunting	7	6%	6	10%	1	2%

1. Graves with pottery;
2. Graves with ornaments;
3. Graves with tools and hunting equipment;
4. Graves with no furnishings.

Based on our use-wear analysis it seems possible to make a more detailed distinction between graves with tools and hunting equipment. We propose an alternative division (Table 12.3) which also incorporates the presumed use of grave goods as indicated by the use-wear analysis (see chapter 9). Only grave goods from the primary deposit (finds at the bottom of the burial pit) were included in this analysis.

Table 12.4 shows the division of these categories for the Elsloo burial ground. Over half of the graves are outfitted with items that relate to the domestic area (primarily pottery). Items related either to craft or hunting are less present, but found in around one in five graves. Combinations between different categories are rare. The combination of domestic and craft items could be overexaggerated due to restrictions in the use-wear analysis, which sometimes is not discriminating enough regarding the presumed use of an item. This especially applies to items which belong to multiple categories (especially domestic and craft but also hunting) like adzes, scrapers and blades. Without use-wear analysis a specific attribution regarding the performed activity is difficult to make. These items have been scored for both categories which account for an overrepresentation of the combination of

domestic and craft items. It is therefore possible that the three combinations do not vary as much (especially the combination of domestic and craft tools). The combination of domestic and craft tools (present in 16% of the graves) occurs presumably far less frequent. Attributing items to other categories would lead to an increase of other combinations than domestic and craft. Presumably, each combination would occur in ca. 10 percent of the graves.

Spatially these categories are presented in Fig. 12.14. Most striking at first hand are the graves with no furnishings which are dominant in the western part of the burial ground. Here, most cremation graves are located for which the taphonomic restrictions regarding the presence or absence of grave goods is already discussed extensively. Disregarding the empty graves, it is clear that there is no clustering of graves with the same composition of grave goods or that in the older or younger part of the burial ground a difference can be seen in the division of compositions. The same distribution arises even when the distorted assemblages of the cremation graves are also disregarded. If the composition of the grave goods per grave may be interpreted as a special kind of ritual where attention is paid towards the composition. However, it is apparent that special choices were made which resulted in a differentiation in the amount as well as the composition of grave goods received.

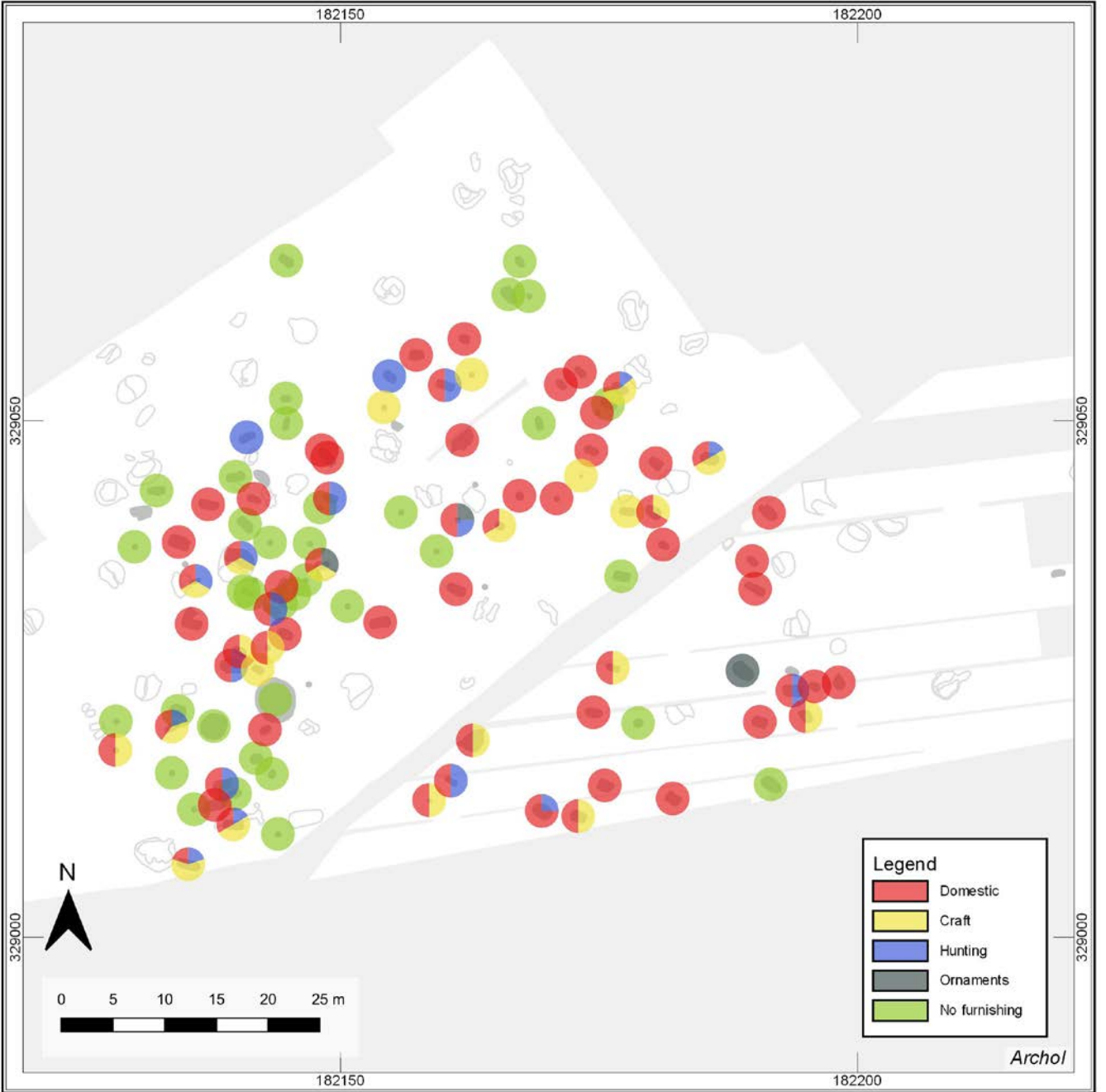


Fig. 12.14 Distribution of grave goods according to domestic, craft, hunting, ornaments and no furnishing.

I.M. van Wijk

13.1 Introduction

The Netherlands is located on the north-western fringe of the LBK territory. There are three known LBK burial sites in the Netherlands, of which Elsloo is the largest and best known.⁵⁴¹ As argued by Van de Velde and others, the number of burials is but a small percentage of the occupants of the LBK settlements in Dutch Limburg, indicating that many deceased were disposed of in alternative ways.⁵⁴² However, when we look at the characteristics of burial at Elsloo⁵⁴³ and other, better preserved LBK cemeteries, then it is clear

that while there is an important degree of diversity, there are also trends that point to rules governing body position, orientation and grave goods.⁵⁴⁴ This is especially the case when compared to contemporaneous and later traditions of non-megalithic burial in the wetland communities of the Lower Rhine Area, where there is little structure and diversity is almost the rule.⁵⁴⁵ These trends fall into a wider pattern in which many aspects of LBK life appear to have been governed by distinct rules and traditions, including settlement location and development, orientation and structure of the houses, structure of the yard, raw material procurement, pottery production and so on.⁵⁴⁶

⁵⁴¹ Modderman 1970.
⁵⁴² Van de Velde 1979.
⁵⁴³ Van de Velde 1979; 1995.
⁵⁴⁴ i.e. Bickle & Whittle 2013.
⁵⁴⁵ Louwe Kooijmans 2007.
⁵⁴⁶ Sommer 2001; Bickle & Whittle 2013; Amkreutz & Van Wijk 2020.

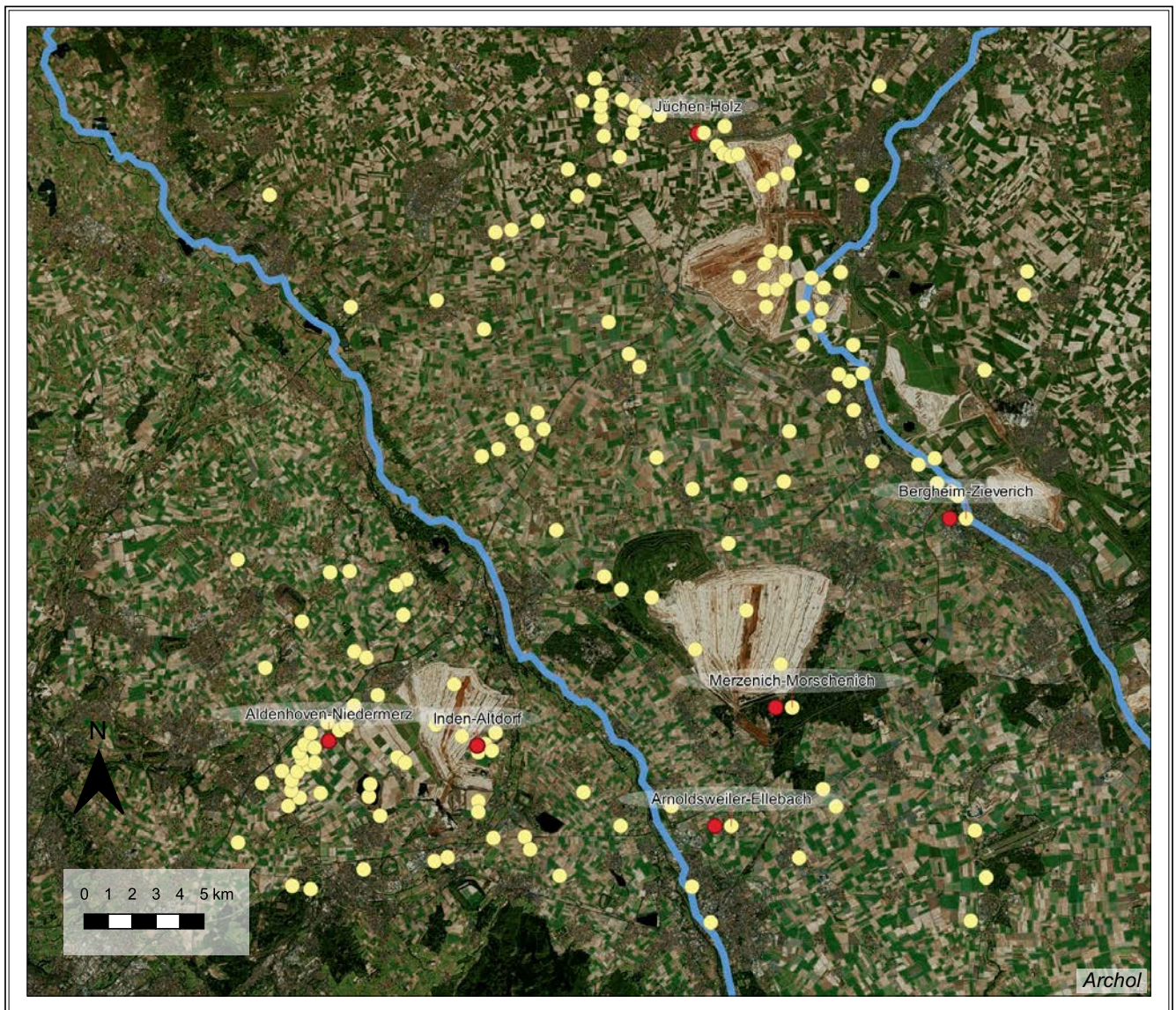


Fig. 13.1 Distribution of LBK settlements and burial grounds in the Rhineland (source: Balkowski 2018, abb.3).

Table 13.1 Main characteristics of the burial grounds in the Rhineland and Elsloo.

Burial ground	total graves	Grave type			Characteristics			average depth burial pits (range in cm)	chronology
		inhumation graves	cremation graves	double	burial ground size	vicinity to settlement (m)	conditions		
Aldenhoven-Niedermerz	113	102	10	1?	5600	400	north part eroded	45 cm (10-105)	Oldest LBK - Final LBK
Arnoldsweiler-Ellebach	229	222	7	3	8800	20	eroded topsoil	26 cm (05-81)	Oldest LBK - Final LBK
Bergheim-Zieverich	30	30			1400	10	partly excavated, eroded >1m	-	Older LBK - Late LBK
Elsloo-Koolweg	113	66	47	2?	6150	50	colluvium	88 cm (14-151)	Older LBK - Final LBK
Inden-Altdorf	120	118	3	2	6850	500	eroded >1m	34 cm (07-85)	Older LBK - Final LBK
Jüchen-Holz	60	59	3		4000	500	colluvium	? (50-200)	Late LBK - Final LBK
Merzenich-Morschenich	280-282	260	12-19		6825	100	eroded >1m	-	Oldest LBK - Final LBK

The nearest Bandkeramik neighbours can be found in Belgium, in the loess-covered parts of the Hesbaya region. To the east, LBK settlements are situated in the adjacent German Rhineland. This large region, which encompasses the lands on the banks of the Rhine, stretches from the North Palatinate Uplands in the south to the Bergisches Land and Hessen in the (north) east. The area is largely part of the federal states of North Rhine-Westphalia and Rhineland-Palatinate. The Rhineland, and more particularly the Niederrheinische Bucht, is home to many Bandkeramik settlements and seven burial grounds. This archaeological wealth has become apparent due to the long-term investigation by the Landschaftsverband Rheinland (LVR) and Köln University of large-scale lignite open pit quarries, especially in the Elsbahtal region and the Aldenhovener Platte. These regions are geographically very similar to the southern province of Limburg in the Netherlands. The LBK settlement clusters of the Graetheide and Aldenhovener Platte are found at arm's length, a 35 km day march from each other. The Graetheide, Rhineland and Hesbaya settlement clusters encompass the north-western limits of Bandkeramik territory.

The closeness of the Rhineland burial grounds, as well as similarities in settlement pattern and composition of the cemeteries, provide common ground for a brief interregional comparison of the burial grounds. Van de Velde, for instance, already made several observations based on comparisons between Elsloo and Niedermerz.⁵⁴⁷ Trautmann highlighted the

cremation ritual for multiple burial grounds, including Elsloo.⁵⁴⁸ In the light of new excavations at Arnoldsweiler-Ellebach and Inden-Altdorf, comparisons between the different burial grounds were made by several researchers.⁵⁴⁹ In this chapter the sites of Elsloo-Koolweg, Arnoldsweiler-Ellebach, Aldenhoven-Niedermerz, Bergheim-Zieverich, Inden-Altdorf, Jüchen-Holz and Merzenich-Morschenich (see Appendix II) will be compared. For this we will merely point out similarities and deviations from a bird's eye view.

13.2 Taphonomy

To make assumptions about (regional) variability between burial grounds, burial rites and the attribution of grave goods to sex, gender or even kinship, a base line must be set. It is tempting to focus on (big) numbers of grave goods. Yet the provided data must be comparable,⁵⁵⁰ not only in terms of used typology and attribution of grave goods, but also with respect to the sites' preservation.⁵⁵¹ The burial grounds of Bergheim-Zieverich, Inden-Altdorf and Merzenich-Morschenich (see Appendix II) have all been subject to severe erosion or agricultural processes. The average depths of the burial pits from these site (Table 13.1) show that depths are primarily shallower than 50 cm, whereas the average depth of the Elsloo burial pits is 88 cm. Only the site of Jüchen-Holz seems to be hardly touched by soil erosion or agricultural processes

⁵⁴⁷ Van de Velde 1979; 1993; 1995; 2011.

⁵⁴⁸ Trautmann 2006.

⁵⁴⁹ Peters 2018; Balkowski 2018 (Arnoldsweiler-Ellebach) and Heller 2014 (Inden-Altdorf).

⁵⁵⁰ The authors wish to thank Nadia Balkowski, Hans-Christoph Strien, Frank Hartel, Daniela Hofmann and Robin Peters for sharing their data and answering questions about the burial grounds.

⁵⁵¹ Pechtl & Hofmann 2013, 124.

and some of the burial pits reach down to 2 m below surface.

Regionally, the burial ground of Elsloo-Koolweg stands out for its many cremation graves (Table 13.1). The question is whether this may be seen as a typical feature for Elsloo-Koolweg, or whether there are other possible explanations. In the Rhineland burial grounds cremation graves are rather scarce. Less than 10 percent of the excavated graves were labelled as cremation graves, while at Elsloo the total is estimated at 50 percent. This rather large difference would suggest that regional variability exists. However, of the selected burial grounds Elsloo was the first to be excavated. A historical reconstruction of the landscape as well as observations made during excavation showed that the burial ground of Elsloo-Koolweg was impacted by ploughing, but parts of even shallow cremation graves still remained, resulting in their large number. Differences in visibility also influence these totals. Many cremation graves from Elsloo-Koolweg yielded very little calcined material, which makes them difficult to spot if the topsoil is removed mechanically. The Aldenhoven-Niedermerz cremation graves also contained very little calcined bone, while the seven Arnoldsweiler cremation burials contained a lot.⁵⁵² We therefore think that the more shallower cremation graves have been disturbed by ground working processes like mechanical ploughing and some of the ones with very little calcined bones might have been missed while excavating, especially when the top is mechanically removed (which is why the excavation strategy at Elsloo-Koolweg was adjusted, see §6.2).

Statements about body position and orientation are a lot more difficult when no bones are preserved, like in Arnoldsweiler-Ellebach and Jülich-Holz. Finally, the intactness of the grave goods assemblage in each grave is of importance as well. Erosive and mechanical processes could negatively impact the dataset, which is tricky to compare sites if taphonomy is disregarded.

13.3 Lay-out

Regarding the size (number of burials) and the area used as a burial ground some differences

but also similarities exist. As Peters already pointed out, burial grounds appear to be located much closer to contemporary settlements than previously assumed.⁵⁵³ Still, there remains a certain distance between the settlement and cemetery, albeit it sometimes only amounts to 10-50 m like at Arnoldsweiler-Ellebach, Aiterhofen, Bergheim, Elsloo, Essenbach and Stephansposching.⁵⁵⁴ This also illustrates the idea of a fluid border between settlement burials and “regular” burial grounds.⁵⁵⁵ It could also be an indication that settlement burials would have been present in Elsloo (or other settlements with nearby burial grounds) but due to poor bone preservation were never detected or recognised.

There is virtually no hard evidence that physical boundaries existed. The lay-out of the Elsloo-Koolweg burial ground suggests such a boundary, but no archaeologically remaining features were found. However, a group of burials seems to be enclosed by a palisade or ditch at the burial site of Charmoy.⁵⁵⁶ An 18 m long palisade has been suggested as a boundary between the settlement and burial ground of Arnoldsweiler-Ellebach as well, but this is still under debate.⁵⁵⁷ The presumed marking of the graves above ground would imply that demarcation was necessary or wanted and part of the burial rites. It also implies that the ritual of burying did not stop after the deceased was interred and visual memory was created which lasted for a longer period of time.

Merzenich-Morschenich supposedly is the largest burial ground in the Rhineland consisting of almost 300 graves and was in use from the Oldest LBK until the Final LBK. Similar numbers have been suggested for Arnoldsweiler-Ellebach, which seems reasonable looking at the total area that was used (Table 13.1). Even at the “smaller” burial grounds like Elsloo-Koolweg, Inden-Altendorf and Aldenhoven-Niedermerz a rather large area was used as burial ground.

Most burial grounds in the Rhineland date from the Oldest or Older LBK and remain in use until the final stages (Final LBK). Only the site of Jüchen-Holz seems to be in use for a shorter period of time. The elongated shape of the burial grounds of Inden-Altendorf and Aldenhoven-Niedermerz might have been caused by multiple, smaller cemeteries which in time grew closer. These smaller parts could belong to moieties, each of them using different parts of a larger burial ground.⁵⁵⁸ Differences in the division of

⁵⁵² Graves 3412, 3432 and 4954 had a “dense nest of burnt bones”

⁵⁵³ Peters 2018, 237 vs Kahlke 1954; Pavuk 1972, 123.

⁵⁵⁴ Peters 2018, 237; Hanoffner & Siftar 2007, 39-40; Schmotz 1992, Fig. 3.; Brink-Kloke 1990, 428; Heinen 2005, Fig. 1.

⁵⁵⁵ Peters 2018, 237; Veit 1996.

⁵⁵⁶ Veit 1996, 92.

⁵⁵⁷ Peters 2018, 237; Ungerath 2014a, 128-129; Balkowski 2018.

⁵⁵⁸ Van Velde 1993; 1995; 2011.

grave furnishings, like in Aldenhoven-Niedermerz, or differences in the orientation of the burial pits (e.g. Inden-Altendorf) could be attributed to such moieties. This could also explain why there seems to be no clear chronological distribution. Bi-partitions have been documented at other burial grounds as well, like Stephansposching and other Bavarian burial sites.

13.4 Cremation graves

As illustrated before Elsloo-Koolweg stands out for its many cremation graves. As Table 3.3

shows, not many burial sites with significant numbers of cremation graves are known. No more than 12 percent of the total amount of know burials are cremations. But sites like Aiterhofen, Fellbach-Oeffingen, Ingenheim, Stephansposching and Wandersleben raise the question whether this is caused by regional variability in the burial ritual or is a result of taphonomy. The finds retrieved during field surveys at the site of Arnoldsweller indicate that many more (cremation) graves presumably existed, but have been eroded or destroyed by subsequent agricultural activities. For Stephansposching, it is also estimated that numerous graves have been completely

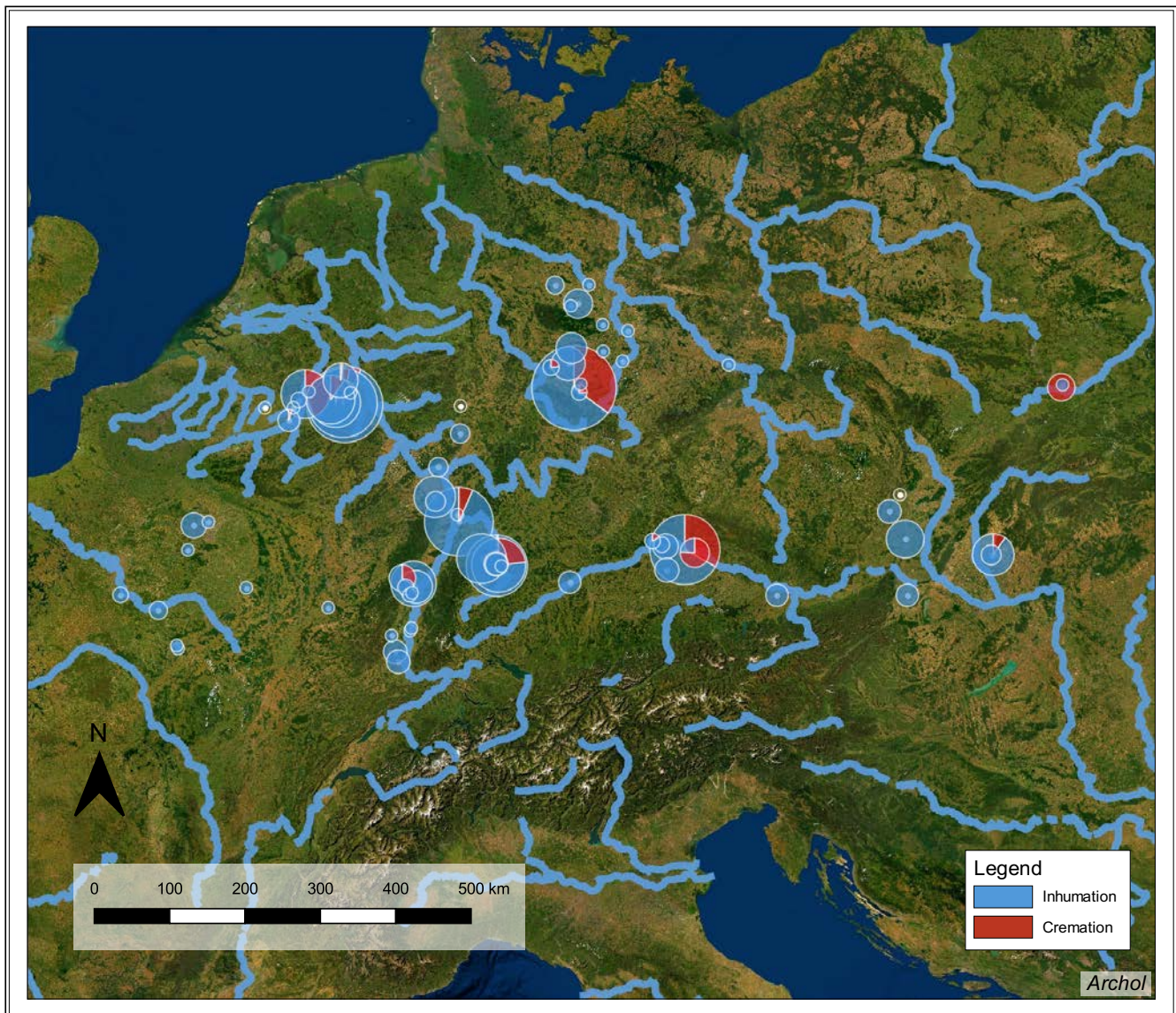


Fig. 13.2 Distribution of burial grounds with cremation and inhumation graves.

orientation of all inhumations in the LBK is E-W, although large regional variations exist, as is also the case for the Rhineland.⁵⁶² Noteworthy is the presence of a less dominant, “antipodal” orientation at most burial grounds, also in the Rhineland (Fig. 13.3).⁵⁶³

was chosen in the Rhineland. Even on a larger scale there is no broader geographical pattern such as exists for the direction of house orientation, partly also because there is such a large variety within the burial grounds.⁵⁶⁴ The Rhineland dataset (n=649) offers potential insights into regional variations or at least a chance to see if other factors were considered as well (Fig. 13.4). Regarding the position of the deceased the dataset is dominated by the

The orientation of LBK graves has been subject to many studies, but it remains unknown why predominately an NW-SE or NE-SW orientation

⁵⁶² Hedges et al. 2013, 376.
⁵⁶³ Hedges et al. 2013, 376; Jeunesse 1997, 63.
⁵⁶⁴ Bradley 2001; Whittle 2012; Hedges et al. 2013, 376.

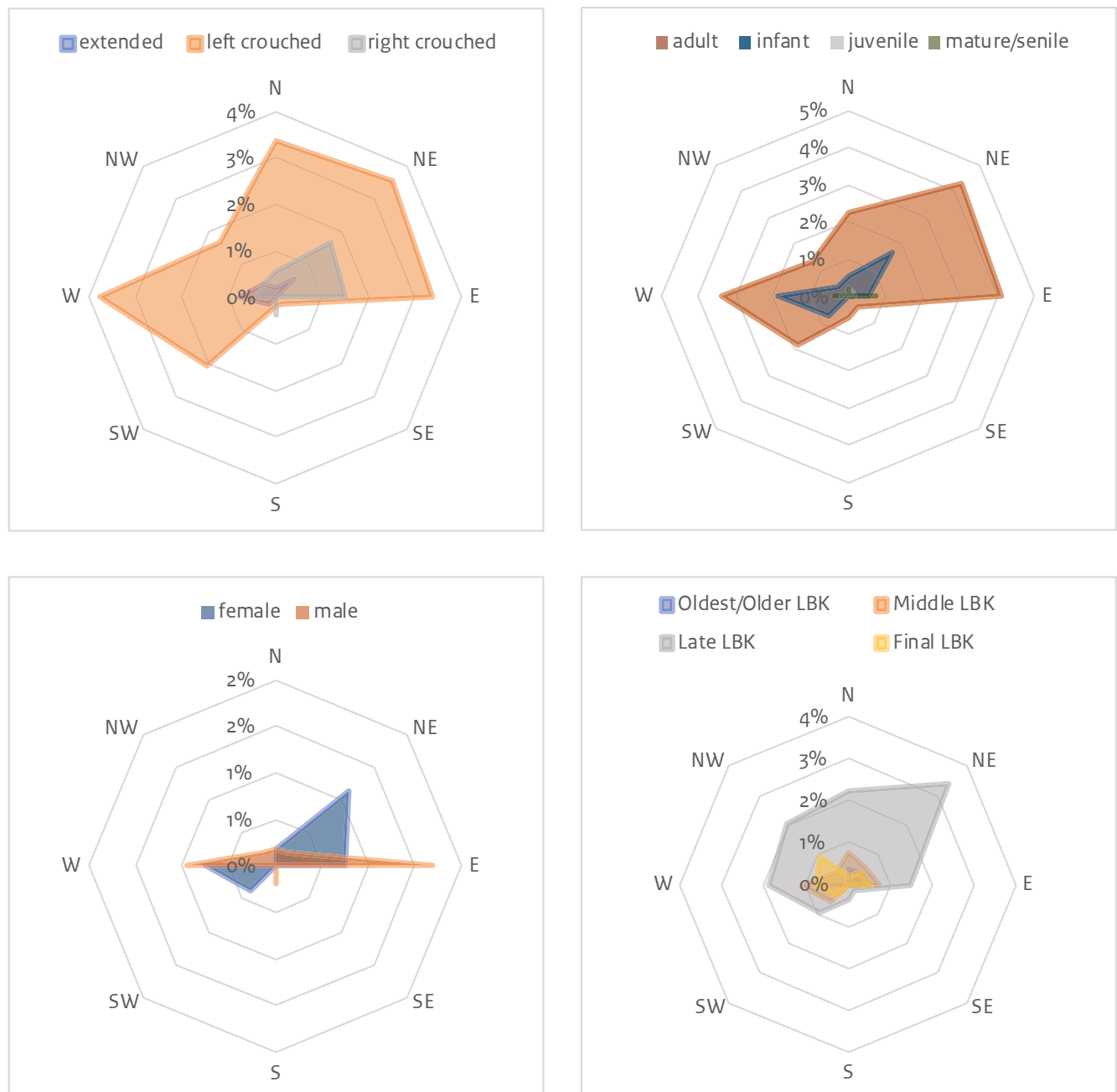


Fig. 13.4 Main grave orientation according to body position, age, sex and chronology.

Arnoldswweiler-Ellebach burial ground due to better bone preservation. Left-crouched burials are dominant throughout most regions of the LBK, apart from Upper Austria (right-crouched) and Basse-Alsace (extended).⁵⁶⁵ Still, in the Rhineland a trend is visible whereby left crouched individuals (n= 98) can be oriented in almost all cardinal directions, while right crouched graves (n=26) are predominantly oriented towards the north-east. All age categories are oriented towards the north-east or south-west. Apparently, age was no consideration with respect to orientation, although we have to point out that only 25 percent of the total dataset (n=139) could be correlated. The same applies for the sexed graves, as males (n=18) tend to be oriented more towards the east or west than females (n=17), regardless of age. Overall, as in the other regions, the body position does not vary significantly with sex or across the age categories.⁵⁶⁶

The position of the body in the grave (left-crouched or right-crouched) and burial orientation (dominant and secondary/antipodal) were in some way connected to the lifeway of the deceased. Yet it remains unclear in what way. Isotope analysis hints that there is a relationship between how the body was treated and the origin or life history of the deceased.⁵⁶⁷ Regional variability in body position and orientation does suggest that these factors were of importance in

the burial rite and not random, yet a definite explanation still eludes us.

At both Arnoldswweiler-Ellebach (grave 5840) and Elsloo-Koolweg (grave 98) charcoal layers were documented in the burial pits. Anthracological examination of these remains showed that these were solely made from oak, fuelling the idea that these were used as a boarding. Other charcoal layers suggest that the deceased were deliberately covered with charcoal, like at Arnoldswweiler-Ellebach (grave 3934) and Elsloo-Koolweg (grave 96).

The diachronic attribution of graves is severely hampered due to the limited possibilities for either absolute or relative dating (decorated pottery, ¹⁴C dating of the youngest graves). Only 18 percent of the graves could be dated (n=121). Of these, most graves are dated to the Late and Final LBK (n=66), while only nine graves can be dated to the Oldest or Older LBK and 46 graves date into a wide span from the Older LBK to the Late LBK.

13.6 Demography

The burial grounds of Arnoldswweiler-Ellebach and Elsloo-Koolweg are the only ones that have yielded information about sex or age (Fig. 13.5). Although only a small part of the grave dataset

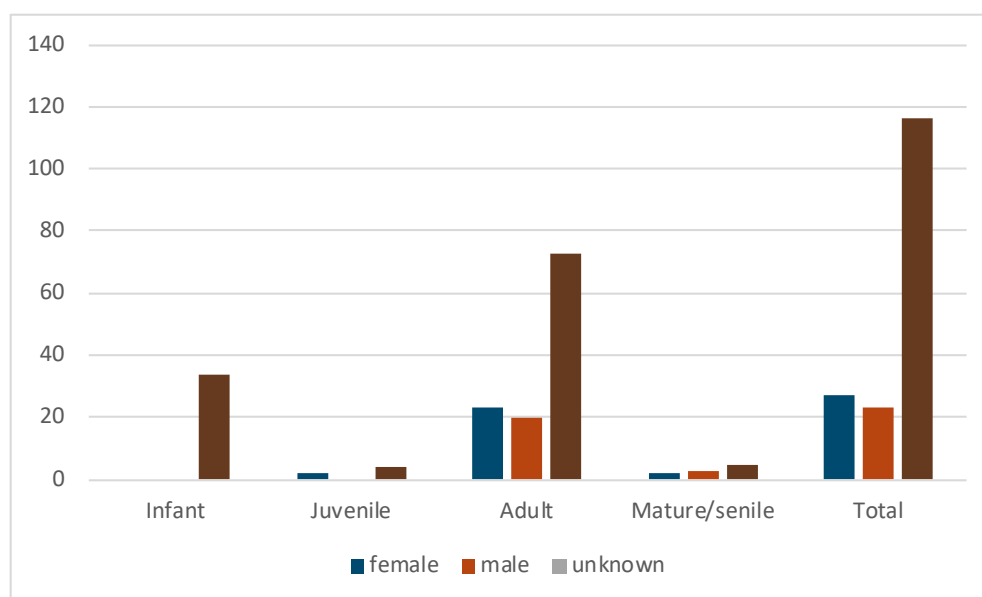


Fig. 13.5 Distribution of age/sex for Arnoldswweiler-Ellebach and Elsloo-Koolweg.

⁵⁶⁵ Hedges et al. 2013, 377.

⁵⁶⁶ Hedges et al. 2013, 377.

⁵⁶⁷ Hedges et al. 2013, 376.

Table 13.4 Age distribution per LBK phase for Arnoldsweiler-Ellebach and Elsloo-Koolweg.

	Infans	Juvenile	Adult	Mature/senile
Oldest LBK			3	
Oldest - Older LBK				
Older LBK				
Older - Middle LBK	2	1	3	
Middle LBK	1		4	
Middle - Late LBK	1	1	9	1
Late LBK			8	1
Late - Final LBK			2	
Final LBK				
Not dated	30	4	87	7
Total	34	6	116	9

could be attributed to sex and age, in general it can be stated that all ages (from infans until senile) are present within the current dataset. Most apparent is the underrepresentation of juveniles. This division is documented for all the LBK regions where 69 percent of the graves belong to adults/matures/seniles, 6 percent to juveniles and 25 percent to children (Table 3.3). Juveniles are the most resilient age category, and demographically it can be expected that they would be less susceptible to an early death. The average life expectancy of an individual living in the early Neolithic was 28 years.⁵⁶⁸ The life expectancy of males was slightly higher than that of females.⁵⁶⁹ The majority of the cremated individuals in the LBK died between the age of 20 and 40, which corresponds well with this average life expectancy.⁵⁷⁰

There are 42 graves (6%) that could be attributed to sex and LBK phase (Table 13.4). Chronologically there seems to be no special differentiation regarding orientation. The rather small dataset is restrictive here as well. In conclusion, it can be stated that the Rhineland dataset shows that biological sex and age proved not to be decisive factors regarding the choice for a particular body position.

grave goods between the different burial sites, but also regarding sex and age categories (Table 13.7). Diachronic distribution patterns are difficult to assess, as most graves date to the Late or Final LBK (§13.5). The focus of this section lies on objects and grave good assemblages which are thought to play a significant role in the LBK burial rite.⁵⁷¹

Most of the time (average ca. 70%) LBK people were put to rest in their own grave and buried with various objects.⁵⁷² Sometimes multiple persons were buried in one grave, or the deceased lay in a single grave without any furnishings. In the Rhineland we also see that most (average 66%) deceased were buried with grave goods in the fill of the pit and/or on the bottom of the grave (Table 13.7). As we do not have detailed information for all sites about the original location (fill/bottom) of the grave goods within the grave, we have chosen to sum all finds and compare them, regardless of the caveats discussed earlier (§6.6.2, §12.3 and §13.2).

When the presence of grave goods is compared with the preservation conditions of the various burial grounds, it is striking that at Jüchen-Holz only 59 percent of the graves were furnished while at the eroded site of Inden-Altdorf over 69 percent of the graves were furnished. At Arnoldsweiler-Ellebach, even with its better bone and organic preservation, only 60 percent of the graves held any goods. Just under 30 percent of the “unfurnished” burials were child graves. The burial grounds of Aldenhoven-

⁵⁶⁸ This expectancy is severely influenced by a very high child mortality in the first years after birth.

⁵⁶⁹ Trautmann 2006; Bach 1978, 20ff; Nieszery 1995, Spatz 2002.

⁵⁷⁰ Trautmann 2006.

⁵⁷¹ Hedges *et al.* 2013, 378.

⁵⁷² Bickle & Whittle 2013, 19.

13.7 Grave goods

The Rhineland dataset (Appendix III-VIII) offers a lot of possibilities regarding the distribution of

Niedermerz (77%) and Elsloo-Koolweg (73%) contain the most graves with grave goods. The question remains if these differences are caused by taphonomic (i.e. erosion or ploughing) or methodological (excavating by hand or excavator) processes, or if they are caused by different local burial rites. The number of grave goods in the fill can be an indication whether taphonomic or methodological processes are to blame.

A division can also be made with respect to the total number of grave goods per grave for the different burial grounds. In the whole LBK distribution area, just under half of all furnished graves (46%) have more than one grave good.⁵⁷³ The same holds for the Rhineland and Elsloo-Koolweg burial grounds (46%). The graves at Aldenhoven-Niedermerz held the most grave goods (3.9 goods per grave), while Arnoldsweiler-Ellebach (1.8), Bergheim-Zieverich (1.2) and Jüchen-Holz (1.4) held on average less than 2 goods per grave. Elsloo-Koolweg (2.6) and Inden-Altendorf (2.4) are better furnished. Only half the size in terms of burials, Aldenhoven-Niedermerz contained almost twice as much grave goods per grave as found at Arnoldsweiler-Ellebach. When comparing numbers, it seems that the graves at Aldenhoven-Niedermerz and Elsloo-Koolweg were outfitted with more stone and flint tools, which may provide (part of an explanation) for

why Arnoldsweiler-Ellebach has fewer grave goods. But this also applies to Inden-Altendorf. Here, fewer stone and flint artefacts have been found, but there is much more pottery. An overall pattern arises where, regardless of taphonomy or methodology, a choice is made regarding the type of grave goods deposited. It would be tempting to argue that these choices were made due to accessibility to certain types of raw materials. Both settlements of Arnoldsweiler-Ellebach and Inden-Altendorf yielded few adzes.⁵⁷⁴

All burial grounds have the same trend whereby graves with a high amount (5-10 or >10) of grave goods are less frequent, except for Aldenhoven-Niedermerz (Table 13.7). Here, more than 27 percent of the graves yield five to ten grave goods, while the figure at other burial grounds is less than 15 percent. While the other burial grounds have a more or less equal division of burial goods in terms of quantities per grave, Aldenhoven-Niedermerz is again the exception. This “richness” can be especially attributed to the number of arrowheads and blades, which are present in abundance in comparison with the other cemeteries. Both Elsloo-Koolweg and Aldenhoven-Niedermerz have more adzes per grave; elsewhere, one adze per burial seems to be the “standard”. In the LBK region, graves with more than three grave goods are generally

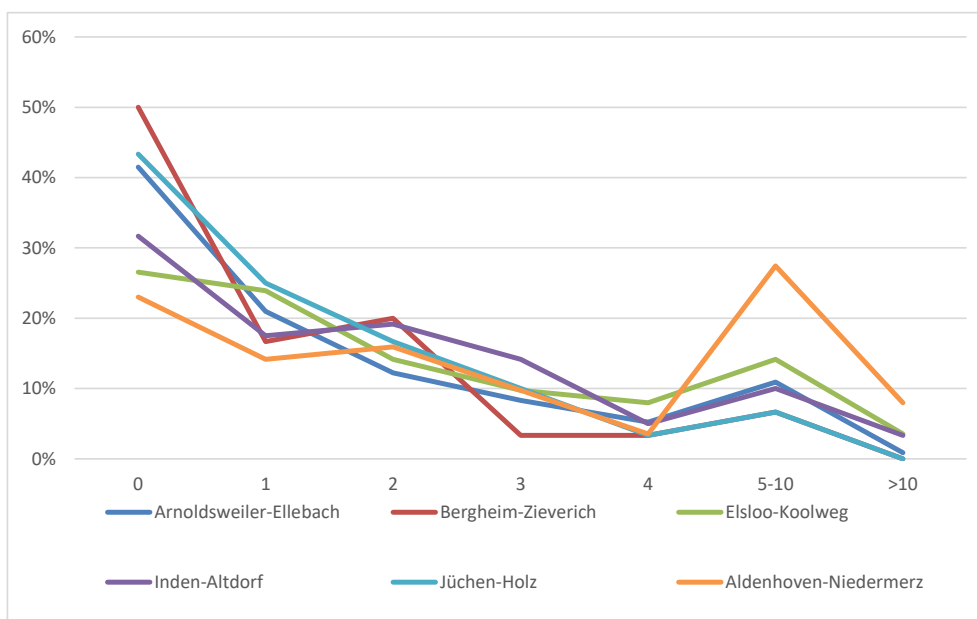


Fig. 13.6 Number of grave goods per grave in the different burial grounds.

⁵⁷³ Hedges et al. 2013, 380.

⁵⁷⁴ Peters 2018, 165.

Table 13.5 Recurrent ‘packages’ in the Rhineland.

	Vessels (>2)	Blades (>2)	Arrowheads (>2)	Arrowheads/ blades	Lumps of ochre (>2)	Adzes (>2)	Adzes/ arrowheads	Flakes (>2)
Aldenhoven-Niedermerz	39	3	9	10	2	7	21	1
Arnoldsweiler-Ellebach	60	1	5	3	4		9	1
Bergheim-Zieverich	3			3			2	
Elsloo-Koolweg	26	2	4	2	1	5	13	4
Inden-Altendorf	45		3	2			4	
Jüchen-Holz	13	2		2	2	1	1	
Aldenhoven-Niedermerz	35%	3%	8%	9%	2%	6%	19%	1%
Arnoldsweiler-Ellebach	26%		2%	1%	2%		4%	
Bergheim-Zieverich	10%			10%			7%	
Elsloo-Koolweg	23%	2%	4%	2%	1%	4%	12%	4%
Inden-Altendorf	38%		3%	2%			3%	
Jüchen-Holz	22%	3%		3%	3%	2%	2%	

attributed to adults (more likely men than women), as was the case in Elsloo-Koolweg where three or more grave goods were present.⁵⁷⁵ But at Elsloo-Koolweg they belong to five female and three male graves. At Arnoldsweiler-Ellebach 86 percent of the age-determined “richer” graves were attributed to adults, of which six graves belong to females and ten to males. Infants (four graves) and juveniles (two graves) could receive more than three grave goods as well.

Several items or sets of the same artefacts, like a bundle of arrows or an arsenal of blades, are present within all the burial grounds and also in our study area (Table 13.5). These recurrent “packages” could be indicative of sex and age.⁵⁷⁶ It remains the question if we should place so much emphasis on the combination of these tools, as complete packages of organic materials are missing, objects may have been taken away, and functional use, as indicated by use-wear analysis, is mostly uninvestigated.⁵⁷⁷ Some graves from Inden-Altendorf (graves 42, 59, 61 and 89) and Aldenhoven-Niedermerz (grave 55) contain more than ten ceramic vessels in one grave. Over 31 graves from the Rhineland and Elsloo-Koolweg contain more than five ceramic vessels per grave. Especially Inden-Altendorf (38%) and Aldenhoven-Niedermerz (35%) have more graves with many vessels per grave. At Aldenhoven-Niedermerz bundles of arrows or

the combination of arrows and blades are much more present than at the other burial grounds. At Bergheim-Zieverich the combination of blades and arrowheads is also more frequent (10%). Elsloo-Koolweg (6% of the graves) and Aldenhoven-Niedermerz (4%) have several graves with more than two adzes each. The combination of adzes and arrowheads is observed at all the burial grounds, but mostly in just a small number of graves (average 4%). But this combination is much more present at Aldenhoven-Niedermerz (19%) and Elsloo-Koolweg (12%). Fifteen of these “packages” could be attributed to sexed remains, ten to male graves and five to female graves, all adults (including three matures/seniles).⁵⁷⁸ Children do not receive such “packages” and only one comes from a juvenile grave. All the other 25 graves belong to adults, of which four matures/seniles. Table 13.6 shows the different “packages” per age category and sex. Adzes and arrows, and adzes and blades are both present for male and female graves. A bundle of arrows as a sole package seems to occur only with adult male graves, but arrows in combination with other goods are also present in female graves, especially in combination with adzes and blades. Packages of ochre seem to be restricted to male graves as well. Blades occur with male and female graves. It is tempting to relate “packages” to male or female graves, as some grave goods may be seen as strong indicators for

⁵⁷⁵ Hedges *et al.* 2013, 380.

⁵⁷⁶ Nieszery 1995; Jeunesse 1997; Zvelebil & Pettitt 2008; Hofmann 2010; John 2011; Hedges *et al.* 2013, 381.

⁵⁷⁷ Hedges *et al.* 2013, 381; Lenneis 2010; Hofmann 2019.

⁵⁷⁸ The biological sex has been determined through physical anthropological analyses for Arnoldsweiler-Ellebach and Elsloo-Koolweg.

male graves, like the bundle of arrows.⁵⁷⁹ However, they rather seem to be age determined, although one infant was given multiple lumps of ochre. The adze as an artefact alone does not seem to be a strongly sexed grave good for males, in contrast to what is frequently mentioned in the literature.⁵⁸⁰ Use-wear analysis, as carried out for Elsloo-Koolweg but also for Nitra and Vedrovice could shed more light on the function of the adzes (i.e. wood working, hide processing) to see whether a sex or age differentiation is apparent (see §14.6).

Differences regarding the other grave furnishings are also apparent between the different burial grounds (Table 13.7), apart from pottery. Pottery seems to be present in similar amounts at all the burial grounds (average 52% per burial ground) except for Bergheim-Zieverich, which yielded far less pottery (20%). Over 60 percent of the graves at Aldenhoven-Niedermerz and Inden-Altdorf contained pottery, which is above average. The number of complete vessels is more or less the same for all the burial grounds (average 25%). There is more variability regarding the division of decorated and undecorated pottery, as sometimes decorated pottery is favoured over undecorated pottery like at Aldenhoven-Niedermerz, Elsloo-Koolweg and Jüchen-Holz.

Querns, grinding or hammer stones, or other stone tools are only present in low quantities. At Arnoldsweiler-Ellebach and Jüchen-Holz no or almost no querns were found,

but other stone tools were present more abundantly at Arnoldsweiler-Ellebach. Over 10 percent of the graves at Aldenhoven-Niedermerz, Elsloo-Koolweg and Merzenich-Morschenich yielded querns or quern fragments, mostly covered with ochre powder. Lumps of ochre are present in equal number at all the sites. Sometimes lumps of ochre are deposited within ceramic vessels, as was documented for Elsloo-Koolweg (grave 89) and Arnoldsweiler-Ellebach (grave 5797). Sometimes these lumps of ochre are perforated like in Elsloo-Koolweg (grave 47), Inden-Altdorf (graves 60, 71 and 85) and Jüchen-Holz (grave 037-11). The burial ground of Aldenhoven-Niedermerz contained considerably more ochre than Arnoldsweiler-Ellebach. At this latter site no ochre powder was found on any of the stone tools and also not on the bones.⁵⁸¹

Most adzes from cemeteries in the Rhineland are made from amphibolite (n=76) and to a lesser extent basalt (n=48). Only Elsloo yielded lydite adzes, making up 15 percent of the total there. At other sites other raw materials, like Revinien quartzite or Grauwacke, were used and deposited. Most of the adzes were flat adzes (type 1) or thick adzes (type 2). The slender, thick adzes (type 3) are a rare find and are only represented at Arnoldsweiler-Ellebach and Elsloo-Koolweg. The average length of the adzes is 9.1 cm and many are shorter than 5 cm, which suggests that they are reworked. Longer adzes (longer than 18 cm) were found at Aldenhoven-Niedermerz, Elsloo-Koolweg, Inden-Altdorf and Merzenich-Morschenich, but are rare finds. The

⁵⁷⁹ Hedges *et al.* 2013, 378.

⁵⁸⁰ Augereau 2021, 964-965; Hedges *et al.* 2013, 378; Modderman 1988, 119; Van de Velde 1990; Farruggia 1992; Nieszery 1995; Jeunesse 1997; Zvelebil & Pettitt 2008.

⁵⁸¹ Peters 2018, 196. Use-wear analysis at Elsloo showed traces of ochre on tools which visually did not carry any traces.

Table 13.6 'Packages' per age category and sex.

Age	Sex	Adzes/blades	Adzes/arrows	Adzes/flakes	Adzes/blades/arrows	Ochre/adze/blade/arrow	Ochre	Ochre/blades	Ochre/adzes/blades	Arrows	Blades	Blades/arrows	Blades/flakes
Child	indet						1						
Adult	male	1	2				1			3		1	
	female		1		1			1			1		
Mature/senile	indet	1	3	1					2	2			1
	male	1	1				1						
	female	1											
	indet					1							

Table 13.7 Division of grave goods per burial ground

	burials	grave goods present	no grave goods	Pottery					Stone										
				vessels	complete vessel	decorated	undecorated	sherds	quern / grinding stone	stone various	ochre	adze	adze amphibolite	adze basalt	adze lydite	adze other	adze type I	adze type II	adze type III
Aldenhoven-Niedermerz																			
Sum				166	52	83	53	173	10	16	25	47	33	11		2	23	17	
N	115	89	26	72	35	51	32	53	10	16	21	37	28	10		1	18	17	
%		77%	23%	63%	30%	44%	28%	46%	9%	14%	18%	32%	24%	9%		1%	16%	15%	
Arnoldsweiler-Ellebach																			
Sum				251	36					17	16	25	12	11		2	5	15	2
N	229	138	91	107	25					11	8	25	12	11		2	5	15	2
%		60%	40%	47%	23%					5%	3%	11%	5%	5%		1%	2%	7%	1%
Bergheim-Zieverich																			
Sum				9		2	7	8	3		2	6	6				4	2	
N	30	15	15	6		2	4	5	3		2	6	6				4	2	
%		50%	50%	20%		7%	13%	17%	10%		7%	20%	20%				13%	7%	
Elsloo-Koolweg																			
Sum				127	39	33	18	61	13	3	19	45	14	17	6	2	15	19	4
N	113	83	30	55	30	24	15	61	13	3	17	38	13	16	5	2	15	16	2
%		73%	27%	49%	27%	21%	13%	54%	12%	3%	15%	34%	12%	14%	4%	2%	13%	14%	2%
Inden-Altendorf																			
Sum				209	38	99	110	152	10	6	10	15	7	6			4	6	
N	121	83	38	73	25	43	56	51	8	6	10	15	7	6			4	6	
%		69%	31%	60%	21%	36%	46%	42%	7%	5%	8%	12%	6%	5%			3%	5%	
Jüchen-Holz																			
Sum				52	18	6	3	43	1	1	8	10	4	3		1			
N	63	37	26	33	16	4	3	18	1	1	6	8	4	3		1			
%		59%	41%	52%	25%	6%	5%	29%	2%	2%	10%	13%	6%	5%		2%			
Merzenich-Morschenich																			
Sum																			
N	280								13		10	33							
%									11%		9%	29%							
Sum				814	183	223	191	437	37	43	80	148	76	48	6	7	51	60	6
N	671	445	226	346	131	124	110	188	35	37	64	129	70	46	5	6	46	60	6
%		66%	34%	52%	25%	30%	27%	28%	5%	6%	10%	19%	10%	7%	1%	1%	8%	9%	1%

Sum refers to the total amount of grave goods while N refers to the number of graves per site. Data for Merzenich is incomplete.

set of same artefacts	Flint							Various			totals
	scraper	blade	arrow head	flake or various	core	strike-a-light	animal bone	charcoal	calced bone		
8	4	63	91	16	7	1		35	20	446	
8	2	25	26	13	6	1		35	20	finds per grave	
7%	2%	22%	23%	11%	5%	1%		30%	17%	3.9	
7	1	24	40	40	1			7	12	422	
7	1	12	19	19	1			7	12	finds per grave	
3%	0,4%	5%	8%	8%	0,4%			3%	5%	2%	1.8
1		6	9	1						36	
1		4	5	1						finds per grave	
3%		13%	17%	3%						1.2	
9	2	29	29	23	4			1	25	43	295
5	1	15	10	13	3			1	24	41	finds per grave
4%	1%	13%	9%	12%	3%			1%	21%	36%	2.6
3		6	20	7	1	2			42	10	286
3		6	8	6	1	2			42	10	finds per grave
2%		5%	7%	5%	1%	2%			35%	8%	2.4
		12	2	2	1				12	5	89
		8	2	2	1				12	5	finds per grave
		13%	3%	3%	2%				19%	8%	1.4
			10								
			9%								
28	7	140	191	89	14	3		8	126	83	1574
28	5	72	74	54	13	4		8	126	83	2.35
4%	1%	21%	28%	13%	2%	0,4%		1%	19%	12%	

latter burial ground provided a most peculiar find of a 38 cm long adze made from basalt. The type 2 thick adze was broken into three pieces and deposited in the grave. Remarkably, one of the three pieces was put in the wrong order, suggesting this was an intentionally deposited broken adze.⁵⁸² But most adzes, at other burial grounds, show signs of extensive use. Some could have been used for as long as 8-15 years.⁵⁸³ They are not only used for working wood, as the use-wear analysis showed (Fig. 4.3), although the contrary is usually suggested.⁵⁸⁴ Adzes are mostly associated with wood working, but also with hide processing and cultivation.

Flint blades and arrowheads are predominantly present at Aldenhoven-Niedermerz. Overall, less than ten percent of the graves are furnished with arrowheads, but at Aldenhoven-Niedermerz they are present twice as often. The flint assemblage is completed by flakes and to a (far) lesser extent cores, scrapers and strike-a-lights. Strike-a-lights are found especially at Inden-Altdorf (graves 14 and 35), Maastricht-Lanakerveld (grave 68.12) and Aldenhoven-Niedermerz (grave 22). They are mostly part of firelighter kits, which contain pyrite, cores and/or blades as well.⁵⁸⁵ Strike-a-lights can be considered a personal item as well. Especially the absence of tools typical in LBK settlement contexts, like scrapers, flint drills, arrow shaft smoothers and spindle whorls, is noticeable for all burial grounds.

The patterning of grave goods is hampered by the purely typological attribution of most lithic and stone assemblages, which allows us only to make comparisons based on presumed

use. Use-wear analysis is a welcome addition, as a more functional interpretation of tool use (or absence of use) can be made. At the moment, data are only available for Elsloo-Koolweg, Vedrovice (Moravia, Czech Republic) and Nitra-Horné Krškany (Slovakia).⁵⁸⁶

A final remark can be made regarding organic tools or containers and animal bones. Apart from animal bones and teeth found in eight graves at Arnoldsweiler-Ellebach and one animal bone tool from Elsloo-Koolweg, almost no organic remains are preserved. Organic remains may be indicative of food offerings used during the burial ritual.⁵⁸⁷ Bones mostly of domestic sheep/goat or pork were found in graves at burial grounds in Ingenheim and Aiterhofen, Dillingen, Stuttgart-Mühlhausen and Stephansposching.⁵⁸⁸ Dietary rituals are difficult to interpret when bones are lacking. Lipid residue analysis, which can be used to determine the contents of ceramic vessels, proved to be successful at Elsloo, which shows the potential for ceramic assemblages from other burial grounds as well. Slightly better preservation conditions at Arnoldsweiler-Ellebach yielded more organic items. Most noteworthy is an oak platter of some kind on the feet of the deceased of grave 3354. On this “platter” the upper and lower jaw of a second individual were deposited.⁵⁸⁹ In grave 5840 a large piece of oak was found on the back of the deceased.⁵⁹⁰ Presumably more wooden objects would have been used during the burial ritual, but are usually missing due to unfavourable preservation conditions.

⁵⁸² Gaitzsch & Janssens 2010, 40-41 and Abb. 39.

⁵⁸³ Ramming 2007, 264.

⁵⁸⁴ Hedges *et al.* 2013, 378; Modderman 1988, 113; Ramming 2007.

⁵⁸⁵ Nieszery 1995, 164.

⁵⁸⁶ Van Gijn & Verbaas (this publication); Masclans Latorre 2020; Masclans *et al.* 2021; Masclans Latorre, Bickle & Hamon 2021.

⁵⁸⁷ Arbogast 2013.

⁵⁸⁸ Arbogast 2013, 259.

⁵⁸⁹ Ciesla & Ibeling 2014, 142; Peters 2018, 404.

⁵⁹⁰ Ciesla & Ibeling 2014, 143; Peters 2018, 404.

14 LBK burial practices in the Netherlands and the Rhineland

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14.1 Introduction

Since its initial recognition, the LBK has been at the centre of attention of many archaeological studies. This pan-European Early Neolithic culture left its marks through large parts of West and Central Europe. Moreover, its –at first glance– uniform material culture and house building offers great potential for comparative analyses not only at a local but regional or even interregional level. Most focus has always been directed at the domestic life of the early farmers, as many of their settlements have been excavated. Other profane or mundane aspects of (presumably) daily life are more difficult to extract from the vast dataset but are getting more and more noticed.⁵⁹¹ Special attention is reserved for LBK burials, either isolated or in clusters of graves in settlements, in mass-graves but predominantly in larger burial grounds or cemeteries.

The vast archaeological dataset, especially the artefacts left behind by the LBK people, offer many narratives for (parts of) our understanding of this Early Neolithic society. (New) finds are being interpreted based upon previous knowledge. In contrast, our understandings of ancient societies are mainly derived from the ethnography and cultural anthropology of supposedly similar present-day societies.⁵⁹²

The general motor of Early Neolithic society is kin. As Van de Velde clearly put it: “...*leadership and labour, marriage and death are all regulated by and according to kin arrangements (e.g., Gero & Conky 1991; Lévi-Strauss 1958 & 1975, Parkin & Stone, eds., 2004)...its economic structure, the way in which labour, work and action are recruited and their products are distributed –in neolithic society all through kin. It is the lineage (larger kin group) which organizes marriage, agriculture, herding and hunting, house building and war.*”⁵⁹³ The institutionalised division of labour between women and men, and age as a ranking principle, provide the social basis for this society.⁵⁹⁴ The roles adult women and men, children and elders play in the production and reproduction of society is fundamental to the division of labour.⁵⁹⁵ Where discarded waste in settlement pits offers limited possibilities for identifying sex and age, our primary knowledge is derived from the skeleton in the burial grounds. However, the sex of the

deceased is a biological attribution and does not fully determine the deceased's social life according to her/his socially defined gender role, which may or may not be predicated on her/his biological sex.⁵⁹⁶

This important social aspect hampers our understanding of the burial rite when binary attributions are only used to differentiate between the sexes. The focus for burial studies therefore lies predominantly on grave goods, as they are believed to be strongly linked to the (final) social role of the deceased.⁵⁹⁷ Grave goods could be personal items of the deceased, objects or food offerings used for the burial ritual, and/or gifts from relatives.

Grave good studies primarily tend to rely on typological and functional approaches in order to identify biological sex and hopefully give clues towards gender. But these objects often carry a biography of their own.⁵⁹⁸ For example, typologically adzes could be classified into various types, while use-wear analysis creates a functional classification which cross-cuts the typological distinction. And yet we still do not know to whom an adze belonged or was given. It is with these reflections in mind that the “Elsloo revisited” project was started. The aim was to identify the different sexes based on osteological research of the cremated individuals and to test earlier statements about sex based on the study of Van de Velde.⁵⁹⁹ Additionally, pottery analysis in combination with lipid residue analysis and use-wear study was carried out to gain insight into the condition and biographies of the grave goods before they were deposited into the grave. The growing understanding that the burial ritual is subject to regional patterns made it necessary to compare the Elsloo-Koolweg burial ground with neighbouring burial grounds in the Rhineland.

14.2 Variabilities in Lifeways

The foregoing introduction to the LBK burial ground at Elsloo-Koolweg has led us to expect that there are clear local patterns in occupation practices and especially in burial rites. In particular the diversity of burial rites and traditions, though hampered by issues of preservation, seems to forewarn against drawing easy conclusions based on gender, age, or status. At first, traditional

⁵⁹¹ I.e. Hofmann (ed) 2019.

⁵⁹² Van de Velde 2011.

⁵⁹³ Van de Velde 2011, 57.

⁵⁹⁴ Allen et al., eds., 2008; Van de Velde 2011, 57; Van de Velde 2016.

⁵⁹⁵ Van de Velde 2011, 58.

⁵⁹⁶ Van de Velde 2011; Van de Velde 2016; Bickle 2020.

⁵⁹⁷ Van Gennep 1909; Van de Velde 2011, 58.

⁵⁹⁸ Hofmann 2015.

⁵⁹⁹ Van de Velde 1997.

approaches, such as statistical analyses,⁶⁰⁰ were used as a good starting point but they need to be combined with multi-proxy approaches in order to move beyond binary interpretations.⁶⁰¹ This also applies to inferences based on, amongst others, skeletal material. A new standard in that respect was set by the “Lifeways project”, published in 2013.⁶⁰² This major study collated evidence from cemeteries, settlement burials, and settlements ranging from northern Hungary westwards along the Danube and up into the Rhine valley and Alsace, focusing on topics such as diet, lifetime mobility, health and mortuary ritual. It had the aim to demonstrate LBK diversity in lifeways, particularly through isotope analysis, but also through osteological information and other archaeological patterning. This was an exciting step forward, as it allowed for the detection of regional patterning and choices made at the village or even kinship level. Moreover, it clearly demonstrated the existence of aspects such as personal mobility, differentiation in diet, etc. Despite that, it is striking that one of the main conclusions is that the degree of homogeneity should not be downplayed. The stable isotope values suggested the existence of similar diets over wide areas and recurrent subsistence practices. Also, the strontium isotope evidence, the osteological evidence and the funerary information in particular point to the existence of many cross-regional similarities, such as the existence of rules of patrilocality. Taken together, the Lifeways researchers argue that there is convincing evidence there was “a shared way of doing things throughout the LBK” and that “kinship and descent were important factors in community networks”.⁶⁰³

It should be pointed out that the evidence is limited for the datasets used, which means that there are distinct filters including the predominance of information from cemeteries in a wide but central part of Europe, where sufficient information was available. Nevertheless, the importance of uniformity in lifeways should be stressed.⁶⁰⁴ On the other hand, the existence of regional patterning and localised choice and the reasons for that should not be underestimated, as the project recurrently found evidence for diversity as well, at varying scales. For instance, isotope data for the burial grounds of Aiterhofen and Schwetzingen show that two groups with

different childhood dietary practices used these cemeteries. Other isotopic evidence pointed to differences in animal husbandry practices between the Rhine and Danube valleys and osteological studies highlighted differences in health and stress between groups. In addition, funerary evidence pointed to regional variation, although no distinct correlation in dietary practices could be detected, and isotope analysis here again also indicated the presence of regional outliers and therefore of “significant variation at the margins of dominant practices”.⁶⁰⁵ What the Lifeways project and its impressive dataset demonstrated is the existence of a basic LBK theme that was shared in space and handed down across generations. The existing and documented variability and outliers were not so much alien to this LBK formula, but an integral part of it, including alternative ways incorporating for instance the use of woodland or uplands.⁶⁰⁶ This more than anything calls for a perspective that analyses the diversity as integral to the well-known LBK uniformity, while at the same time valuing its role in providing increased understanding because of its divergence from the mean.

How does this reflect on the study at hand? Clearly there are implications and limitations to be mentioned. The revision of the Elsloo-Koolweg evidence is of course of a much more limited scope. Where the Lifeways project focused on those sites that provided qualitative and quantitative information from a European perspective, the case study here is local and regional. Nevertheless, the importance of the Elsloo-Koolweg cemetery should not be underestimated. Its presence at the north-western edge of the LBK range is interesting in itself, also given the fact that it has already been intensively studied and used in many comparisons with other burial grounds. Furthermore, its association with the largest LBK settlement in the Netherlands and its regional position in one of the most intensively studied *Siedlungskammer* indicates that while the material to work with may not always be ideal, mainly due to issues of preservation, its contextual position to a large extent compensates for that. This study therefore may importantly add to our understanding of the north-western LBK for a number of reasons:

- It may clarify the potential and limitations of multi-proxy approaches for Neolithic

⁶⁰⁰ Van de Velde 1979.

⁶⁰¹ e.g. Masclans *et al.* 2020; 2021

⁶⁰² Bickle & Whittle 2013.

⁶⁰³ Hedges *et al.* 2013, 384.

⁶⁰⁴ sense Modderman 1988.

⁶⁰⁵ Hedges *et al.* 2013, 384.

⁶⁰⁶ Hedges *et al.* 2013, 384.

settlement and cemetery remains with limited preservation, as is the case for the entire Pleistocene part of the Netherlands. In addition, it provides indications for the potential of archaeological material that has been stored in depots but neglected for many decades;

- It may elucidate the dynamics between cemetery and settlement, both for Elsloo-Koolweg, the Graetheide plateau and the wider region;
- It may provide a more detailed understanding of the role and function of grave goods in relation to both the social composition of the cemetery, and the characteristics of the mortuary practices;
- It may provide a welcome addition to the sparse knowledge on aspects such as gender, mobility, diet and regional characteristics for the LBK in the Netherlands and the whole of north-western Europe.

Clearly the scope of this study is novel for the Neolithic in the Netherlands and for LBK studies here so far. While for quite some time it was believed that too little was preserved to be able to add information to the existing traditional analyses, this has now changed. Research methods and detection thresholds do enable the investigation of lifeways and their variability. The challenge, as has been demonstrated by the Lifeways project, lies in how diversity should be studied against the overwhelming evidence for uniformity that exists within the LBK as a whole. The position of the individual, the local and the regional should be valued for the degree to which it differs from what we know and to what extent that expands the inherent diversity of LBK lifeways.

14.3 Social implications

Burials have always been of interest to archaeologists and the broader public because they offer the best opportunity to feel close to “our ancestors”, particularly when skeletal remains are preserved. In the most favourable preservation circumstances, we are able to look past people in the face. Their study has also offered archaeologists the chance to make assumptions about origin, mobility, social “status” and societal role of the deceased

individually and within the community. The (final) social role of the deceased in this respect has often been assumed to be represented by the goods that accompany them in their graves.⁶⁰⁷

To illustrate the challenges involved in interpreting social structure we have focussed on the aspects of sex, age and gender within the burial context. As argued by Bickle and Whittle,⁶⁰⁸ the increase in documented LBK burials in cemeteries, especially during the large-scale excavations between the 1960s and 80s, has given rise to studies focusing on these features to interpret social structure, identity and, as was already pointed out by Modderman, regional variation.⁶⁰⁹ One of the first to work with these burial datasets was Van de Velde.⁶¹⁰ His work tried to come to terms with aspects of gender and age to be able to make inferences about the division of labour and status. It is important to note here that this is a difficult terrain. Even when the sex of a skeleton can be undoubtedly identified, this is a biological categorisation that may have differed from the socially defined gender role (see above).⁶¹¹ Similar caveats apply to skeletal age and an age group’s role in society. In that sense, the extent to which age or gender groups are strictly delimited socially, and/or correspond to our modern expectations, is open to investigation. Biological identification is therefore one aspect in creating a societal role, but should be treated with care. Unfortunately, in the western part of the LBK many cemeteries are situated in areas that suffer from decalcification of the loess, thus yielding merely cremated remains, enamel or body shadows. As such, much emphasis is placed on the grave goods and position of the graves, especially in the work by Van de Velde.⁶¹² For instance, presumed male graves are identified by arrowheads as a prime marker for hunting or warfare, and other objects such as adzes are identified as being male in a second step. Where these sets are found in paired graves interpreted as couples buried with complementary work-sets, females graves may then be identified, for instance through the presence of querns and pottery. In general, the socio-economic status is assumed to increase with access to and role in production, making it likely that those with most grave goods were the adults or elderly and therefore opening avenues to define children or senile individuals. In all

⁶⁰⁷ Van Gennep 1909; Van de Velde 2011.

⁶⁰⁸ See Bickle & Whittle 2013, also see Reineck 1979; Peschel 1992; Nieszery 1995; Jeunesse 1997; Frirdich 2003; Trautmann 2006.

⁶⁰⁹ Modderman 1988.

⁶¹⁰ e.g. Van de Velde 1979a, 1979b; 1993; 1995; 2011.

⁶¹¹ Pankowska 2008.

⁶¹² Van de Velde 1979.

these cases the well-known archaeological *adagium* “the dead do not bury themselves” should be noted and with it the realisation that some of the aspects of burial may point to traits other than gender, occupation, status or age of the deceased. Analysis based on burial position, type and grave goods should therefore be treated as an important baseline, but need not reveal a coherent pattern corresponding to predefined categories. The same goes for maybe all too easy identifications of strangers or outsiders in LBK cemeteries, such as those with an allegedly “Mesolithic” identity, based on grave goods.⁶¹³

Part of the reason for approaching these “traditional” methods of burial analysis with caution has been the success of recent stable isotope studies, and a shift in focus towards the actual practices of burial and the role of funerary sites and rites in the creation and manipulation of identity.⁶¹⁴ Isotope studies of strontium and carbon/nitrogen have provided insights into the mobility and diet of individuals, while a broadened scope on the mortuary practices has added dimensions of space, time and performance, allowing a more diversified perspective on the role of funerary ritual in the creation of identity.⁶¹⁵ For the aspect of gender in particular, and following from sexual division of labour, it has been acknowledged that gender is produced, performed and constructed and that methods that rely only on ethnographic or historical analogy have been limited in the interpretations they provide.⁶¹⁶ The combination with other methods is important and has led to the identification of novel aspects, such as evidence for birth control and childcare in relation to population growth, sex-based mobility patterns based on strontium isotope analysis, different sex-based diet orientations through dietary isotope analysis and a sexual division of labour based on muscular stress markers in osteological analysis.⁶¹⁷

Of course, it is important to note that the power of these approaches benefits enormously from the quality of the excavation data and above all the preservation of organic remains. The re-interpretation of the Elsloo-Koolweg cemetery has limitations on both counts, but the consequences of these studies and the broadened scope they have provided over the past two decades should be included in our analyses of the social implications of the burial

data. This does not mean that traditional approaches based on grave good analyses are less valuable, but rather that they should be combined with modern methods where possible and interpreted against the evidence from sites with better preservation. Only by broadening our scope is it possible to arrive at a more accurate assessment of the social implications of burial. Also, and importantly, apart from comparative research in relation to other burial sites, the use of modern methods and a broadened theoretical scope, it is important to re-integrate the burial evidence with both the accompanying settlement or settlements as a whole and the wider region. Funerary and settlement landscapes were not isolated, and it is necessary to study their development in space and over time in relation to each other. This is where the Dutch LBK may provide an exceptionally valuable addition, as it is one of the most well-researched and documented *Siedlungskammer* in the north-western LBK. This provides interesting opportunities for linking cemetery and settlement, burial and occupation, death and life.

In the following, several aspects of the patterns observed in chapter 13 will be evaluated. This will lead to an interpretation that focuses more on the characteristics and diversity of the burial ritual and what this diversity may express, instead of an analysis that uses the data for inferences about the structure of LBK society in rigid categorizations.

14.4 The burial ground in time and space

In chapter 12 the spatial analysis of the Elsloo-Koolweg burial ground has been presented. This yielded several distinct patterns. Most notably the cemetery did not start at the time the first longhouses of the settlement were built. This already poses the question why it started later on. Is this because the settlement grew beyond a certain threshold level? Or do the first graves belong to the first settlers, who of course did not die right away when the settlement was started? It is however remarkable that the first graves seem to be “richer” in grave goods, which could be seen as a tribute to the first settlers. In any case it is clear that not everybody from this blooming agglomeration was buried here. If we

⁶¹³ e.g. the hunter/warrior at Schwanfeld, Gronenborn 2003.

⁶¹⁴ Bickle & Whittle 2013; also see Frirdich 2003; Hofmann 2010; Boulestin *et al.* 2009; Zeeb-Lanz *et al.* 2009.

⁶¹⁵ see Bickle & Whittle 2013; also Bickle & Hofmann 2011; Frirdich 2003; Jeunesse 2003.

⁶¹⁶ Masclans *et al.* 2021.

⁶¹⁷ Masclans *et al.* 2021.

assume that, over the two centuries of its existence, the settlement was home to at least a thousand people, then its 113 graves are only a limited reflection of the overall population. Van de Velde estimates that in the course of the existence of the settlement of Elsloo-Koolweg, 120 to 180 people were buried there.⁶¹⁸ The fact that not everybody was buried in the cemetery was already remarked upon by Van de Velde, but it does beg the question what the decisive criterium was.⁶¹⁹ The enclosing ditch or demarcation of some kind that is assumed for Elsloo-Koolweg would have further emphasised this burial distinction. Was burial in the settlement more of a norm than in a cemetery, or is the dominant burial form beyond our archaeological scope? Burials (inhumations and to a lesser extent cremations) in cemeteries are archaeologically best recognisable although cemeteries are lacking in some areas like Hungary and the Paris Basin.⁶²⁰ The Lifeways database provided an overview of the variability in burial customs and showed once again that apart from cemeteries people were also buried in other contexts (i.e. settlements or enclosures, or both in cemeteries and settlement), and underwent different treatments (inhumation, cremation, interment on settlements and fragmentation).⁶²¹ Still, the larger part of the population seems not to be interred within a cemetery or settlement. Therefore it seems that cemetery burial was already a distinction in itself, perhaps based on social position, either ascribed (due to external factors like inheritance, sex or age) or achieved (acquired by achievements and abilities).⁶²² Female and male graves are equally present within the burial grounds, which implies that sex was not a significant aspect in choosing burial location.⁶²³ The age categories represented in cemeteries and settlements, however, are significantly different suggesting that some selection on the basis of age was made.⁶²⁴ In what way this putative social position that results in burial at a cemetery in the first place, is represented by grave goods remains part of the discussion. An important age threshold seems to be around the age of seven when grave good assemblages became more complex.⁶²⁵ At Arnoldweiler-Ellebach and Elsloo-Koolweg, 34 child burials (aged 0-12 years old) were found in total. Most of them (59%) did not contain any grave goods, the others were predominantly furnished with

pottery and sometimes another kind of items, such as an adze, multiple stone tools, lumps of ochre or a blade. This age division is also emphasised by the fact that not all (non-child) graves carry grave goods or that some child graves carry very many, “packaged”, or some special grave goods. Whatever the reason, we can exclude that the status displayed in the fact of burial in a cemetery is an achieved status, as all age groups were buried, albeit children’s graves are underrepresented. Another option is that many more people were cremated than have been archaeologically retrieved. The number of shallow cremation graves has been distorted due to taphonomic processes. If cremation is archaeologically underrepresented this would mean a major shift regarding the dominant burial form and calculations of the population being buried.

At another level a further issue arises, namely that Elsloo-Koolweg is by far the largest burial ground for the whole of the LBK *Siedlungskammer* in Limburg, both on the left and right side of the river Meuse. Does this mean the village and burial ground acted as a central place of burial and perhaps ritual for the larger region? Or are many other burial grounds still waiting to be discovered, like in the Rhineland, where 30 years passed between the excavation of Aldenhoven-Niedermerz and the discovery of the second burial ground? Burial grounds are archaeologically difficult to prospect. They yield few finds in the plough soil, which could easily be missed or misinterpreted during a field survey. Surface finds at the burial ground of Arnoldweiler-Ellebach were not identified as belonging to a burial ground until after the site was excavated.⁶²⁶ The burial pits are not picked up during geophysical surveys either. Two attempts carried out at Maastricht-Lanakerveld did not succeed in finding the burial ground.⁶²⁷ The notion that some cemeteries functioned as regional central places might be underlined by the burial ground of Aldenhoven-Niedermerz. Where many other cemeteries in the Rhineland and the Netherlands have settlements in the immediate vicinity, the burial ground of Aldenhoven-Niedermerz lies on its own between numerous settlements. This burial ground yields the “richest” graves compared to the other burial grounds, with many more grave goods per grave. But still, 23 percent of the Aldenhoven-Niedermerz graves were deprived of any

⁶¹⁸ Van de Velde 1993, 162.

⁶¹⁹ Van de Velde 1979.

⁶²⁰ Pechtl & Hofmann 2013, 124.

⁶²¹ Bickle & Whittle 2013; Pechtl & Hofmann 2013, 124.

⁶²² Collet 2006.

⁶²³ Hedges et al. 2013, 373.

⁶²⁴ Hedges et al. 2013, 373-374.

⁶²⁵ Siemoneit 1997, 35; Hedges et al. 2013, 374.

⁶²⁶ Czesla & Ibeling 2014, 147-148.

⁶²⁷ Van Wijk & Laan 2020.

– archaeologically preserved– grave goods; not significantly less in comparison to other burial grounds.⁶²⁸ It is important to realise these ideas before we take a closer look at the patterning within the cemetery itself, as we have not even begun to understand why and how cemeteries arose in the first place.

At Elsloo-Koolweg, the start of the burial ground can be placed in the Older LBK. The majority of the graves are probably dug during the Late LBK. What is important to underline here is that cremation graves were part of the first interments taking place and in fact dominate the earlier phase. It is unclear why this is, but it may point to a preference for cremation in the early phases of use of the burial ground. This could also relate to the idea that cremation in terms of investment, energetic cost and fiery display, cremation is the more impressive ritual, which would perhaps facilitate and consolidate the communal role the cemetery had to play in the earlier days. Of course, other motives are equally possible, and it is clear that cremations are an important part of the ritual across the whole LBK territory. But in the last phases the practice of cremation seems to be abandoned for some particular reason.⁶²⁹

Over time the central focal point of the burial ground seems to have shifted or wandered, much like the settlement. As (almost) none of the graves overlap or intercut it is clear that this also means a constant awareness and (likely) demarcation for a growing number of graves. This underlines the fact that not only the place was important as a resting place for the active community, but also that burials and in fact the deceased as ancestors remained of importance. In the next sections some examples will be discussed on how some graves may have been part of rituals of re-opening, secondary interment and perhaps extraction of skeletal material, cremation remains and/or grave goods.

While burial continues right until the end of the settlement, it is clear that most interments took place when the Elsloo villages (and others) blossomed during the Middle and Late LBK.⁶³⁰ This supports the idea that burial grounds in general were part of a phase of stability in the LBK, which does not mean that this culture was not characterised by continuously shifting group compositions and fissioning. In essence, the very rapid spread of the LBK and the later infilling of

the different *Siedlungskammern* indicate the separation of part of every new generation into new villages or even new settlement clusters further afield.⁶³¹ It is unclear whether parts of these larger structures in society, which run along kinship lines, can be distinguished in the cemetery. The data do not allow the identification of individual households over time, and it is also possible that people from other villages were buried at Elsloo as well. A possibility arises from the proposition by e.g. Van de Velde that moieties existed.⁶³² These intra-settlement divisions among clans would create patterning on a somewhat larger scale that may be observed. In the burial ground there exist hints at spatial clustering. Modderman argued for a distinction between an eastern and western part at Elsloo. These may be chronological, as there appear to be some differences in pottery decoration and richness of the graves; however, the idea of moieties may also be an option.⁶³³ The elongated shape of the burial grounds of Inden-Altendorf and Aldenhoven-Niedermerz might have been caused by multiple smaller cemeteries which in time grew closer together. These smaller clusters could belong to moieties or lineages, each of them using different parts of a larger burial ground.⁶³⁴ Furthermore it would be an attractive idea to think of cremation versus inhumation along those lines, but this does not seem to be the case, as cremation graves do not seem to cluster in any known burial ground.

14.5 For richer, for poorer. Body treatment and grave good composition and patterning

As has been argued above, status in burial has too often been attributed based on the quality and quantity of objects and associated with the traditional (and familiar) burial of complete corpses with grave goods.⁶³⁵ Over the past years discourse has gradually shifted to arrive at a more versatile and flexible explanation by focusing on the practice of burial itself and the many idiosyncratic aspects involved. Research has also moved beyond seeing a person as belonging to one or two categories, but accepting the idea of personhood and identity as a complex web in which different objects may

⁶²⁸ About 10% of the graves probably would have carried organic ornaments like spondylus shells or boar tusks as grave goods, which are missing in the Rhineland graves, probably due to poor preservation (Hedges *et al.* 2013, 379).

⁶²⁹ As settlements grew larger and consequently needed more agricultural land, a speculative lack of firewood might have caused the burial ritual to shift more towards inhumation.

⁶³⁰ Van Wijk 2016.

⁶³¹ Also Hofmann 2020b.

⁶³² Van de Velde 1979; Van de Velde 2011; Van de Velde 2016.

⁶³³ Modderman 1970, 69–74; 1988.

⁶³⁴ Van Velde 1993; 1995; 2011.

⁶³⁵ e.g. Bickle 2019; Frirdich 1994; 2003; Hofmann 2009.

indicate how a person was constituted beyond singular identifications of gender, age or status.⁶³⁶ This, for Elsloo-Koolweg, means that the composition of objects in individual burials should be investigated for patterning, while on the other hand we must accept that this patterning may very well arise from a multitude of factors. Of course, it is also a difficulty that so few human remains have been preserved and organic tools are absent as well, but nevertheless the focus on the burial rites and the objects has yielded a number of trends.

14.5.1 The burial

The graves were spread in an area of ca. 6150 m² and could have been enclosed by a ditch or some other kind of demarcation. First the south-western part of the burial ground was taken into use, which later on expanded towards the east. The burial pits hardly intercut, which suggests that they were marked above ground. It remains uncertain if cremation graves were marked as well. The cremation rites itself do not seem to be associated with status, age or gender, but something different. One of the initial stages of the rite is the cremation of the corpse on a funeral pyre before eventual burial. Anthracological research showed the use of primarily native taxa like oak, ash, hazel, *Malinae*, cherry and elm, mainly used in the form of logs. Branch wood was hardly used. In five out of seven cases, oak was used during the combustion and in four of the seven cases ash was present, which suggests that a selection was made regarding the choice of wood for the pyre. They are supplemented with species that were available in the immediate vicinity, such as hazel, *Malinae*, hornbeam and alder. If funeral pyres where erected on the ground surface, hardly any remains would be archaeologically visible due to (modern) post-depositional processes. Many burial pits (both inhumation and cremation), but also natural features like tree throws, contain (layers or concentrations of) charcoal which are indicative of fires (pyres?) on the burial ground. Empty spaces within the burial ground might thus have been reserved for pyres, although they may also have been erected outside but in the vicinity of the burial ground.

After cremation the calcined bone fragments were gathered. Most cremation graves contained a relatively low amount of burned human bone fragments, which are generally small in size. A deliberate selection of specific skeletal parts could not be demonstrated, also because a large part of the possible contents appears to be missing. The question is whether these persons were deliberately kept incomplete and burial as *pars pro toto* was sufficient. One explanation may be that these deceased continued to play an important role in society after their death and that this required their physical remains to be present in some form. This may also explain the appearance of cremation remains in other graves, which cannot be explained by the transportation of material on the surface through erosion, trampling, etc. People of all ages were cremated. It is therefore assumed that age was not a defining characteristic for the choice of either cremation or inhumation. However, the absence of babies and young children could be an indication that they received a different treatment and were interred somewhere else. Trautmann suggests that cremation took place outside the burial ground, as funeral pyres have not been identified.⁶³⁷ Burned wood that has been recovered from the graves containing cremated material is not enough to suggest that the individual was burned on site. She therefore argues that travellers who met their death on route were cremated out of practical reasons, but ease of transportation was probably not the exclusive reason for a cremation, nor were all travellers cremated for transportation. Other factors, such as different causes of death, may have contributed to the reason for why an individual was cremated.⁶³⁸

The burial pits for the inhumations predominantly had a long oval shape, probably following the contours of the corpse, which was mostly placed in a crouched position on its left side and its head facing either north or south. The pits are oriented mostly towards the NW-SE, although for some graves alternative orientations were chosen. Variations regarding pits size and orientation are documented, but there seems to be a common way of burial although it varies regionally and even within regions.⁶³⁹ The dominant orientation was probably meaningful in terms of a broader

⁶³⁶ e.g. Nilsson Stutz 2008.

⁶³⁷ Trautmann 2006, 182.

⁶³⁸ Trautmann 2006, 182.

⁶³⁹ Hedges *et al.* 2013, 377; Peters 2018, 529.

tradition of regularised funerary rites, but local choices regarding orientation seem to predominate and therefore overrule “general” traditions.⁶⁴⁰ The ways the bodies were positioned and oriented within the graves demonstrate a strong regional variation even within the Rhine-Meuse area and are therefore indicative of changing social roles or beliefs in the funerary rite.⁶⁴¹

Rituals concerning the physical treatment of the body (embalming; extraction of organs, etc.) have not been documented (yet), but might have existed as part of the first stages of the burial ritual. There are however several examples that body parts were added, or maybe even extracted (cremations), during the funeral ritual. Examples are an upper and lower jaw of a second individual that were deposited in a grave at Arnoldsweiler-Ellebach.⁶⁴² Adding individuals to the burial was also documented for Elsloo-Koolweg, where a concentration of human calcined bones was added to an inhumation during the infilling of the burial pit; their relation is unknown to us. In contrast, several burials at Arnoldsweiler-Ellebach contain neonates and infants together with adults, presumably one of the child’s parents. Adding individuals could also happen much later, as at Elsloo-Koolweg a cremation was added to an earlier inhumation grave.

14.5.2 Grave goods

Grave good assemblages are thought to have played a significant role in the LBK burial rite, as they were likely linked somehow to the (final) social role of the deceased; at least they are archaeologically the most visible means for us to try and understand the funerary rites.⁶⁴³ As in the case of Elsloo-Koolweg, many studies were based on the assumption that funerary rites are rigid and strongly subjected to traditional behaviour.⁶⁴⁴ Supra-regional studies showed that regional variation regarding funerary rites is much larger than previously thought. In some regions rites seem to be more regularised than in others, but we have to be cautious when trying to compare regional or local patterns against an imagined ideal LBK “tradition”.⁶⁴⁵ In what way the variation reflects different social structures is still a matter of discussion.⁶⁴⁶

Comparing grave goods between burial grounds becomes complicated when different preservation conditions prevail (bone and organic remains) and different excavation techniques (manual versus mechanical) have been used. Another complicating factor is that the burial rite may well have had several stages during which objects were placed next to the deceased, added at a later date or removed.⁶⁴⁷ Grave goods present within the fill also play into this debate.⁶⁴⁸

Most of the time (average ca. 70%), LBK people were put to rest in their own grave and buried with various objects.⁶⁴⁹ Sometimes they were buried with multiple persons in one grave or alone in a grave without any furnishings. To contribute to the discussion and to the detailed information needed to understand regional variation, we will next summarise the findings of our research at Elsloo.

At Elsloo-Koolweg, grave goods were present in the fill and/or bottom of the burial pits and organic material was only preserved as lipid residue and pollen. These are merely an echo of daily life before the objects in which they were found were deposited in a grave. Only one bone needle survived the acid soil conditions. Grave goods were absent in 38 percent of the graves. Inhumation graves seem to be furnished with more grave goods, but this image may be skewed since most cremation graves were found directly under the topsoil and therefore had been subject to disturbance by, for instance, ploughing. Pottery is the most frequent grave good, followed by flint arrowheads and blades as well as stone adzes. In several graves multiple artefacts were deposited as a part of tool sets. Most grave goods seem to have been functional and personal ornaments are nearly absent. Still, analysis showed that most grave goods had been used before being deposited into a grave. There were no indications of pristine objects apart from maybe the arrowheads. For instance, most of the pottery was broken, sometimes had poorly executed decoration (suggesting everyday ware) and was “dripping” with animal fats but, in many cases, only a single or few sherds were found. Many of these sherds, which have a weathered surface, probably fell in the burial pits by accident, while others were deposited intentionally. At Arnoldsweiler-Ellebach the same pattern was observed for stone objects.⁶⁵⁰

⁶⁴⁰ Hedges *et al.* 2013, 377.

⁶⁴¹ Hedges *et al.* 2013, 376.

⁶⁴² Cziesla & Ibeling 2014, 142; Peters 2018, 404.

⁶⁴³ Van Gennep 1909; Hedges *et al.* 2013, 378.

⁶⁴⁴ Pavuk 1972; Van de Velde 1979; Modderman 1988; Veit 1996.

⁶⁴⁵ Jeunesse 1996; Hofmann 2010; Bickle *et al.* 2011; Hedges *et al.* 2013, 381.

⁶⁴⁶ Hedges *et al.* 2013, 381; Hofmann 2019.

⁶⁴⁷ Hedges *et al.* 2013, 381; Hofmann 2019.

⁶⁴⁸ Peters & Balkowski 2020.

⁶⁴⁹ Bickle & Whittle 2013, 19.

⁶⁵⁰ Peters & Balkowski 2020.

It seems that different kinds of grave goods were deposited with different grave types. Querns, arrowheads and scrapers are (almost) absent in cremation graves. These tools were also heavily used and show signs of wear and tear. The arrowheads were deposited with their shafts. None of them, however, show indisputable evidence for having been used as a projectile. Of interest is the presence of arrowheads in the early cremation and inhumation graves. Their presence could be indicative for the earliest stages of settlement when there seems to be a much invested in forest exploitation and intensive exploitation of local mineral resources for ceramic and lithic production.⁶⁵¹ They could also be indicative for the presence of danger and used for defence during the initial stages of settlement. All the adzes whose function could be inferred were related to wood working, only one had traces consistent with working hides and processing plants. These adzes were present in both male and female graves and therefore do not represent a gendered task, as also seems to be the case with other grave goods. The quern fragments have multiple traces of wear caused by grinding cereals. Most of them were covered in ochre. In some cases, the fragments were further destroyed by additional flaking of the surface and sides. Whereas in settlements, flint tools used for hide working predominate, and woodworking is also very important, such traces are notably absent on the flint implements at the Elsloo-Koolweg cemetery. Notably missing too are harvesting implements like sickle blades, as well as scrapers. Other tools or “typical” LBK items are absent as well, namely large storage vessels, pottery in which milk or beeswax (honey) was stored, spindle whorls or remains of domestic animals (Table 14.1). This indicates that certain tasks are not represented within the funerary rites.

There are large variations in the number of grave goods present within a grave and in the number of grave good categories. Some graves have as many as thirteen grave goods, but most graves

are furnished with one to four artefacts. Cremation graves appear to have fewer artefacts of the same kind per grave; again probably due to post-depositional disturbances. Older graves contain no more or fewer grave goods than younger graves. However, three graves which presumably date to the oldest phase in the south-west corner of the burial ground contain the most grave goods and are clustered together. They might represent the graves of the founders of the settlement. In conclusion, there does not seem to have been a difference in the number or in the composition of grave goods between cremation and inhumation graves. The same rules regarding grave goods seem to have been applied to both burial customs. There is a distinction to be made regarding the kind of grave goods which accompanied the dead into the grave. A quarter of the graves did not contain any –archaeologically visible or preserved– grave goods. If so, (decorated and undecorated) pottery, flint artefacts (especially blades and arrowheads) and adzes were the most common grave goods and to a lesser extent ochre and querns. In several graves multiple artefacts were deposited as part of a tool set. Most grave goods can be found at the base of the burial pits, positioned around the body. Mostly they are placed around the head, head and mid-section, mid-section only, or head and feet.

It seems that choices were made regarding the composition of the grave good assemblage, the spatial and chronological distribution of graves and burial goods, and the sexual or age attribution of goods at the Elsloo-Koolweg burial ground (Table 14.2). They seem to be indicative for the (regional) variability of the burial customs in general although it must be stressed that the recognised choices or local patterns can be interpreted as specific or really elaborate ‘rules’ for the burial rite. Some aspects have been undertaken on a larger scale, some only exist in Elsloo although no thorough comparison with other burial grounds have been undertaken. Overall, they are emblematic for the diversity within the burial ritual.

⁶⁵¹ Hamon & Gomart 2021, 693.

	Profane					Activity area								
	lineage	exchange	warfare	ritual	personal	burial ground			settlement			uplands		
					ornaments	absent	occasionally	frequent	absent	occasionally	frequent	absent	occasionally	frequent
						1					1	1		
								1			1		1	
	1	1		1	1		1			1		1		
	1	1	1	1			1			1			1	
	1	1	1	1			1			1			1	
						1				1		1		
							1			1		1		
	1	1		1	1		1			1		1		
								1			1		1	
									1		1			1
	1	1	1	1	1					1				1
											1		1	
											1		1	
											1		1	
											1		1	
											1		1	
											1		1	
	1	1		1				1			1		1	
	1	1		1	1			1	1				1	
							1				1		1	

Table 14.1 continued

	Activities																
	domestic					craft				husbandry			agriculture	hunting and fishing			herding
	clothing	cooking	grinding	medicine	storage	chopping	knapping	polishing	building	butchering	skinning	milking	harvesting	killing	butchering	skinning	
Organic																	
animal bone (teeth)										1							
animal bone (calcinated)		1								1							
animal bone (comb, pin)																	
animal bone (mandible/limbs)		1		1						1	1			1	1		1
animal bone (needle, hook)	1													1	1	1	1
antler						1			1								
Spondylus, Atlantic, river shell	1																
bees wax		1		1					1				1				
birch bark		1		1	1								1				
charcoal		1		1		1							1				
human bone																	
milk		1		1					1			1					
seeds		1		1	1								1				1
wood		1			1	1			1					1			1

	Profane					Activity area								
	lineage	exchange	warfare	ritual	personal	burial ground			settlement			uplands		
					ornaments	absent	occasionally	frequent	absent	occasionally	frequent	absent	occasionally	frequent
	1	1	1	1	1		1			1			1	
							1				1		1	
	1	1	1	1	1		1		1				1	
				1			1			1			1	
		1	1	1	1		1		1				1	
						1			1				1	
	1	1		1	1			1		1			1	
		1		1			1				1		1	
				1				1			1		1	
			1	1	1			1		1				
		1		1			1				1		1	
						1					1		1	
				1	1			1			1		1	

Table 14.2 Recognised ‘choices’ in the burial ritual at Elsloo-Koolweg

Grave good combination	
	All different combinations between various kinds and types of artefacts were deposited within the graves. But some combinations seem to have been preferred;
	If no pottery is present in cremation graves, then there are also no arrowheads;
	If no pottery is present in inhumation graves, then there are also no stone tools like hammer or wet stone as well as other indet stone fragments (stone various), ochre, scrapers, flakes and cores;
	Querns or other artefacts of the “stone various” category are always found in both grave types in combination with other artefacts, but never with cores and/or scrapers;
	If no lumps of ochre are present, then cores are also absent in inhumation graves and scrapers are absent in both grave types;
	Adzes in cremation and inhumation graves are always found in combination with other finds, apart from two inhumation graves;
	If no scrapers are present in inhumation graves, then no cores are found either;
	Blades in cremation graves are always found in combination with other grave goods, but in inhumation graves they are also present without scrapers or cores or as the only grave good;
	Inhumation graves without arrowheads also lack scrapers or cores;
	Scrapers and cores are almost absent within inhumation graves;
	Large pottery vessels (storage) are absent;
	Calcined animal bones (domestic or wild) are absent
Spatial and chronological patterns	
	Both inhumation and cremation graves with pottery are evenly distributed within the burial ground;
	Stone and flint tools are also evenly distributed within the burial ground;
	Lydite adzes are only present in the eastern (youngest) part of the burial ground;
Age/sex	
	Female graves were furnished with more pottery and adzes than male graves;
	Male graves yielded more ochre fragments;
	Most grave goods were found in mature/senile graves;
	Graves thought to belong to infants and/or children (4 graves) contained some (undecorated) pottery as well as type 2 adzes;
	Type 1 and 3 adzes seem to have been reserved for adults;
	There seems to be no difference with respect to the various grave goods for adult and mature/senile graves;

14.5.3 Closing of the pits

Once the corpse, together with the grave goods, was put to rest in its grave, it was frequently covered with ochre powder. Directly or after some time, the pits were filled in by hand or by natural processes. There are strong indications that the grave pits were left open for some time after the initial burial.⁶⁵² Finds present within the fill indicate that this also was part of the burial ritual, as particular artefacts such as complete

vessels, an adze or a piece of ochre were either deliberately placed in the pit during the infilling or accidentally fell in. Especially charcoal, calcined bone and (decorated and undecorated) sherds are present within the fills of the pits. It has been suggested that fires burned inside the pits or that wooden boards were present. Some graves, also in Elsloo, have signs of internal wooden structures while some have niches or platforms.

The layers of charcoal at the bottom of the burial pit or about 20–30 cm above the pit floor, as if they were covering something, consist of various wood species, which indicates that the

⁶⁵² Modderman 1970; Bonnabel, Paresys & Thomasausen 2003; Thevenet 2004; Bickle & Whittle 2013; Hofmann 2019.

charcoal did not derive from a single piece or single species of wood. This charcoal is probably material that comes from activities not related to the burial and/or from settlement noise, although the concentration of charcoal in some samples is quite high. Some pit sides were also covered with charcoal: an indication that the pits were clad with boards. The presumed boarding in grave 98 is solely made out of oak, supporting the idea of a deliberate construction. Charcoal layers on the pit floor suggest intentional deposition during the burial ritual. The assumption that twigs or branches were used to create a floor layer could not be upheld, as most of the charcoal derives from logs.

The burial ritual is archaeologically visible whenever a grave is dug or a pyre left behind. This is only a part of the ritual which presumably already started much earlier, at the time of dying or even prior to that and may have continued longer. In conclusion, it can be stated that particular choices seem to have been made during the burial ritual. Finds in the upper grave fills could indicate a more extended process of mourning and commemoration.⁶⁵³ But, there seems to be no distinctive patterns which enable us to make statements about sex and age distinctions related to inhumation and cremation graves, nor could we identify changing patterns during the use of the burial ground. However, certain regularities—of which some are apparent, but probably most are as yet unknown to us—seem to have been followed during the main burial rite and any later rituals like commemoration.

14.6 Gender identification: sex is not the issue

In many recent studies of LBK mortuary practices the emphasis has been on teasing out the relationship between biological sex and assumed gender, as well as on grave goods as assumed indicators for social position in these Early Neolithic communities and for the sexual division of labour. It is undeniable that large-scale studies such as the “Lifeways” project have revealed some patterning.⁶⁵⁴ In particular the association of polished stone tools with male burials of a certain status has been accepted as a pervasive trend⁶⁵⁵ that also appears to be related to a restricted

isotopic mobility signal for those males.⁶⁵⁶ At the same time a critical study by Bickle has pointed out that the position and state of these adzes was very diverse, indicating wide-ranging associations related to either the deceased, the mourners, or both.⁶⁵⁷ Physical anthropological research furthermore shows that although there is some sex-based patterning, such as stress markers on elbows⁶⁵⁸ related to throwing activities, overall sex-based trends are subtle and overwhelmingly show variability, and that there is a greater mobility range for women.⁶⁵⁹ Moreover, we view these patterns as indications for kinship relations whereas the data appear to show the existence of patrilineal, patrilocal communities with males as the anchoring figures amassing wealth and prestige through material culture, social ties, architecture and burial ritual. Bickle argues that this a priori idea of patrilocality should be challenged and that categories of objects and functions should not be assumed to be the same in life and in death.⁶⁶⁰ The example of the many ways adzes are deposited and the fact that they sometimes also occur in female graves nuances their role as a status indicator. Similarly, querns may have been an attribute associated mainly with female tasks in life, as evidenced in physical stress markers on bones but the association of querns with females in death is even less clear than the association of adzes with men.⁶⁶¹ They were often recycled and reused and, as demonstrated in Elsloo-Koolweg, often covered in ochre.⁶⁶² The heart of the matter, as argued by Bickle, is that while biological sex may be an important factor it does not result in a binary idea of gender that works as a template for explaining task division, kinship and hierarchy.⁶⁶³ Robb and Harris argue that Neolithic gender was contextual to particular objects and practices⁶⁶⁴ and Bickle confirms this for the LBK, stressing that while biological sex may not have defined gender, sexed bodies did matter in creating patterning across diet, mobility and daily tasks and in the funerary sphere.⁶⁶⁵ The latter, however, displays differences in grave good assemblages and treatments suggesting that people could be more creative in what was deposited in graves, particularly in those of women.⁶⁶⁶ Apart from gender, similar patterns can be expected to also be identifiable for age. Bickle points out that instead of looking at traditional binary divisions and identifying major patterns or norms, it may be more fruitful to study difference and variation

⁶⁵³ Bickle & Whittle 2013, 19; Whittle 1998; Hofmann 2019.

⁶⁵⁴ Bickle & Whittle 2013.

⁶⁵⁵ e.g. Modderman 1988.

⁶⁵⁶ Bentley *et al.* 2012.

⁶⁵⁷ Bickle 2019, 209.

⁶⁵⁸ Hedges *et al.* 2013.

⁶⁵⁹ Bickle 2019, 211.

⁶⁶⁰ Bickle 2019, 213.

⁶⁶¹ Bickle 2019, 213.

⁶⁶² Hamon 2009; Van Wijk & Porreij-Lyklema 2015.

⁶⁶³ Bickle 2019, 214; Robb & Harris 2017.

⁶⁶⁴ Robb & Harris 2017, 141.

⁶⁶⁵ Bickle 2019, 214.

⁶⁶⁶ Bickle 2019, 214.

and how they reflect differently on issues such as kinship, gender and identity.⁶⁶⁷ Similar arguments apply for wealth and status. Often these are all too easily attributed to male burials with many objects, arguing in favour of a patriarchal or even gerontocratic society, while in fact the evidence is much more varied. This was already noted by Frirdich, who argued that differences are not necessarily a straightforward reflection of status, but rather relate to how the graveside ritual was carried out.⁶⁶⁸ As such, analyses need to accord greater emphasis to the placement, state and quality of the objects interred. Graveside rites may reflect both on the deceased and the mourners, as well as exhibiting changes over time.

For Elsloo-Koolweg this is both an appropriate and necessary but challenging approach, as few identifiable human remains have been preserved. Therefore, abandoning an implicit search for male and female graves allows for a more objective evaluation of patterning. Of importance is the realisation that we are working with a distorted dataset in the sense that the find assemblages of the cremation graves are not intact due to (modern) post-depositional processes. Another important aspect is that the grave good composition in both inhumation and cremation graves was similar. This allowed us to make specific choices for our intra-site analysis, where the cremation graves were variously included or not.

14.7 A final farewell

Identifying LBK funerary rites and burial practices based on archaeological data proves to be a challenge as more datasets open up and additional (science-based) research is carried out. Typological and functional approaches are being tested and adjusted, whilst variable regional practices are being revealed. The larger picture seems to be upheld, as widely shared practices formed the foundation for much of the funerary practices, as in fact is true for many aspects of the LBK. They were maintained and passed on for generations, right until the end of the LBK. On the other hand, regional variability shows that each community, even at a local level, deviated from or added to “traditional” burial customs. Even within the burial grounds in the Rhineland and the

Netherlands, a large variation exists regarding body treatment and grave goods assemblages. But there are many similarities as well in both the treatment of the body and the composition of the grave good assemblage.

The foregoing paragraphs have dealt with aspects of patterning in the cemetery, mainly regarding issues of gender and status. The absence of conclusive evidence on the sex and age of the individuals forces our attention towards the characteristics of the burial itself, its position in the cemetery and the objects interred, their position and state (pristine, rare, used, broken). In combination, these have a different story to tell that transcends simplistic binary categories of gender, or status attributed to rich male graves or aged persons. Apart from thinking about the role of the person in the grave, it appears that the role of the mourners and society is of equal importance and the burial rites and grave good composition may have shifted regionally and over time. As argued by Huntington and Metcalf almost half a century ago, at death the body and identity enter a stage of disentanglement that redefines obligations and redistributes roles.⁶⁶⁹ Death therefore is also very much an arena for the living to display status, redefine positions, social and emotional ties, and to facilitate the transitions of the deceased’s soul. In relation to the latter, but from a different perspective, Liv Nilsson Stutz argued that Mesolithic burials in Scandinavia showed an element of emotion or care that can be recognised in the burials.⁶⁷⁰

Elaborating on new approaches towards burial ritual, Hofmann argues for burial rites to be interpreted as performances that involve both the deceased, the mourners and society and that are at the same time repetitive (allowing for patterning), but also open to improvisation. Rituals are governed by certain principles, but these can be employed more or less flexibly.⁶⁷¹ Hofmann continues that burials are unique performances guided by shared concepts of appropriateness and rules, and as such allow for the local, regional and chronological trends we observe. She argues that mourners in fact creatively combine existing elements into a “funerary drama” with innovative or expressive variations that are enacted time and again, further stressing that there may be patterns that are more unreflected and taken for granted, along the lines of

⁶⁶⁷ also see Sommer 2001.

⁶⁶⁸ Frirdich 1994, 344; 2003, 557.

⁶⁶⁹ Huntington & Metcalf 1979, 62-67.

⁶⁷⁰ Nilsson Stutz 2008.

⁶⁷¹ Hofmann in prep.

*habitus*⁶⁷², while others may have been more creative and singular. Both are of course prone to change. As such the challenge for us as researchers in trying to understand the burial ritual of the LBK is to abandon preconceived concepts of gender and status and adopt a more contextual approach. The heart of the matter is to what extent we can identify the patterning that could be present. What, in this case for Elsloo-Koolweg, were the general trends that can be observed, what is common practice and what are the instances when such an idea or norm is abandoned? All this requires an approach to LBK funerary archaeology that is less structural and about society, and more attuned to the ritual practices taking place.

Reflecting on the various aspects of Elsloo-Koolweg, the Rhineland burial grounds or on an even a larger scale, some further general trends can be distinguished. The first concerns the limited variety of grave goods being deposited in contrast to the vast toolkit at hand in everyday life (Table 14.1). Repetitions and many variations within the composition of the grave good assemblage exist, but many graves are also (archaeologically) without any goods. Most of the time graves merely contain the same objects in different quantities or different compositions. Regional variability or individual preferences notwithstanding, in terms of a general burial “tradition” the selectiveness of the objects deposited –or not deposited– is overwhelmingly clear.⁶⁷³ These objects may stand for skill, status, domestic or hunting activities, lifestyle in general, rituals, ornamentation of the body, etc. As Hofmann puts it: “Perhaps not unexpectedly, we do not see an accurate representation of an individual’s roles and responsibilities in life, but a selection, an ideal image focused on the ornamentation of the body, the provision of food and drink and on only some activities.”⁶⁷⁴ (Functional) references to the agricultural lifestyle, butchering, fishing or gathering are almost disregarded, as if not important.⁶⁷⁵ Whether grave goods are representative of everyday life or provide a particular formalised setting in which symbolic versions of sex were presented, as Masclans *et al.* put it, is in our view irrelevant if these objects are seen as personal items of the deceased.⁶⁷⁶

In many studies the focus lies on the deceased individual and the presumed relation of the objects to her/him. But there are many

indications that the mourners played a very important role within the ritual, not only during the initial burial. This touches upon the second trend that is visible, which is the lack of pristine grave goods. Use-wear analysis at Elsloo-Koolweg, but also at Nitra and Vedrovice, showed that the deposited flint and stone tools were heavily used, which for some suggests the existence of a sexual division of labour.⁶⁷⁷ Pottery and ceramic objects are mostly fragmented – whether deliberately or not⁶⁷⁸– and show signs of heavy use, for instance as cooking vessels or storage containers for meat. We find these objects in the same condition as those retrieved in the waste pits on settlements. When conforming to an “ideal image”, a clearer sexual division or division into age categories would be expected, more pristine objects would have been deposited, and trends would be easier to detect. Yet, sex does not seem to be an issue and age merely contributes to the number of grave goods deposited. Of importance is that each of the objects seems to carry a biography of its own, regardless of the deceased’s gender.⁶⁷⁹

We propose that grave goods indeed are representative of everyday life, but that of the group rather than of the individual. This group –the mourners or kin– is frequently involved in the burial rite, one aspect of which consisted of depositing grave goods at the bottom of the grave or later on – even years later – in the fill. The objects selected are mostly personal items of this group and not just cultural objects, i.e. the pot which was not so nicely decorated, the adze which felled many trees, the arrow that (could have) killed many boars, or which was exchanged during a gathering. These were objects personal to this group, objects that reflect direct actions that contributed to something grand (a meal, a feast, the splitting of a big tree trunk, etc.) or held a special meaning for the owner, perhaps very likely in relation to the deceased. These are the objects being deposited, covered with ochre, presumably as some kind of (cleansing) ritual, and in this way creating a relational identity.⁶⁸⁰ With these rituals ordinary objects are transformed into extraordinary objects.⁶⁸¹ From ethnographic and anthropological studies it is apparent that these personal items are drenched with stories and in rituals, which paves the way for their use during the funerary rites and after.⁶⁸²

Burial studies tend to focus on the

⁶⁷² cf. Bourdieu 1977.

⁶⁷³ Also Faruggia 1992, 305f; Bickle & Whittle 2013.

⁶⁷⁴ Hofmann in prep.; Masclans *et al.* 2021.

⁶⁷⁵ Also Hofmann in prep.

⁶⁷⁶ Masclans *et al.* 2021, 31.

⁶⁷⁷ Masclans *et al.* 2021.

⁶⁷⁸ Modderman 1988; Niezery 1995;

Hofmann 2010; Hofmann 2019.

⁶⁷⁹ Van Gijn 2010; Hofmann 2015.

⁶⁸⁰ Brück & Fontijn 2013, 206-207.

⁶⁸¹ Kapitány & Nielsen 2019, 170.

⁶⁸² i.e. Bourdieu 1977; Barret 1989; Boivin 2010; Bradley 2003.

individual, while in this Early Neolithic acephalous society the group is of more importance.⁶⁸³ As these objects, their number, their rarity, and their versatile compositions do not accumulate in relation to personal achieved status or individual skill, the only answer lies with the benefits of the group, the lineage, moiety, or kin. A deceased person therefore is not buried as an individual, but as a member of a group represented by the personal objects this group carried or used, or those with meaning to them.

Maybe this is best reflected by differences in burial style: cremation or inhumation. As grave good composition and age do not seem to correlate with body treatment (as in, cremation vs inhumation), it was the group that decided in which way somebody was buried. The same goes for body orientation and position. Clear patterns regarding age and sex are absent or unrecognisable, but certain patterns that transcend regional variability seem to exist and could easily be related to temporally recurring events like time of death (morning, mid-day or night), seasonality, solar or lunar cycles, seasonal animal migration, harvesting seasons, or just by copying rites from relatives buried at other burial grounds in other regions.

In conclusion the current study has further underlined and demonstrated the existence of patterning that does not easily relate to classical interpretations of prehistoric burial customs along lines of gender and age. Although these patterns exist, the character of the objects, the variability surrounding a common theme and wider trends observed argue in favour of a ritual that importantly reflects the larger community and its relation to the deceased. Additionally, there appears to be superregional patterning that may point to wider shared beliefs, traditions, and rituals in the larger LBK sphere. As such the Elsloo-Koolweg burial ground forms a good starting point for further research into the origins of the shared diversity that characterizes the LBK in life and death.

14.8 Future prospects

Documentation is key for a successful analysis. This already starts on site, or rather before the first spade hits the ground. Observations made in the field during excavation need to be

documented per grave. Special attention needs to be paid to:

- Position of grave goods
- Dimensions of grave pit, cremation pit (shape, size, depth)
- Colouring of the soil due to ochre powder or something else (take samples)
- Finds present in the fill
- Presence of niches or ledges as part of the grave structure

14.8.1 Methodology

The chosen excavation methodology needs to be tailored towards finding (shallow) cremation graves. Mechanical excavators could easily do the job, but their drivers need to be patient and cautious and therefore well-instructed. The ploughsoil provides indicators for the absence or presence of cremation graves as well as other presumed activities that could have taken place on the burial ground (i.e. funeral pyres).

Another issue concerns the way burial pits should be excavated: either in cross-section or by excavating stratigraphically in plan. Especially if bone preservation is poor, the latter is preferable to help identify body shadows. However, by just excavating in spits information about the grave structure could get lost. It is recommended to use modern recording methods (3D photogrammetry or similar techniques) for documenting and reconstructing the burial pit.

Finally, the awareness that data may be analysed many years after excavation should also lead to adjustments when excavating. Sampling is of utmost importance, not just for now but also for later. It sounds elementary, but the many samples taken in 1958 from Elsloo-Koolweg proved of much value for this research.

14.8.2 Storage

Lipid residue and use-wear analysis showed the importance of “good” finds storage and handling. Even plastic bags leave their (chemical) marks, as do pencil tips. It is still unknown what caused the contamination in the ceramic sherds. Care in the storage of data is also essential. The

⁶⁸³ Van de Velde 2016; Van Wijk & Van de Velde 2019.

grave good assemblage of Elsloo-Koolweg is divided between various museums, although generally managed by the National Museum of Antiquities. The field drawings are safeguarded by the Provincial Depot while field reports, object and field photos, etc. are stored at the Faculty of Archaeology of Leiden University and in private collections. A remark regarding the availability of comparative data from other burial grounds is also necessary. The open-source Lifeways database offers a good start, but needs to be updated and new information about burial grounds added. We explicitly wish to express our gratitude towards our German and British colleagues for sharing their information about the Rhineland burial grounds. Any faults regarding interpretation or representation of the data are our own.

14.8.3 In conclusion

Finally, this study showed the importance of recreating the original excavation, assumptions and analysis, and to subsequently build on the gathered data from your own ideas. The Elsloo-Koolweg burial ground has been internationally acclaimed and, hopefully, by adding this new research will be once again. We hope that this kind of research, especially the science-based research such as lipid-residue, use-wear, physical anthropological and charcoal analysis provide a baseline for future research regarding burials and burial grounds. Of importance is a holistic approach which integrates as many

science-based research approaches as well as typological material studies as is (economically) feasible in order to get a better understanding of past human behaviour. It is no more a matter of observing, counting, describing, and categorising finds and soil features but especially a matter of interpreting the observed archaeological dataset in combination with the notion that it represents a specific (past) activity.

In conclusion, it can be stated that when excavating LBK burial grounds a lot of information about the site taphonomy is already available when studying geographical and historical maps as well as in in the topsoil. During excavation special attention needs to be paid towards the fill of the pits, these are best studied in cross-section. At Elsloo-Koolweg, body shadows were only visible in the deeper graves. For these burial pits it is better to excavate them horizontally instead of in cross-section as body shadows provide much detail about body position and body orientation. It is encouraged to obtain an exact digital position of all objects within a grave. Sampling of the fill (top and bottom), as well as sieving for smaller microscopic objects is of utmost importance just as storage is.

And lastly, there has been much research already carried out which can be used to your advantage. Just be critical of the data and its provenance and its usability. As in all scientific fields new understanding develops by progress. That in itself means moving away from, or expanding upon previous thought.

- Allen, N.J., H. Callan, R. Dunbar & W. James (eds)** 2008: *Early Human Kinship: from sex to social reproduction*, London (Royal Anthropological Institute).
- Albrethsen, S.E. & E. Brinch Petersen** 1976: Excavation of a mesolithic cemetery at Vedbaek, Denmark, *Acta Archaeologica* 47, 1-28.
- Amkreutz, L.W.S.W.**, 2004: Bandkeramiek langs de Maas. Een analyse en interpretatie van bandkeramische vindplaatsen op het laagterras van de Maas in Limburg, Leiden (ongepubliceerde doctoraalscriptie Faculteit der Archeologie, Universiteit Leiden).
- Amkreutz, L.W.S.W.**, 2013: Persistent traditions. A long-term perspective on communities in the process of neolithisation in the Lower Rhine Area (5500-2500 cal BC), Leiden.
- Amkreutz, L.**, 2016: It's better to burn out than to fade away. A comparative perspective on the diversity in LBK endings in the Rhine-Meuse region, in: L. Amkreutz, F. Haack, D. Hofmann & I. van Wijk (eds), *Something out of the ordinary? Interpreting diversity in the Early Neolithic Linearbandkeramik and beyond*, Newcastle upon Tyne, 357-397.
- Amkreutz, L.W.S.W., C.C. Bakels, F.T.S. Brounen, W. Dijkman, A.L. van Gijn, M.E.Th. de Grooth, W.P.A.M. Hendrix, T. de Reus, H. Schmitz, P. van de Velde, A.M. Verbaas, H. Vromen, J.P. de Warrimont & I.M. van Wijk** 2012: An Odyssey along the river Meuse. New perspectives on old Dutch LBK research (1925-2001), *Notae Praehistoricae* 32, 51-71.
- Amkreutz, L.W.S.W. & I.M. van Wijk** 2020: Odds and end(ing)s. Aspects of deposition and ritual behaviour in the Linearbandkeramik of the Low Countries, in: D. Hofmann (ed.), *Magical, mundane or marginal? Deposition practices in the Early Neolithic Linearbandkeramik culture*, Leiden, 83-112. Depositions.
- Arbogast, R.-M.**, 2013: Food offerings in graves from the Danubian Neolithic (5500-4900 B.C.) in the upper Rhine valley, *Anthropozoologica* 48(2), 255-261.
- Arps, C.E.S.**, 1978: Petrography and possible origin of adzes and other artefacts from prehistoric sites near Hienheim and Elsloo, Sittard and Stein, in: C.C. Bakels (ed.), *Four Linearbandkeramik settlements and their environment: a paleoecological study of Sittard, Stein, Elsloo, and Hienheim*, Leiden (*Analecta Praehistorica Leidensia* 11), 202-228.
- Arps, C.E.S.**, 1990: Bandkeramische dissels van Centraal-Europa: gesteentesoorten en herkomst, *Nederlandse Archeologische Rapporten* 9, 11-27.
- Augereau, A.**, 2021: Funerary Practices as a Testimony of Ideology in Western Linearbandkeramik Culture. *Open Archaeology*, Vol. 7 (Issue 1), pp. 953-971. <https://doi.org/10.1515/opar-2020-0184>.
- Bach, A.**, 1978: Neolithische Populationen im Mittelbe-Saale-Gebiet. Zur Anthropologie des Neolithikums unter besonderer Berücksichtigung der Bandkeramiker, Weimar (Museum für Ur- und Frühgeschichte Thüringens).
- Baetsen, S.**, 2008: Fysisch antropologisch onderzoek, in: N.M. Prangma (red.), *Lomm, hoogwatergeul fase 1 (gemeente Arcen en Velden), een archeologische opgraving*, Amersfoort (ADC Rapport 1344), 113-119.
- Baetsen, S.**, 2009: Het menselijke botmateriaal, in: L. Meurkens, E. Heunks & I.M. van Wijk (red.), *Bewoning, infrastructuur en begraving van IJzertijd tot middeleeuwen in het toekomstige tracé van de A2 Passage bij Maastricht, een Inventariserend Veld Onderzoek door middel van proefsleuven*, Leiden (Archol Rapport 120), 103-115.
- Baetsen, S.**, 2010a: Fysisch antropologisch onderzoek, in: H.A.P. Veldman & E. Blom (red.), *Onder de zoden van Zaltbommel, een rurale nederzetting en een grafveld uit de Romeinse tijd in het plangebied De Wildeman*, Amersfoort (ADC Rapport 1800/ADC Monografie 8), 233-248, 445-464.
- Baetsen, S.**, 2010b: Crematierresten, in: T. de Jong & S. Beumer (red.), *Archeologisch proefsleuvenonderzoek en opgraving knooppunt Ekkersrijt-IKEA, gemeente Son en Breugel. Deel I. Wonen bij een grafheuvel uit de middenbronstijd*, Eindhoven (ACE Rapport 51), 191-232.
- Baetsen, S.**, 2011a: Fysisch-anthropologisch onderzoek, in: D.A. Gerrets & G.L. Williams (red.), *Water en vuur, archeologisch proefsleuvenonderzoek en opgraving te Lomm Hoogwatergeul fase III*, Amersfoort (ADC Rapport 2703), 197-212.
- Baetsen, S.**, 2011b: Menselijk bot, in: L. Meurkens & A.J. Tol (red.), *Grafvelden en greppelstructuren uit de IJzertijd en Romeinse tijd bij Iitteren (gemeente Maastricht), opgraving Iitteren-Emmaus vindplaatsen 1 & 2*, Leiden (Archol Rapport 144), 153-167.
- Baetsen, S.**, 2011c: Het menselijke botmateriaal, in: H.A.P. Veldman (red.), *Graven in Zoelen, de opgraving van een Romeinse nederzetting en grafveld te Zoelen Scharenburg, gemeente Buren*, Amersfoort (ADC Rapport 2391), 191-219.
- Baetsen, S.**, 2011d: Fysisch-anthropologisch onderzoek, in: L.M.B. van der Feijst & H.A.P. Veldman, *Graven in het verleden van Valburg, een midden-Romeins grafveld en bewoningssporen uit de Laat-Romeinse tijd te Molenzicht*, Amersfoort (ADC Rapport 2519), 123-142.
- Bakels, C.C.**, 1978: Four Linearbandkeramik settlements and their environment: a paleoecological study of Sittard, Stein, Elsloo, and Hienheim, Leiden (*Analecta Praehistorica Leidensia* 11).
- Bakels, C.C.**, 1982: The settlement system of the Dutch Linearbandkeramik, (*Analecta Praehistorica Leidensia* 15), 31-45.

- Bakels, C.C.**, 1987: On the adzes of the Northwestern Linearbandkeramik, (*Analecta Praehistorica Leidensia* 20), 53-85.
- Bakels, C.C.**, 2009: The western European Loess Belt. Agrarian History, 5300 BC-AD 1000, Dordrecht.
- Bakels C.C.**, 2011: Crop remains from Schwanfeld, Ldkr. Schweinfurt, Germany, a site occupied by, successively, Earliest Linearbandkeramik, Grossgartach and Bernburg farmers, in: J. Lüning (red.) *Schwanfeldstudien zur Ältesten Bandkeramik*, Bonn, 223-231 (Universitätsforschungen zur prähistorischen Archäologie, Band 196).
- Bakels, C.C.**, 2015: Botanisch onderzoek van bandkeramische sporen, in: I.M. van Wijk & A. Porreij-Lyklema (red.), *Opgravingen in de bandkeramische nederzetting van Elsloo-Koolweg: Uitwerking van drie opgravingscampagnes aan de Joannes Riviusstraat en Paulus Potterstraat te Elsloo*, Leiden (Archol Rapport 252), 163-168.
- Bakels, C.C.**, 2021: De vegetatiegeschiedenis van Sittard aan de hand van een pollendiagram, *Natuurhistorisch Maandblad* 118/7, 165-172.
- Bakels, C.C. & P. van den Broeke** 1981, without title, in: J.H.F. Bloemers & W.J.H. Willems (red.), *Archeologische kroniek van Limburg over de jaren 1977-1979*, plaats (Publications de la Société Historique et Archéologique dans le Limbourg 1980-1981), 117-117.
- Bakels, C.C., & R. Roussele** 1985: Restes botaniques et agriculture du Néolithique ancien en Belgique et aux Pays Bas, *Helinium* 25, 37-57.
- Bakels, C.C. & W. Hendrix** 1999: Ein bandkeramisch Dechseldepot aus Stein-Berg aan de Maas, Nederlande, *Archäologisches Korrespondenzblatt* 29, 317-324.
- Balkowski, N.**, 2012: Zur Synchronisierung ausgewählter bandkeramischer Siedlungen in Niederländisch Limburg und auf der Aldenhovener Platte, Köln (Unveröffentlichte BA-Arbeit, Universität zu Köln).
- Balkowski, N.**, 2018: Siedlung, Brunnen und Keramik des linearbandkeramischen Fundplatzes Arnoldsweiler-Ellebach, Cologne (Unpublished PhD dissertation, University of Cologne).
- Balkowski, N. & S. Hartmann** 2015: Vom Merzbachtal in die Graetheide? – Die Synchronisation der niederländischen Bandkeramik mit der Aldenhovener Platte am Beispiel der Siedlung und des Gräberfeldes von Elsloo, *Archäologische Informationen* 38, 531-542.
- Banffy, E. & K. Oross** 2010: The earliest and earlier phase of the LBK in Transdanubia, in: D. Gronenborn & J. Petrasch (eds), *The spread of the Neolithic to central Europe. International symposium, Mainz 24 June – 26 June 2005*, Mainz (RGZM-Tagungen 4), 255-273.
- Barrett, J.C.**, 1989: Time and Tradition: the rituals of everyday life, in H.A. Nordström & A. Knappe (eds), *Bronze Age Studies: Transactions of the British-Scandinavian Colloquium in Stockholm 1985*, Stockholm (The National Museum of Antiquities Studies 6), 113-126.
- Beckers Sr., H.J. & G.A.J. Beckers Jr.**, 1940: *Voorgeschiedenis van Zuid-Limburg*, Maastricht.
- Bender, B.**, 1993: Landscape, politics and perspectives, Oxford.
- Bentley, R.A., P. Bickle, L. Fibiger, G. Nowell, C. Dale, R.E.M. Hedges, J. Hamilton, J. Wahl, M. Francken, G. Grupe, E. Lenneis, M. Teschler-Nicola, R.-M. Arbogast, D. Hofmann & A. Whittle** 2012: Community differentiation and kinship among Europe's first farmers, *Proceedings of the National Academy of Sciences* 109, 9326-9330.
- Berk, B.**, 2017: De crematie-resten, in: A. A. Kerkhoven (red.), *Het urnenveld van Dwingeloo*. De Archeologische Definitieve Opgraving (DO) aan de Lheeweg 1 te Dwingeloo (gemeente Westerveld. Dr.), Nieuwegein (Transect-rapport 1529), 54-76.
- Beug, H.J.**, 2004: *Leitfaden der Pollenbestimmung für Mitteleuropa und angrenzende Gebiete*, München.
- Bickle, P.**, 2019: Thinking gender differently: New approaches to identify differences in the central European Neolithic, *Cambridge Archaeological Journal*, 30(2), 201-218.
- Bickle, P., D. Hofmann, R.A. Bentley, R. Hedges, J. Hamilton, F. Laiginhas, G. Nowell, D.G. Pearson, G. Grupe & A. Whittle** 2011: Roots of diversity in a Linearbandkeramik community: isotope evidence at Aiterhofen (Bavaria, Germany), *Antiquity* 85, 1243-1258.
- Bickle, P. & A. Whittle (eds)** 2013: *The first farmers of central Europe. Diversity in LBK Lifeways*, Oxford and London.
- Bickle, P. & A. Whittle** 2013: LBK lifeways: a search for difference. In P. Bickle & A. Whittle (eds), *The first farmers of central Europe: diversity in LBK lifeways*, Oxford: Oxbow, 1-27.
- Boelicke, U.**, 1982: Gruben und Häuser. Untersuchungen zur Struktur bandkeramischer Hofplätze, in: J. Pavúk (Hrsg.), *Siedlungen der Kultur mit Linearbandkeramik in Europa*, Nitra (Internationales Kolloquium Nové Vozokany, 17.-20. November 1981), 17-28.
- Boes, E.**, 2006: Comportements rares et variabilité funéraire au Néolithique ancien. L'exemple de la nécropole rubanéé des 'Octrois' à Ensisheim (Haut-Rhin, France), in: K. Alt, R.-M. Arbogast, C. Jeunesse & S. van Willigen (eds), *Archéologie funéraire du Néolithique danubien. Nouveaux enjeux, nouvelles approches. Actes de la table ronde de Fribourg-en-Brisgau, 17, 18 octobre 1998*, Zimmersheim (Association pour la promotion de la Recherche Archéologique en Alsace), 77-92.

- Bogaard, A., T.H.E. Heaton, P. Poulton & I. Merbach** 2007: The impact of manuring on nitrogen isotope ratios in cereals: archaeological implications for reconstruction of diet and crop management practices, *Journal of Archaeological Science* 34, 335-343.
- Bogucki, P.I.**, 1988: Forest farmers and stockherders. Early agriculture and its consequences in north-central Europe, Cambridge.
- Boivin, N.**, 2010: *Material Cultures, Material Minds: The Impact of Things on Human Thought, Society, and Evolution*, Cambridge.
- Bonnabel, L., C. Paresys & L. Thomasausen** 2003: Un groupe de tombes en contexte d'habitat néolithique rubané à Écriennes 'La Folie' (Marne): approche des gestes funéraires, in: P. Chambon & J. Leclerc (eds), *Les pratiques funéraires néolithiques avant 3500 av. J.-C. en France et dans les régions limitrophes. Saint-Germain-en Laye 15-17 juin 2001*, Paris (Société Préhistorique Française), 45-53.
- Bosquet, D.**, 2013: Chronological signification of Linear Pottery waste assemblages and waste management at the village scale: spatial analysis of Remicourt "En Bia Flo" II (Liège province, Belgium), in: C. Hamon, P. Allard & M. Ilett (eds), *The domestic space in LBK settlements*, Rahden, 111-126.
- Bosquet, D., M. Golitko & A. Salavert** 2008: Une phase pionnière à l'origine du peuplement rubané de la Hesbaye liégeoise (Belgique), in: L. Burnez-Lanotte, M. Ilett & P. Allard (eds), *Fin des traditions danubiennes dans le Néolithique du Bassin parisien et de la Belgique (5100-4700 av. J.-C.)*, Paris (Société Préhistorique Française Mémoire 44), 301-316.
- Boulestin, B., A. Zeeb-Lanz, C. Jeunesse, F. Haack, R.-M. Arbogast & A. Denaire** 2009: Cannibalism in the Linear Pottery culture at Herxheim (Palatinate, Germany), *Antiquity* 83, 968-982.
- Bourdieu, P.**, 1977 (1967): Outline of a theory of practice, Cambridge.
- Boyle, A.**, 2010: Analyse van de gecremeerde menselijke resten afkomstig van het grafveld bij Lomm Hoogwatergeul fase II, in: D.A. Gerrets & R. de Leeuwe (red.), *Rituelen aan de Maas, Lomm Hoogwatergeul fase II, een archeologische opgraving*, Amersfoort (ADC Rapport 2333), 197-242.
- Bradley, R.**, 2001: Orientations and origins. A symbolic dimension to the long house in Neolithic Europe, *Antiquity* 75, 50-56.
- Bradley, R.**, 2003: A Life Less Ordinary: the Ritualization of the Domestic Sphere in Later Prehistoric Europe, *Cambridge Archaeological Journal* 13(1), 5-23.
- Brink-Kloke, H.**, 1990: Das linienbandkeramische Gräberfeld von Essenbach-Ammerbreite, Ldkr. Landshut, Niederbayern, *Germania* 68, 427-481.
- Brinkman, E.J. & P.J.R. Modderman** 1970: "Das Gräberfeld.", in: P.J.R. Modderman, (Hrgs.), *Linearbandkeramik aus Elsloo und Stein*, Leiden (Analecta Praehistorica Leidensia 3 (I)), 45-76.
- Brothwell, D.R.**, 1981: *Digging up bones*, Oxford.
- Brounen, F.T.S. & E. Rensink** 2006: Itteren-Sterkenberg (gemeente Maastricht). Waardstellend onderzoek van een vindplaats uit het Vroeg-Neolithicum (Lineaire Bandkeramiek), de Late Bronstijd en de IJzertijd in het Maasdal, Amersfoort (Rapportage Archeologische Monumentenzorg 140).
- Brounen, F.T.S. & E. Rensink** 2007: Kelmond-Beekerveld (gemeente Beek). Waardstellend onderzoek van een omgrachte nederzetting uit het Vroeg-Neolithicum A (Lineaire Bandkeramiek), Amersfoort (Rapportage Archeologische Monumentenzorg 153).
- Brounen, F.T.S., E. Drenth & P.A.C. Schut** 2010: La Hoguette north of the Rhine. The Ede Frankeneng site revisited, in: B. Vanmontfort, L. Louwe Kooijmans, L. Amkreutz & L. Verhart (eds), *Pots, Farmers and Foragers. Pottery traditions and social interaction in the earliest Neolithic of the Lower Rhine Area*. Leiden (ASLU 20), 95-104.
- Budja, M.**, 2010: The archaeology of death: from 'social personae' to 'relational personhood', *Documenta Praehistorica* 37, 44-54.
- Buttler, W. & W. Haberey** 1936: *Die bandkeramische Ansiedlung bei Köln-Lindenthal*, Berlin & Leipzig (Römisch-Germanische Forschungen 11 (2 Bnd)).
- Carlier, Q.**, 2010: The querns from Elsloo. An analysis of the querns from the Linearbandkeramik settlement and cemetery at Elsloo, Leiden (Unpublished MA-thesis Leiden University).
- Casanova, E., T. D. J. Knowles, C. William, M. P. Crump, & R.P. Evershed** 2017: Use of a 700 MHz NMR microcryoprobe for the identification and quantification of exogenous carbon in compounds purified by preparative capillary gas chromatography for radiocarbon determinations, *Analytical Chemistry* 89(13), 7090-7098.
- Casanova, E., T. D. J. Knowles, C. William, M. P. Crump & R. P. Evershed** 2018: Practical considerations in high-precision compound-specific radiocarbon analyses: eliminating the effects of solvent and sample cross-contamination on accuracy and precision, *Analytical Chemistry* 90(18): 11025-11032.
- Casanova, E., T. Knowles, A. Bayliss, J. Dunne, M. Baranski, A. Denaire, P. Lefranc, S. di Lernia, M. Roffet-Salque, J. Smyth, T. Gillard, E. Claßen, M. Ilett, C. Jeunesse, A. Marciniak, S. Minnitt, I. van Wijk & R. Evershed** 2020: Accurate compound-specific radiocarbon dating of archaeological pottery vessels, *Nature* 580, 506-510.

- Casanova, E., T. Knowles, A. Bayliss, M. Roffet-Salque, V. Heyd, J. Pyzel, E. Claßen, L. Domboróczy, M. Ilett, P. Lefranc, C. Jeunesse, A. Marciniak, I. van Wijk & R. P. Evershed** in press: Emergence of Dairying in the 6th millennium BC amongst the Linearbandkeramik Farmers of Central Europe Directly ¹⁴C-dated Through Fat Residues Preserved in Pottery Vessels, *Proceedings of the National Academy of Sciences*.
- Chapman, J.**, 2000: Fragmentation in archaeology. People, places and broken objects in the prehistory of south-eastern Europe, London.
- Charters, S., R.P. Evershed, L.J. Goad, A. Leyden, P.W. Blinkhorn & V. Denham** 1993: Quantification and distribution of lipid in archaeological ceramics: implications for sampling potsherds for organic residue analysis and the classification of vessel use, *Archaeometry* 35(2), 211-223.
- Claßen, E.**, 2006 (2011): *Siedlungen der Bandkeramik bei Königshoven*, Darmstadt (Rheinische Ausgrabungen 64).
- Claßen, E. & F. Schmid** 2019: Kein Rauch ohne Feuer. Zur Deutung von Brandspuren in bandkeramischen Großbauten, in: J. Meurers-Balke, T. Zerl & R. Gerlach, *Auf dem Holzweg ... Eine Würdigung für Ursula Tegtmeier* (Archäologische Berichte 30), 71-84.
- Conneller, C.**, 2009: Transforming bodies: Mortuary practices in Mesolithic Britain, in: S. McCartan, R. Schulting, G. Warren, G. & P. Woodman (eds), *Mesolithic Horizons Vol. II*, Oxford.
- Copley, M. S., R. Berstan, S. N. Dudd, G. Docherty, A.J. Mukherjee, V. Straker, S. Payne & R. P. Evershed** 2003: Direct chemical evidence for widespread dairying in prehistoric Britain, *Proceedings of the National Academy of Sciences of the United States of America* 100(4), 1524-1529.
- Correa-Ascencio, M. & R. P. Evershed** 2014: High throughput screening of organic residues in archaeological potsherds using direct methanolic acid extraction, *Analytical methods* 6, 1330-1340.
- Craig, O. E., V.J. Steele, A. Fischer, S. Hartz, S.H. Andersen, P. Donohoe, A. Glykou, H. Saul, D.M. Jones, E. Koch & C.P. Heron** 2011: Ancient lipids reveal continuity in culinary practices across the transition to agriculture in Northern Europe, *Proceedings of the National Academy of Sciences* 108(44), 17910-17915.
- Cramp, L. J. E. & R. P. Evershed** 2014: Reconstructing aquatic resource exploitation in human Prehistory using lipid biomarkers and stable isotopes, *Treatise on geochemistry (Second Edition)* 14, 319-339.
- Cramp, L.J.E., J. Jones, A. Sheridan, J. Smyth, H. Whelton, J. Mulville, N. Sharples & R.P. Evershed** 2014: Immediate replacement of fishing with dairying by the earliest farmers of the northeast Atlantic archipelagos, *Proceedings of the Royal Society B* 281, 20132372.
- Cuijpers, A.G.F.M.**, 2015: Fysisch-antropologisch onderzoek, in: W.J.H. Verwers & W.J. van Tent (red.), *Merovingisch grafveld Elst-'t Woud (gemeente Rhenen, provincie Utrecht)*, Amersfoort (Rapportage Archeologische Monumentenzorg 223), 61-86.
- Czekaj-Zastawny, A. & M.M. Przybyła** 2012: Modlniczka 2, Powiat Krakowski – cmentarzysko kultury ceramiki wstęgowej rytej i osady neolityczne, Kraków (Krakowski Zespół do Badań Autostrad).
- Cziesla, E., H. Husmann, T. Ibeling & O. Ungerath** 2010: *Düren-Arnoldsweiler: ein exzeptioneller Fundplatz durch die Zeiten*, Stuttgart, (Archäologie im Rheinland 2010).
- Cziesla, E. & T. Ibeling (eds)** 2014: Autobahn 4, Fundplatz der Extraklasse: Archäologie unter der neuen Bundesautobahn bei Arnoldsweiler, Langenweißbach.
- De Grooth, M.E.Th.**, 2007: Flint: procurement and distribution strategies; technological aspect, in: P. Van de Velde (ed.), *Excavations at Geleen-Janskamperveld 1990/1991*, Leiden (Analecta Praehistorica Leidensia 39), 143-171.
- De Grooth, M.E.Th.**, 2014: Flint, in: I. van Wijk, L. Amkreutz & P. van de Velde (eds), "Vergeten bandkeramiek". Een Odyssee naar de oudste neolithische bewoning in Nederland, Leiden, 655-658.
- Dee, M. W., S. W. L. Palstra, A.T. Aerts-Bijma, M.O. Bleeker, S. de Bruijn, F. Ghebru, H.G. Jansen, M. Kuitems, D. Paul, R.R. Richie, J.J. Spriensma, A. Scifo, D. van Zonneveld, B.M.A.A. Verstappen-Dumoulin, P. Wietzes-Land & H.A.J. Meijer** 2020: Radiocarbon Dating at Groningen: New and Updated Chemical Pretreatment Procedures, *Radiocarbon* 62(1), 63-74.
- Debono Spiteri, C., R.E. Gillis, M. Roffet-Salque, L. Castells Navarro, J. Guilaine, I.M. Muntoni, M. Saña Segui, D. Urem-Kotsou, H.L. Whelton, O.E. Craig, J.D. Vigne, & R.P. Evershed** 2016: Regional asynchronicity in dairy production and processing in early farming communities of the northern Mediterranean, *Proceedings of the National Academy of Sciences of the United States of America* 113(48): 13594-13599.
- De Moor, J.J.W.**, 2007: Human impact on Holocene catchment development and fluvial processes – the Geul River catchment, SE Netherlands (PhD thesis Vrije Universiteit).
- Devlin, J.B & N.P. Hermann** 2008: Bone colour as an interpretive tool of the depositional history of archaeological remains, in: C.W. Schmidt & S.A. Symes (eds), *The analysis of burned human remains*, London, 109-128.
- Dohrn-Ihmig, M.**, 1980: Überlegungen zur Verwendung bandkeramischer Dechsel aufgrund der Gebrauchsspuren. *Fundberichte aus Hessen* 19/20: 69-78.

- Dohrn-Ihmig, M.**, 1983: Das bandkeramische Gräberfeld von Aldenhoven-Niedermerz, Kreis Düren. Archäologie in den Rheinischen Lössbörden. Beiträge zur Siedlungsgeschichte im Rheinland, Köln (Rheinische Ausgrabungen 24), 47-190.
- Douda, J., J. Doudová, A. Drašnarová, P. Kuneš, V. Hadincová, K. Krak, P. Zákřavský & P. Mandák** 2014: Migration Patterns of Subgenus *Alnus* in Europe since the Last Glacial Maximum: A Systematic Review, *Plos One* 9, e88709.
- Dunne, J., R. P. Evershed, M. Salque, L.J.E. Cramp, S. Bruni, K. Ryan, S. Biagetti & S. di Lernia** 2012: First dairying in green Sahara Africa in the fifth millennium BC, *Nature* 486, 390-394.
- Evershed, R. P., C. Heron & L.J. Goad** 1990: Analysis of organic residues of archaeological origin by high-temperature gas chromatography and gas chromatography-mass spectrometry, *The Analyst* 115, 1339-1342.
- Evershed, R.P.**, 2008: Organic residue analysis in archaeology: the archaeological biomarker revolution, *Archaeometry* 50(6): 895-924.
- Evershed, R.P., S. Payne, A.G. Sherratt, M.S. Copley, J. Coolidge, D. Urem-Kotsu, K. Kotsakis, M. Özdoğan, A. Özdoğan, O. Nieuwenhuys, P.M.M.G. Akkermans, D. Bailey, R.R. Andeescu, S. Campbell, S. Farid, I. Hodder, N. Yalman, M. Özbaşaran, E. Biçakci, Y. Garkinfel, T. Levy & M. Burton** 2008: Earliest date for milk use in the Near East and southeastern Europe linked to cattle herding, *Nature* 455, 528-531.
- Farrugia, J.-P.**, 1992: Les outils et les armes en pierre dans le rituel funéraire du Néolithique Danubien, Oxford (British Archaeological Reports, Int. Ser. 58).
- Farrugia, J.-P.**, 2002: Le cimetière de la Céramique Linéaire d'Aiterhofen (Bavière orientale) dans le contexte de l'Europe centrale. Une crise majeure de la civilisation du Néolithique Danubien des années 5100 avant notre ère, *Bulletin de la Société Préhistorique Luxembourgeoise* 23/24, 75-127.
- Fischer, U.**, 1956: Die gräber der Steinzeit im Saalegebiet. Studien über neolithische und frühbronzezeitliche Grab- und Bestattungsformen in Sachsen-Thüringen, Berlin.
- Friedli, H., H. Lotscher, H. Oeschger, U. Siegenthaler & B. Stauffer** 1986: Ice core record of the $^{13}\text{C}/^{12}\text{C}$ ratio of atmospheric CO_2 in the past two centuries, *Nature* 324, 237-238.
- Friedrich, C.**, 1994: Kulturgeschichtliche Betrachtungen zur Bandkeramik im Merzbachtal, in: J. Lüning & P. Stehli (Hrsg.), *Die Bandkeramik im Merzbachtal auf der Aldenhovener Platte*, Köln/Bonn (Beiträge zur neolithischen Besiedlung der Aldenhovener Platte V, Rheinische Ausgrabungen 36), 207-393.
- Friedrich, C.**, 2003: Strukturen im Wandel: Ein bandkeramisches Gräberfeld entsteht, in: J. Eckert, U. Eisenhauer & A. Zimmermann (Hrsg.), *Archäologische Perspektiven, Analysen und Interpretationen im Wandel: Festschrift für Jens Lüning zum 65. Geburtstag*, Rahden/Westfalen, (Internationale Archäologie: Studia honoraria 20), 545-559.
- Friedrich, C.**, 2005: Struktur und Dynamik der bandkeramischen Landnahme, in: J. Lüning (Hrsg.), *Die Bandkeramik im 21. Jahrhundert*. Symposium in der Abtei Brauweiler bei Köln vom 16.9. - 19.9.2002, Rahden (Internationale Archäologie 7), 81-110.
- Friedrich, C.**, 2014: Kulturgeschichtliche Betrachtungen zur Bandkeramik im Merzbachtal, in: J. Lüning & P. Stehli (Hrsg.), *Die Bandkeramik im Merzbachtal auf der Aldenhovener Platte*. Beiträge zur neolithischen Besiedlung der Aldenhovener Platte V, Köln/Bonn (Rheinische Ausgrabungen 36), 207-393.
- Gabriel, I.**, 1979: *Studien zur Tonware der Bandkeramik in Westfalen und Nordhessen*, Bonn (Bonner Hefte zur Vorgeschichte 19-20 (2 Bnd)).
- Gaitsch, W. & J. Janssens** 2010: Ein bandkeramischer Siedlungs- und Bestattungsplatz im Braunkohlentagebau Hambach, Stuttgart (Archäologie im Rheinland 2009), 39-41.
- Gassin, B., J.F. Gibaja, P. Allard, D. Boucherat, E. Claud, I. Clemente, C. Guéret, J. Jacquier, R. Khedhaier, G. Marchand, N. Mazucco, A. Palomo, U. Perales, T. Perrin, S. Philibert & L. Torchy** 2014: Late Mesolithic notched blades from western Europe and North Africa: technological and functional variability, in: J. Marreiros, N. Bicho & J.F. Gibaja (eds), *International Conference on Use-Wear Analysis, Actes du colloque de Faro* (2012), Cambridge, 224-231.
- Gero, J.M. & M.W. Conkey (eds)** 1991: Engendering archaeology - women and prehistory, Oxford.
- Gerlach, R. & J. Meurers-Balke** 2015: Bäche ohne Wasser. Die Geschichte der kleinen und mittleren Lössbäche im Rheinland, *Archäologie im Rheinland* 2014/2015, 25-28.
- Gerlach, R., J. Meurers-Balke, A.J. Kalis, A.J. P.Fischer, A. Hilgers & J. Protze** 2011: Erste Ergebnisse zur Umweltrekonstruktion in Düren-Arnoldsweiler, *Archäologie im Rheinland* 2010, 65-68.
- Gerlach, R., P. Fischer, A. Hilgers, J. Protze & J. Meurers-Balke** 2014: Die Geschichte der neolithischen Siedlungsböden und des Ellebachtals, in: E. Czesla & T. Ibeling (Hrsg.), *Autobahn 4, Fundplatz der Extraklasse. Archäologie unter der neuen Bundesautobahn bei Arnoldsweiler, Langenweißbach*, 59-68.
- Gerling, C.**, 2006: Das linienbandkeramische Gräberfeld von Schwetzingen, Rhein-Neckar-Kreis, Würzburg (Unpubl. Magisterarbeit Würzburg 2006).

- Gerling, C.**, 2009: Schwetzingen, ein 'reguläres' Gräberfeld der jüngeren Linearbandkeramik, in: A. Zeeb-Lanz (Hrsg.), *Krisen – Kulturwandel – Kontinuitäten. Zum Ende der Bandkeramik in Mitteleuropa. Beiträge der internationalen Tagung in Herxheim bei Landau (Pfalz) vom 14.-17.06.2007*, Rahden (Internat. Arch. Arbeitsgemeinschaft Symposium 10), 103-110.
- Gerling, C.**, 2012: Das linearbandkeramische Gräberfeld von Schwetzingen, Rhein-Neckar Kreis, *Fundberichte aus Baden-Württemberg* 32, 7-263.
- Gosden, C. & Y. Marshall** 1999: The cultural biography of objects, *World Archaeology* 31(2), 169-178.
- Graiewski, N & D. Rupprecht** 2001: Das zweite linearbandkeramische Gräberfeld im Rheinland, *Archäologie im Rheinland 2000*, 32-34.
- Graiewski, N & D. Rupprecht** 2002: Vorbericht über die Ausgrabung des bandkeramischen Gräberfeldes Altdorf (Gemeinde Inden, Kr. Düren), in: H.-J. Beier (Hrsg.), *Varia neolithica II - Beiträge der Sitzung der AG Neolithikum in Trier 2001. Beiträge zur Ur- und Frühgeschichte Mitteleuropas, Band 32*, 155-163.
- Gronenborn, D.**, 1999: A variation on a basic theme: the transition to farming in southern central Europe, *Journal of World Prehistory* 13(2), 123-210.
- Gronenborn, D., (Hrsg.)** 2003: Der „Jäger/Krieger“ aus Schwanfeld: Einige Aspekte der politisch-sozialen Geschichte des mitteleuropäischen Altneolithikums. In *Archäologische Perspektiven (Festschrift für Jens Lüning zum 65. Geburtstag)*, Espelkamp, 35-48.
- Gronenborn, D.**, 2007: Beyond the models: "Neolithisation" in Central Europe, in: A. Whittle & V. Cummings (eds): *Going Over. The Mesolithic-Neolithic Transition in North-West Europe*, *Proceedings of the British Academy* 144, 13-32.
- Grünberg, J.M.**, 2000: *Mesolithische Bestattungen in Europa. Teil 1: Auswertung, Rahden/Westf.* (Internationale Archäologie. Vol. 40).
- Hachem, L.**, 2000: New observations on the Bandkeramik house and social organization, *Antiquity* 74, 308-312.
- Halbrucker, É., G. Fiers, H. Vandendriessche, T. De Kock, V. Cnudde & P. Crombé** 2021: Burning flint: An experimental approach to study the effect of fire on flint tools, *Journal of Archaeological Science: Reports* 36, 14.
- Hamilton, J., R.A. Bentley, P. Bickle, L. Fibiger, R.E.M. Hedges, L. Reynard, C. Wright, P. Cullen, C. Dale, C. Nowell & A. Whittle** 2013: Seeking diversity: methodology, in: P. Bickle & A. Whittle (eds), *The first farmers of central Europe: diversity in LBK lifeways*. Oxford: Oxbow, 29-48.
- Hamon, C.**, 2009: The Functional and Symbolic Value of Grinding Stone Tools from the Late Bandkeramik of North-Western Europe, *Internet Archaeology* 26.
- Hamon, C. & L. Gomart** 2021: Social Rules and Household Interactions Within the LBK: Long-Standing Debates, *New Perspectives. Open Archaeology* 2021; 7: 690-704.
- Hampton, O.W.**, 1999: *Culture of stone. Sacred and profane uses of stone among the Dani*, College Station Texas (Texas A & M University Anthropology Series).
- Hanöfner, A. & L. Siftar** 2007: Die Ausgrabungen in Ödmühle, Gemeinde Aiterhofen, Lkr. Straubing-Bogen 1975-1980, *Jahresbericht des Historischen Vereins für Straubing* 108, 31-277.
- Hartel, F.**, 2011: Das linearbandkeramische Gräberfeld von Jüchen-Holz, Kr. Neuss, Köln (Kurzberichte der LVR Antrag 285).
- Hartel, F.**, in prep.: Linearbandkeramische Gräberfelder als Quelle zur Religionsgeschichte (working title).
- Hedges, R., R.A. Bentley, P. Bickle, P. Cullen, C. Dale, L. Fibiger, J. Hamilton, D. Hofmann, G. Nowell & A. Whittle** 2013: The supra-regional perspective, in P. Bickle & A. Whittle (eds), *The first farmers of central Europe. Diversity in LBK lifeways*, Oxford, 343-384.
- Heinen, M.**, 2005: Von der Steinzeit bis zum Mittelalter. Die Ergebnisse der archäologischen Ausgrabungen in Bergheim-Zieverich, *Jahrbuch des Bergheimer Geschichtsvereins e. V., Bd. 14*, 12-54.
- Heinen, M. & R. Nehren** 2005: Erstmals im Rheinland: bandkeramische Siedlungsreste und Gräber in direkter Nachbarschaft, *Archäologie im Rheinland 2004*, 40-42.
- Heller, K.**, 2014: Das bandkeramische Gräberfeld von Inden-Altdorf, Kr. Düren (»Inden-Altdorf A«), in: L. Clare, K. Heller, M. Ismail-Weber & C. Mischka (Hrsg.), *Die Bandkeramik im Altdorfer Tälchen bei Inden, Darmstadt (Rheinische Ausgrabungen 69)*, 337-429.
- Hendrix, W.P.A.M.**, 1991: Onderzoek Bandkeramische nederzetting bedrijventerrein Sanderboutlaan nabij Elsloo, *Archeologie in Limburg* 47, 10.
- Hendrix, W.P.A.M.**, 1992: Bandkeramische nederzetting Sanderboutlaan, *Publications SHAL* 127 (1991), 263-266.
- Hendrix, W.P.A.M.**, 1998: Een Bandkeramische vondst nabij Steinerbos te Stein, *Archeologie in Limburg* 76, 33-36.
- Hendrix, W.P.A.M.**, 1999: De bandkeramische nederzetting Stein-Heidekampweg, *Archeologie in Limburg* 80, 21-24.
- Hermann, B., G. Grupe, S. Hummel, H. Piepenbrink & H. Schutkowski** 1990: *Prähistorische Anthropologie*, Berlin.

- Hiddink, H.A.**, 2003: Het grafritueel in de Late IJzertijd en Romeinse tijd in het Maas-Demer-Scheldegebied, in het bijzonder van twee grafvelden bij Weert, Amsterdam (Zuidnederlandse Archeologische Rapporten 11).
- Hiddink, H.A.**, 2006: Opgravingen op het Rosveld bij Nederweert 2, graven en grafvelden uit de IJzertijd en Romeinse tijd, Amsterdam (Zuidnederlandse Archeologische Rapporten 28), 21-51.
- Hjelle, K.L.**, 1999: Modern pollen assemblages from mown and grazed vegetation types in western Norway, *Review of Palaeobotany and Palynology* 107, 55-81.
- Hoffmann, E.**, 1978: Die Körpergraber der Linien- und Stichbandkeramik in den Bezirken Halle und Magdeburg, *Jahresschrift der mitteldeutschen Vorgeschichte* 62, 135-201.
- Hoffmann, D.**, 2009: Cemetery and Settlement Burials in the Lower Bavarian LBK, in: D. Hoffmann & P. Bickle (Hrsg.), *Creating Communities. New Advances in Central European Neolithic Research* (Oxford, Oakville 2009), 220-234.
- Hoffmann, D.**, 2010: Soziale Beziehungen und Verwandtschaft in der Bandkeramik: Struktur oder Flexibilität?, in: E. Claßen, T. Doppler & B. Raminger (Hrsgs.), *Familie -- Verwandtschaft -- Sozialstrukturen: sozialarchäologische Forschungen zu neolithischen Befunden*, Kerpen-Loogh, (Fokus Jungsteinzeit, Bnd 1), 31-42.
- Hoffmann, D.**, 2015: The burnt, the whole and the broken. Funerary variability in the Linearbandkeramik, in: Z. Devlin & E.J. Graham (eds), *Death embodied: archaeological approaches to the treatment of the corpse*, Oxford and Philadelphia.
- Hoffmann, D.**, 2020a: Structured deposition in the Linearbandkeramik – is there something to talk about?, in: D. Hoffmann (ed.), *Magical, mundane or marginal? Deposition practices in the Early Neolithic Linearbandkeramik culture*, Leiden, 9-32.
- Hoffmann, D.**, 2020b: Not going anywhere? Migration as a social practice in the early Neolithic Linearbandkeramik. *Quaternary International* 2020; Volume 560/561, 228-239.
- Hoffmann, D. & P. Bickle** 2011: Culture, tradition and the settlement burials of the Linearbandkeramik (LBK) culture, in: B. Roberts & M. Vander Linden (eds), *Investigating archaeological cultures. Material culture variability and transmission*, New York 183-200.
- Hoffmann, D., J. Pechtl, R.A. Bentley, P. Bickle, L. Fibiger, G. Grupe, J. Hamilton, R.E.M. Hedges, M. Schultz & A. Whittle** 2013: Southern Bavaria, in: P. Bickle & A. Whittle (eds), *The first farmers of central Europe. Diversity in LBK lifeways*, Oxford: Oxbow, 205-248.
- Holck, P.**, 1986: *Cremated bones*, Oslo.
- Holwerda, J.H.**, 1927: Aus Holland, Bericht über die Fortschritte der Römisch-Germanische Forschung 16, 119-163.
- Hoskins, J.**, 1998: *Biographical objects: how things tell the story of people's lives*, New York.
- Hoyer, W.**, 2010: Das bandkeramische Gräberfeld Niedermerz 3 und die Siedlungen im mittleren Merzbachtal --ein Vergleich, in: E. Claßen, T. Doppler & B. Raminger (Hrsgs.), *Familie -- Verwandtschaft -- Sozialstrukturen: sozialarchäologische Forschungen zu neolithischen Befunden*. Kerpen-Loogh: Welt und Erde (Fokus Jungsteinzeit, Bnd 1), 43-51.
- Huisman, D.J., F. Braadbaart, I.M. van Wijk & B.J.H. van Os** 2012: Ashes to ashes, charcoal to dust: micromorphological evidence for ash-induced disintegration of charcoal in Early Neolithic (LBK) soil features in Elsloo (the Netherlands), *Journal of Archaeological Science* 39.
- Huntington, R. & P. Metcalf** 1979: *Celebrations of Death: the Anthropology of Mortuary Ritual*, Cambridge.
- Huntley, B. & H.J.B. Birks** 1983: *An atlas of past and present pollen maps for Europe: 0-13000 years ago*, Cambridge.
- Jeunesse, C.**, 1995: Les groupes régionaux occidentaux du Rubané (Rhin et Bassin parisien) à travers les pratiques funéraires, *Gallia Préhistoire* 37, 115-154.
- Jeunesse, C.**, 1996: Les fossés d'enceintes de la culture à céramique linéaire en Alsace, in: P. Duhamel (ed.), *La Bourgogne entre les bassins rhénan, rhodanien et parisien : carrefour ou frontière ? Actes du XVIIIe Colloque interrégional sur le Néolithique*. Dijon, 25-27 octobre 1991, (Revue Archéologique de l'Est, supplément 14), 257-269.
- Jeunesse, C.**, 1997: Pratiques funéraires au néolithique ancien —sépultures et nécropoles des sociétés danubiennes (5500/4900 av. J.-C.), Paris.
- Jeunesse, C.**, 2003: Néolithique «initial», Néolithique ancien et néolithisation dans l'espace centre-européen : une vision rénovée, *Revue d'Alsace* 129, 2003, 97-112.
- Jeunesse, C.**, 2009: Le front de colonisation occidentale (entre Rhin et Seine) et l'identité rubanée, in: J. Kosłowski (ed.), *Interactions between different models of Neolithization north of the central European agro-ecological barrier*, Krakow (Polska Akademia Umiejętności), 151-176.
- John, J.**, 2011: Status of Spondylus artifacts within the LBK grave goods, in: F. Ifantidis & M. Nikolaidou (eds), *Spondylus in prehistory. New data and approaches. Contributions to the archaeology of shell technologies* (BAR International Series 2216), Oxford (BAR International Series 2216), 39-45.

- Jones, A. & G. MacGregor (eds)** 2002: Colouring the past. The significance of colour in archaeological research, Oxford.
- Kahlke, H.-D.**, 1954: Die Bestattungssitten des donauländischen Kulturkreises der jüngeren Steinzeit. Teil 1: Linienbandkeramik, Berlin.
- Kapitány, R., & M. Nielsen** 2019: Ritualized Objects: How We Perceive and Respond to Causally Opaque and Goal Demoted Action, *Journal of Cognition and Culture* 19(1-2), 170-194.
- Keeley, L.H.**, 1977: Beobachtungen über Mikro-Abnutzungsspuren an 14 Klingen von Hienheim, *Analecta Praehistorica Leidensia* 19, 71-72.
- Keeney, M., I. Katz & M.J. Allison** 1962: On the probable origin of some milk fat acids in rumen microbial lipids, *Journal of the American Oil Chemists' Society* 39(4), 198-201.
- Krahn, C.**, 2003: Überlegungen zum Interaktionssystem der bandkeramischen Siedlungen auf der Aldenhovener Platte, in: J. Eckert, U. Eisenhauer & A. Zimmermann (Hrsg.), *Archäologische Perspektiven, Analysen und Interpretationen im Wandel: Festschrift für Jens Lüning zum 65. Geburtstag*, Rahden/Westfalen, (Internationale Archäologie: Studia honoraria 20), 515-544.
- Kreuz, A.**, 2008: Closed forest or open woodland as natural vegetation in the surroundings of Linearbandkeramik settlements? *Vegetation History and Archaeobotany* 17, 51- 64.
- Kuper, R., H. Löhr, P. Stehli & A. Zimmermann** 1973: Struktur und Entwicklung des Siedlungsplatzes, in: J.-P. Farruggia, R. Kuper, J. Lüning & P. Stehli (Hrsg.), *Der bandkeramische Siedlungsplatz Langweiler 2 Gemeinde Aldenhoven, Kreis Düren, Köln/Bonn, (Rheinische Ausgrabungen, Band 13)*, 22-50.
- Laan, W. & I.M. van Wijk** 2020: Geofysisch onderzoek op het Lanakerveld. Met meerdere methodes op zoek naar meerdere perioden. Inventariserend veldonderzoek (IVO-o), Maastricht-Lanakerveld, gemeente Maastricht, Leiden (Archol-rapport 533).
- Lanting, J. N. & J. van der Plicht** 2002: De 14C-chronologie van de Nederlandse pre- en protohistorie III: Neolithicum, *Palaeohistoria* 41/42 (1999/2000), 1-110.
- Lefranc, P. & E. Boës** 2009: Les restes humain manipulés du site rubané d'Ittenheim 'Complex Sportif' (Bas-Rhin), in: A. Zeeb-Lanz (ed.), *Krisen-Kulturwandel-Kontinuitäten. Zum Ende der Bandkeramik in Mitteleuropa. Beiträge der internationalen Tagung in Herxheim bei Landau (Pfalz) from 14.-17.06.2007*, Rahden, 197-211.
- Lenneis, E.**, 2010: Empty graves in LBK cemeteries: indications of special burial practices, *Documenta Praehistorica* 37, 161-166.
- Lévi-Strauss, C.**, 1958: *Anthropologie structurale*. Paris (E transl., 1967: *Structural anthropology*. Garden City).
- Lévi-Strauss, C.**, 1975: *La voie des masques*. Genève (D Übers., 1977: *Der Weg der Masken*. Frankfurt am Main: Insel Verlag 1977, Édition revue, 1979: augmentée, suivie de trois excursions, Paris).
- Lévi-Strauss, C.**, 1979: *La voie des masques*. Édition revue: augmentée, suivie de trois excursions, Paris.
- Lindgren, D., L. Paule, X. Shen & R. Yazdani** 1995: Can viable pollen carry Scots pine genes over long distances?, *Grana* 34, 64-69.
- Link, T.**, 2014: Gewaltphantasien? Kritische Bemerkungen zur Diskussion über Krieg und Krise am Ende der Bandkeramik, in: T. Link & H. Peter-Röcher (eds), *Gewalt und Gesellschaft, Dimensionen der Gewalt in ur- und frühgeschichtlicher Zeit*, Bonn (Universitätsforschungen zur prähistorischen Archäologie 259), 271-286.
- Lisitsyna, O.V., T. Giesecke & S. Hicks** 2011: Exploring pollen percentage threshold values as an indication for the regional presence of major European trees, *Review of Palaeobotany and Palynology* 166, 311-324.
- Little, A. & A.L. van Gijn** 2017: Enigmatic plant-working tools and the transition to farming in the Rhine/Meuse delta, *Analecta Praehistorica Leidensia* 47, 1-11.
- Liu, Y., X. Shang, P. Sheng, G. Song, Y. Liu, X. Shang, P. Sheng & G. Song** 2018: Pollen dispersal in traditional processing of buckwheat and its application in agricultural archaeology, *Science China Earth Sciences* 61/12, 1792-1803.
- Lodewijckx, M.**, 1990: Millen: Bandkeramisch grafveld? *Archeologie*, 52-53.
- Lodewijckx, M.**, 1981: De Bandkeramische Nederzetting te Wange (Brabant), *Notae Praehistoricae* 1/1981, 26-27.
- Lonnée, H. A. & G.J.R. Maat** 1998: Inhumations in a Roman cemetery at Valkenburg-Marktvelde (Zuid Holland) in the Netherlands, Leiden (Barge's Anthropologica 3).
- Louwe Kooijmans, L.P. (red.)** 2001: Archeologie in de Betuweroute. Hardinxveld-Giessendam Polderweg. Een mesolithisch jachtkamp in het rivierengebied (5500-5000 v. Chr.), Amersfoort (Rapportage Archeologische Monumentenzorg 83).
- Louwe Kooijmans, L.P.**, 2007: Multiple choices. Mortuary practices in the Low Countries during the Mesolithic and Neolithic, 9000-3000 cal BC, in: L. Larsson, F. Luth & T. Terberger (eds), *Innovation and continuity - non-megalithic mortuary practices in the Baltic. New methods and research into the development of stone age society*, Mainz am Rhein (Berichte der Romisch Germanische Kommission 88), 551-580.
- Louwe Kooijmans, L.P.**, 2013: Reflections on the Mesolithic burial pits at Mariëenberg (province of Overijssel), the Netherlands, in: M.J.L.Th. Niekus, R.N.E. Barton, M. Street & Th. Terberger, *A mind set on flint studies in honour of*

- Dick Stapert, Groningen (Groningen Archaeological Studies 16), 401-424.
- Lovejoy, C., R. Meindl, T. Pryzbeck & R. Mensfort** 1985: Chronological metamorphosis of the auricular surface of the ilium; a new method for the determination of adult skeletal age at death, *American journal of Physical Anthropology* 68, 15-28.
- Lüning, J.**, 1982: Forschungen zur bandkeramischen Besiedlung der Aldenhovener Platte im Rheinland, in: *Siedlungen der Kultur mit Linearkeramik in Europa* (Nitra-1981 Symposium), 125-156.
- Lüning, J.**, 1988: Frühe Bauern in Mitteleuropa im 6. und 5. Jahrtausend v. Chr., *Jahrbuch des Römisch-Germanischen Zentralmuseum Mainz* 35, 27-93.
- Macintosh, A.A., R. Pinhasi & J.T. Stock** 2017: Prehistoric women's manual labor exceeded that of athletes through the first 5500 years of farming in central Europe, *Science Advances* 3(11), eaao3893.
- Maes, B. (red.)** 2013: Inheemse bomen en struiken in Nederland en Vlaanderen. Herkenning, verspreiding, geschiedenis en gebruik, Amsterdam.
- Maat, G.J.R.**, 1997: A simple selection method of human cremations for sex and age analysis, Villafranca, Padovana. (*Proceedings of the Symposium 'Cremation studies in archaeology'*).
- Maat, G.J.R., A.E. van den Merwe & Th. Hoff** 2012: Manual for the Physical Anthropological Report, Leiden/Amsterdam (*Barge's Anthropologica* 6).
- Maresh, M.M.**, 1955: Linear growth of bones of extremities from infancy through adolescence, *American journal of disease of children* 89, 742-753.
- Marreiros, J.M., B. Gibaja, J. Francisco & B.N. Cham** 2015: *Use-wear and residue analysis in archaeology*, New York (Manuals in archaeological method, theory and technique).
- Masclans, A., C. Hamon, C. Jeunesse & P. Bickle** 2021: A sexual division of labour at the start of agriculture? A multi-proxy comparison through grave good stone tool technological and use-wear analysis, *PLoS ONE* 16(4). E0249130, <https://doi.org/10.1371/journal.pone.0249130>
- Masclans Latorre, A.**, 2020: Use-wear Analyses of Polished and Bevelled Stone Artefacts during the Sepulcres de Fossa/Pit Burials Horizon (NE Iberia, c. 4000-3400 cal B.C.), Oxford (BAR International Series 2972).
- Masclans Latorre, A., P. Bickle & C. Hamon** 2021: Sexual Inequalities in the Early Neolithic? Exploring Relationships Between Sexes/Genders at the Cemetery of Vedrovice Using Use-Wear Analysis, Diet and Mobility, *Journal of Archaeological Method and Theory* 28,232-273.
- Masclans Latorre, A., Z. Tvrđý, J. Pavúk, M. Cheben & P. Bickle** 2021: Exploring sexual division of labour at "Nitra Horné Krškany" cemetery using stone tool use-wear analysis, physical activity markers, diet, and mobility as proxies, *Archaeological and Anthropological Sciences* 13(109),20.
- McKinley, J.I.**, 1989: Cremations: expectations, methodologies and realities, in: C.A. Roberts, F. Lee & J. Bintliff (eds), *Burial archaeology, current research, methods and developments*, Oxford (*British Archaeological Reports, British series* 211), 65-76.
- McKinley, J.I.**, 1994: Bone fragment size in British burials and its implications for pyre technology and ritual, *Journal of Archaeological Science* 21, 339-342.
- McKinley, J.I.**, 2004: Compiling a skeletal inventory: cremated human bone, in: Brickley, M. & J.I. McKinley (eds), *Guidelines to the Standards for Recording Human Remains*. Southampton, Reading (*Institute of Field Archaeologists Paper no. 7 / British Association for Biological Anthropology and Osteoarchaeology*).
- Meier-Arendt W.**, 1966: *Die bandkeramische Kultur im Untermaingebiet* (Verein von Altertumsfreunden im Regierungsbezirk Darmstadt e. V., vol. 3).
- Meindl, R.S. & C.O. Lovejoy** 1985: Ectocranial Suture Closure: A Revised Method for the Determination of Skeletal Age at Death Based on the Lateral-Anterior Sutures, *American Journal of Physical Anthropology* 68: 57-66.
- Meurkens, L. & I.M. van Wijk (eds.)** 2009: Wonen en begraven op de Caberg van het vroege neolithicum tot en met de vroege middeleeuwen. Inventariserend Veld Onderzoek van een cultuurlandschap te Maastricht-Lanakerveld, Leiden (Archol Rapport 100).
- Meyer, C., C. Lohr, D. Gronenborn & K.W. Alt** 2015: The massacre mass grave of Schöneck-Kilianstädten reveals new insights into collective violence in Early Neolithic Central Europe, *Proc. Natl. Acad. Sci. USA* 112, 11217-11222.
- Modderman, P.J.R.**, 1950: Onderzoek van een bandkeramische nederzetting te Elsloo (L.), Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek 19, 4-6.
- Modderman, P.J.R.**, 1958/1959: Die Bandkeramische Siedlung von Sittard, *Palaeohistoria* 6-7, 33-120.
- Modderman, P.J.R. (red.)** 1970: *Linearbandkeramik aus Elsloo und Stein*, Leiden (Analecta Praehistorica Leidensia 3).
- Modderman, P.J.R.**, 1975: Elsloo, a Neolithic farming community in the Netherlands, in: R. Bruce-Mitford (ed.), *Recent Archaeological Excavations in Europe*, London/Boston, 260-286.
- Modderman, P.J.R.**, 1988: The Linear Pottery Culture: diversity in uniformity, Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek 38, 65-139.

- Montanari, C.**, 1996: Recent pollen deposition in alder woods and in other riverine plant communities, *Allionia* 34, 309-323.
- Müller-Scheßel, N., Z. Hukelová, J. Meadows, I. Cheben, J. Müller & M. Furholt** 2019: New burial rites at the end of the Linearbandkeramik in southwest Slovakia, *Antiquity* 95/379, 65-84.
- Nieszery, N.**, 1995: Linearbandkeramische Gräberfelder in Bayern, Espelkamp.
- Nilsson Stutz, L.**, 2008: More than a metaphor: approaching the human cadaver in archaeology, in: F. Fahlander & T. Oestigaard (eds), *the materiality of Death, Bodies, Burials, Beliefs*, Oxford (BAR International Series 1768), 19-28.
- Nordholz, D.**, 2015: Untersuchungen zum Verhältnis der Geschlechter in der Linienbandkeramik. Ausgewählte Befunde aus Gräberfeldern, Rahden (Internationale Archaeologie 127).
- Osterhaus, U.**, 1975: Jungsteinzeitliche Gräberfelder an Donautal - Gewinne und Verluste. *Ausgrabungsnotizen aus Bayern* 1975/2.
- Orton, C.P., P.A. Tyers & A. Vince** 1993: *Pottery in archaeology*, Cambridge.
- Outram, A. K., N.A. Stear, R. Bendrey, S. Olsen, A. Kasparov, V. Zaibert, N. Thorpe & R.P. Evershed** 2009: The earliest horse harnessing and milking, *Science* 323(5919), 1332-1335.
- Pankowská, A.**, 2008: Hodnocení shody odhadu pohlaví mezi dvěma batadeli na souboru lidských kosterních pozostatku z lokality Hulín 3. [Evaluation of the degree of agreement in sex determinations by two observers of the collections of skeletons from the archaeological site "Hulín 3"] *Archeologické rozhledy* LX, 725-732.
- Parkin, R. & L. Stone (eds)** 2004: Kinship and family – an anthropological reader, Oxford.
- Pavúk, J.**, 1972: Neolithisches Gräberfeld in Nitra, *Slovenská Archeológia* 20, 5-106.
- Pechtl, J. & D. Hofmann** 2013: Irregular burials in the LBK – All or none? in: N. Müller-Scheeßel & N. Baumann, 'Irreguläre' Bestattungen in der Urgeschichte: Norm, Ritual, Strafe ...?, Akten der Internationalen Tagung in Frankfurt am Main vom 3. bis 5. Februar 2012, Bonn, 123-138.
- Peschel, C.**, 1992: Regel und Ausnahme. Linearbandkeramische Bestattungssitten in Deutschland und angrenzenden Gebieten, unter besonderer Berücksichtigung der Sonderbestattungen, Rahden (Internationale Archäologie, vol. 9).
- Peters, R.**, 2018: Das Gräberfeld, die Grabenanlage und die Steinartefakte des linearbandkeramischen Fundplatzes Arnoldsweiler-Ellebach, Köln (Unpublished doctoral dissertation).
- Peter, R. & N. Balkowski** 2020: Grave goods, refuse or the remains of rituals? Differences in the assemblages from the LBK burials of Arnoldsweiler-Ellebach, in: D. Hofmann (ed.), *Magical, mundane or marginal? Deposition practices in the Early Neolithic Linearbandkeramik culture*, Leiden, 83-112.
- Pettitt, P. & R. Hedges** 2008: The age of the Vedrovice cemetery: the AMS radiocarbon dating programme, *Anthropologie* 46, 125-134.
- Pétrequin, P. & A.M. Pétrequin** 2000: *Ecologie d'un outil. La hache de pierre en Irian Jaya (Indonesie)*, Paris (Monographie du CRA/CNRS).
- Podborský, V.**, 2002: *Dvěpohřebišťe Neolitického lidu s Lineární Keramikou ve Vedrovicích na Morave*, Brno (Masarykovy University Philosophy Faculty Dept. of Archaeology and Museology).
- Polman, S.P.**, 2001: Project Grensmaas, deelgebieden Aan de Maas Noord, Bosscherveld, Herbricht, Hochter Bambt, Kotem, Maasband, Nattenhoven en Vissersweert: een Aanvullende Archeologische Inventarisatie, Amsterdam.
- Porreij-Lyklema, A.**, 2015: Sporen van de bandkeramische nederzetting te Sittard. Een archeologische begeleiding conform protocol opgraven aan de Brugstraat te Sittard, Leiden (Archol Rapport 268).
- Porreij-Lyklema, A.**, 2017: Terug naar Sittard Thien Bunder. Voortzetting van het onderzoek naar een laat bronstijd grafveld en sporen van een bandkeramische nederzetting, Leiden (Archol Rapport 362).
- Ramminger, B.**, 2007: Nah am Wasser gebaut: ein neues bandkeramisches Erdwerk aus Schöneck-Kilianstädten, *Hessenarchäologie* 2006, 32-35.
- Rauber-Kopsch, F.**, 1914: Lehrbuch der Anatomie des Menschen, Abteilung II, Knöcher, Bänder, Leipzig.
- Reimer, P., W. E. N Austin, E. Bard, A. Bayliss, P.G. Blackwell, C. Bronk Ramsey, M. Butzin, H. Cheng, R. Lawrence Edwards, M. Friedrich, P.M. Grootes, T.P. Guilderson, I. Hajdas, T.J. Heaton, A.G. Hogg, K.A., Hughen, B. Kromer, S.W. Manning, R. Muscheler & S. Talamo** 2020: The IntCal20 Northern Hemisphere radiocarbon age calibration curve (0-55 cal kBP), *Radiocarbon*, 62(4), 725. <https://doi.org/10.1017/RDC.2020.41>
- Reinecke, K.**, 1978: Die Linearbandkeramik in Niederbayern, *Beitrage zur Geschichte Niederbayerns während der Jungsteinzeit* 1, 4-20.
- Richter, I.**, 1968/1969: Die bandkeramischen Gräber von Flomborn, Kreis Alzey, und vom Adlerberg bei Worms, *Mainzer Zeitschrift* 63/64, 158-179.
- Richter, T.**, 2011: Das bandkeramische Gräberfeld von Holz im Tagebau

Garzweiler, *Archäologie im Rheinland* 2010, 57-59.

Robb, J. & O.J.T. Harris 2017: Becoming gendered in European prehistory: was Neolithic gender fundamentally different? *American Antiquity* 83(1), 128-47.

Roffet-Salque, M., Regert, R.P. Evershed, A.K. Outram, L.J.E. Cramp, O. Decavallas, J. Dunne, P. Gerbault, S. Mileto, S. Mirabaud, M. Pääkkönen, J. Smyth, L. Šoberl, H.L. Whelton, A. Alday-Ruiz, H. Asplund, M. Bartkowiak, E. Bayer-Niemeier, L. Belhouchet, F. Bernardini, M. Budja, G. Cooney, M. Cubas, E.M. Danaher, M. Diniz, M., L. Domboróczy, C. Fabbri, J.E. González-Urquijo, J. Guilaine, S. Hachi, B.N. Hartwell, D. Hofmann, I. Hohle, J.J. Ibáñez, N. Karul, F. Kherbouche, J. Kiely, K. Kotsakis, F. Lueth, J.P. Mallory, C. Manen, A. Marciniak, B. Maurice-Chabard, M.A. McGonigle, S. Mulazzani, M. Özdoğan, O.S. Perić, S.R. Perić, J. Petrasch, A.-M. Pétrequin, P. Pétrequin, U., Poensgen, C.J. Pollard, F. Poplin, G. Radi, P. Stadler, H. Stäuble, N. Tasić, N., D. Urem-Kotsou, J.B. Vuković, F. Walsh, A. Whittle, S. Wolfram, L. Zapata-Peña & J. Zoughlami 2015: Widespread exploitation of the honeybee by early Neolithic farmers, *Nature* 527, 226-230.

Roffet-Salque, M., J. Dunne, D. Altoft, E. Casanova, L.J.E. Cramp, J. Smyth, H. Whelton & R.P. Evershed 2017: From the inside out: upscaling organic

residue analyses of archaeological ceramics, *Journal of Archaeological Science: Reports* 16, 627-640.

Rösing, F.W., 1977: Methoden und Aussagemöglichkeiten der Antropologischen Leichenbrandbearbeitung, *Archäologie und Naturwissenschaften* 1, 53-80.

Rots, V. & H. Plisson 2014: Projectiles and the abuse of the use-wear method in a search for impact, *Journal of Archaeological Science* 48, 154-165.

Ruijters, M.H.P.M., G. R. Ellenkamp & G. Tichelman 2015: De beek die geeft en de beek die neemt, Plangebied Ligne, gemeente Sittard-Geleen, Weesp (RAAP-rapport 2989).

Salque, M., P.I. Bogucki, J. Pyzel, I. Sobkowiak-Tabaka, R. Grygiel, M. Szmyt & R.P. Evershed 2013: Earliest evidence for cheese making in the sixth millennium BC in northern Europe, *Nature* 493: 522-525.

Schalich, J., 1983: Boden- und Landschaftsgeschichte des bandkeramischen Gräberfeldes in Niedermerz, in: M. Dohrn-Ihmig (ed.), *Das bandkeramische Gräberfeld von Aldenhoven-Niedermerz, Kreis Düren, Köln* (Archäologie in den Rheinischen Lößböden. Beiträge zur Siedlungsgeschichte im Rheinland, Rheinische Ausgrabungen 24), 48-53.

Schallig, M.-C., 1995: Een onderzoek naar de gebruikssporen op de vuurstenen artefacten

behorende bij de huizen 4, 9, 12 en 23 van de bandkeramische nederzetting Elsloo, Leiden (Intern Rapport, Faculty of Archaeology, Universiteit Leiden).

Shepard, A.O., 1954: *Ceramics for the archaeologist*, Washington.

Scheuer, L. & S. Black 2000: *Developmental Juvenile Osteology*, London/San Diego.

Schmotz, K., 1984: Der archäologische Forschungsstand in der Gemarkung Stephansposching mit einem Vorbericht über das neuentdeckte jungsteinzeitliche Gräberfeld, *Deggendorfer Geschichtsblätter* 4, 5-17.

Schmotz, K., 1992: *Das bandkeramische Gräberfeld von Stephansposching, Deggendorf* (Archäologische Denkmäler im Landkreis Deggendorf 7).

Schreurs, J., 1988: Een gebruikssporen analyse van de vuurstenen artefacten uit de Bandkeramische nederzetting te Elsloo, Leiden (MA thesis, Faculteit der Archeologie, Universiteit Leiden).

Schweingruber, F.H., 1990: *Microscopic Wood Anatomy*. Structural variability of stems and twigs in recent and subfossil woods from Central Europe, Birmensdorf (Swiss Federal Institute for Forest, Snow and Landscape Research).

Siebelink, M.S., 2011: The settlement structure of the first Dutch village, a use-wear study and a spatial analysis of the Bandkeramik settlement

Geleen-Janskamperveld, Leiden (MA thesis, Faculty of Archaeology, Leiden University).

Siemoneit, B., 1997: Das Kind in der Linienbandkeramik: Befunde aus Gräberfeldern und Siedlungen in Mitteleuropa, Rahden.

Sinopoli, C.M., 1991: Approaches to archaeological ceramics, New York.

Sluys, J., H. Vromen & E. van Geel 1978: Nieuwe lineairbandkeramische vondsten in Geleen, *Archeologie in Limburg* 4, 9-10.

Smits, E., 1992: het grafveld van Spijkenisse-Hartel West: het fysisch antropologisch onderzoek, in: Döbken, A.B. (red.), *BOOR balans 2, bijdragen aan de bewoningsgeschiedenis van het maasmondgebied*, Rotterdam, 223-230.

Smits, E., 2006: *Leven en sterven langs de Limes* (proefschrift Universiteit van Amsterdam).

Smits, E. & H.A. Hiddink 2003: Het menselijke botmateriaal, in: H.A. Hiddink (ed.), *Het grafritueel in de Late IJzertijd en de Romeinse tijd in het Maas-Demer-Schelde gebied*, in het bijzonder van twee grafvelden bij Weert, Amsterdam (Zuidnederlandse Archeologische Rapporten 11), 143-167.

Smits, E. & H.A. Hiddink 2006: Het menselijke botmateriaal, in: H.A. Hiddink, *Opgravingen op het Rosveld bij Nederweert 2, graven en grafvelden uit de IJzertijd en Romeinse tijd*, Amsterdam (Zuidnederlandse Archeologische Rapporten 28), 21-51.

- Sommer, U.**, 2001: 'Hear the instructions of thy father, and forsake not the law of thy mother'. Change and persistence in the European early Neolithic, *Journal of Social Archaeology* 1, 233-270.
- Soudský, B.**, 1962: The Neolithic Site of Bylany, *Antiquity* 36, 190-200.
- Spatz, H.**, 2002: Bäumchen und Sichel: Aspekte und Überlegungen zum Übergang vom frühen zum mittleren Neolithikum in Zentraleuropa, *Archeologické rozhledy* 54, 279-300.
- Stehli, P.**, 1973: Keramik, in: J.-P. Farruggia, R. Kuper, J. Lüning u. a. (Hrsg.), *Der Bandkeramische Siedlungsplatz Langweiler 2*, Bonn (Rheinische Ausgrabungen 13), 57-100.
- Stehli, P.**, 1994: Chronologie der Bandkeramik im Merzbachtal, in: J. Lüning & P. Stehli (Hrsg.), *Die Bandkeramik im Merzbachtal auf der Aldenhovener Platte*, Köln/Bonn, 79-191.
- Taçon, P.S.C.**, 2004: Ochre, clay, stone and art: the symbolic importance of minerals as life-force among Aboriginal peoples of Northern and Central Australia, in: N. Boivin & M. A. Owoc (eds), *Soils, Stones and Symbols. Cultural Perceptions of the Mineral World*, London.
- Tamis, W.L.M., R. van der Meijden, J. Runhaar, R.M. Bekker, W.A. Ozinga, B. Odé & I. Hoste** 2004: Standaardlijst van de Nederlandse flora 2003, *Gorteria* 30.
- Tegtmeier, U.**, 2011: Bemerkungen zu den verkohlten Holzern aus bandkeramischen Körperbestattungen in Düren-Arnoldsweiler (Unpubl. Bericht).
- Thévenet, C.**, 2004: Une relecture des pratiques funéraires du Rubané récent et final du Bassin parisien: l'exemple des fosses sépulcrales dans la vallée de l'Aisne, *Bulletin de la Société Préhistorique Française* 101, 815-26.
- Thisse-Derouette, R., J. Thisse-Derouette & J. Thisse jr** 1952: Découverte d'un cimetière omalien à rite funéraire en deux temps (crémation et enfouissement des cendres) en Hesbaye liégeoise à Hologne-aux-Pierres, *Bulletin de la Société Préhistorique Française* XLIX (3/4), 175-190.
- Trautmann, I.**, 2006: *The Significance of Cremations in Early Neolithic Communities in Central Europe*. Dissertation Geowissenschaftlichen Fakultät, Eberhard-Karls-Universität, Tübingen.
- Ubelaker, D.H.**, 1989: Human skeletal remains. Excavation, analysis, interpretation, Washington.
- Ungerath, O.**, 2014: Das Gräberfeld zur bandkeramischen Siedlung, in: E. Czesla & T. Ibeling (Hrsg.), *Autobahn A4. Fundplatz der Extraklasse — Archäologie unter der neuen Bundesautobahn bei Arnoldsweiler*, Langenweißbach, 125-150.
- Van de Velde, P.**, 1979a: *On Bandkeramik social structure*, Leiden (Analecta Praehistorica Leidensia 12).
- Van de Velde, P.**, 1979b: The social anthropology of a Neolithic cemetery in the Netherlands, *Current Anthropology* 20(1), 37-58.
- Van de Velde, P.**, 1990: Bandkeramik social inequality. A case-study, *Germania* 68, 19-38.
- Van de Velde, P.**, 1993: Soziale Struktur, Graberfeldanalyse und Repräsentativität. Der Fall der nordwestlichen Bandkeramik, *Helinium* 33, 1993, 157-167.
- Van de Velde, P.**, 1995: Dust and ashes: the two Neolithic cemeteries of Elsloo and Niedermerz compared, *Analecta Praehistorica Leidensia* 25, 173-188.
- Van de Velde, P.**, 2012: Chronology of the Dutch Neolithic Bandkeramik Culture: a new attempt, *Analecta Praehistorica Leidensia* 43/44, 293-305.
- Van de Velde, P.**, 2011: Aspects of LBK burial. On the organization of Northwestern Danubian cemeteries, in: A. Hauzeur, I. Jadin & C. Jungels (éd.) *5000 ans avant J.-C., La grande migration? Le Néolithique ancien dans la collection Louis Éloy*, Bruxelles, 57-63 (Fédération Wallonie-Bruxelles: Service du Patrimoine culturel).
- Van de Velde, P.**, 2016: It's the lineage, stupid! The rise and fall of the northwestern Linearbandkeramik, in: T. Kerig, K. Nowak & G. Roth (eds), *Alles was zählt. Festschrift für Andreas Zimmermann*, Bonn.
- Van de Velde, P. & C.C. Bakels** 2002: Beek-Geverikerveld. Een noodopgraving in een Prehistorisch Boerendorp, Leiden.
- Van de Velde, P.(ed.)** 2008: *Excavations at Geleen-Janskamperveld 1990/1991*, Leiden (Analecta Praehistorica Leidensia 39).
- Van de Velde, P., E. Lohof & S. Wyns** 2009: A LBK Earthwork at Beek (Prov. Limburg) -- le modèle rosheimois -- in the Netherlands, *Archäologisches Korrespondenzblatt* 39, 455-470.
- Van de Velde, P. & I.M. van Wijk** 2014: De huizen van de Bandkeramiek (LBK) in Nederland, in: A.G. Lange, E.M. Theunissen, J.H.C. Deeben, J. van Doesburg, J. Bouwmeester & T. de Groot (red.), *Huisplattegronden in Nederland. Archeologische sporen van het huis*, Amersfoort, 29-60.
- Van den Bos, R.P.M. & G.J.R. Maat** 2002: Cremated remains from a roman burial site in Tiel-Passewaaij (Gelderland), Leiden (Barge's Anthropologica 9).
- Van Gennep, A.**, 1909: *Les rites de passage*. (Eng.transl. 1960, 1977: *The rites of passage*), London.
- Van Gijn, A.L.**, 1990: The wear and tear of flint. Principles of functional analysis applied to Dutch Neolithic assemblages, Leiden (Analecta Praehistorica Leidensia 22).

- Van Gijn, A.L.**, 2010: Flint in focus: lithic biographies in the Neolithic and Bronze Age, Leiden.
- Van Gijn, A.L.**, 2014: Science and interpretation in microwear studies, *Journal of Archaeological Science* 48(1), 166-169.
- Van Gijn, A. L. & N. Mazucco** 2013: Domestic activities at the Linear Pottery site of Elsloo (Netherlands): a look from under the microscope, in: C. Hamon, P. Allard & M. Ilett (eds), *The domestic space in LBK Settlements*, Rahden / Westfalen, 111-126.
- Van Hees, E.E.**, 2021: Waarderingsrapport. Houtskool LBK grafveld. Elsloo Koolweg - Gemeente Stein, Leiden (Archeologisch Onderzoek Leiden bv (Archol)).
- Vanmontfort, B.**, 2008: Forager-farmer connections in an "unoccupied" land-first contact on the western edge of LBK territory, *Journal of Anthropological Archaeology* 27, 149-160.
- Vanmontfort, B., L. Louwe Kooijmans, L. Amkreutz & L. Verhart (eds)** 2010: Pots, farmers and foragers: pottery traditions and social interaction in the earliest Neolithic of the Lower Rhine Area, Leiden (ASLU 20)
- Van Wijk, I.M.**, 2002: Elsloo revisited: een archeologische begeleiding in de bandkeramische nederzetting van Elsloo, Leiden (Archol-rapport 22).
- Van Wijk, I. M.**, 2006: Een Schlitzgrube in Sittard. Inventariserend veldonderzoek te Sittard, Rijksweg Zuid, gem. Sittard-Geleen, Leiden (Archol-rapport 52).
- Van Wijk, I.M.**, 2009: Wetenschappelijk kader provinciaal archeologisch aandachtsgebied Graetheide, Maastricht.
- Van Wijk, I.M.**, 2016a: Settlement dynamics on the Cannerberg. Archaeological research of Bandkeramik and Iron Age settlements, Leiden (Archol report 300).
- Van Wijk, I.M.**, 2016b: This Land is Your Land, This Land is My Land: A Dutch view on LBK settlement patterning, in: L.W.S.W. Amkreutz, F. Haack, D. Hofmann & I.M. van Wijk (eds), *Something Out of the Ordinary? Interpreting Diversity in the Early Neolithic Linearbandkeramik and Beyond*, Newcastle upon Tyne, 331-356.
- Van Wijk, I.M.**, 2019: Elsloo-Koolweg revisited, het Bandkeramisch grafveld van Elsloo-Koolweg opnieuw onderzocht. Plan van Aanpak, Leiden (Archol Intern Rapport).
- Van Wijk, I.M.**, 2020: 'Erfindeling van een bandkeramische nederzetting, van model naar praktijk', in: A. Huijbers, L. Theunissen, W. Roessingh, K. de Vries, J. van Doesburg, R. Jansen, S. Arnoldussen & E. Wieringa (eds): *KNA Leidraad Onderzoeken van Gebouwplattegronden van rurale agrarische nederzettingen*.
- Van Wijk, I.M. & L.G.L. van Hoof** 2006: Beek revisited: Inventariserend Veld Onderzoek van een bandkeramisch nederzettingsterrein te Beek-Remigiusstraat, Leiden (Archol-rapport 76).
- Van Wijk, I.M. & P. van de Velde** 2007: Terug naar de Bandkeramiek, in: R. Jansen en L.P. Louwe Kooijmans (red.), *10 jaar Archol: van contract tot wetenschap*, Leiden, 131-150.
- Van Wijk, I.M., A.J. Tol, L.G.L. van Hoof, P.F.B. Jongste & P. Mennens** 2008: Beek, een poort voor het verleden naar het heden; een Archeologische Beleidsadvieskaart voor de gemeente Beek, Leiden (Archol-rapport 85).
- Van Wijk, I.M., L. Meurkens & A. Porreij-Lyklema** 2012: Opgraven langs de Rijksweg A2 te Stein-Heidekampweg, Stein-Steinerbos en Geleen-Chemelot, Leiden (Archol-rapport 150).
- Van Wijk, I.M., L.W.S.W. Amkreutz & P. van de Velde** 2014: *Vergeeten Bandkeramiek. Een Odyssee naar de oudste neolithische bewoning van Nederland*, Leiden (Archol-rapport 250).
- Van Wijk, I.M. & A. Porreij-Lyklema** 2015: Opgravingen in de bandkeramische nederzetting van Elsloo-Koolweg, Uitwerking van drie opgravingscampagnes aan de Joannes Riviusstraat en Paulus Potterstraat te Elsloo, Leiden (Archol-rapport 252).
- Van Wijk, I.M. & P. Van de Velde** 2020: House societies or Societies with houses. Bandkeramik kinship and settlement structure in a Dutch nutshell, in: V. Klinkenberg, R. van Oosten & C. van Driel-Murray (eds), *A human environment. Studies in honour of 20 years Analecta editorship by prof. dr. Corrie Bakels*, Leiden, 143-152 (Analecta Praehistorica Leidensia 50).
- Verbaas, A.**, 2014: Synthese: Steen, in: I.M. van Wijk, L. Amkreutz, & P. Van de Velde (red.), *'Vergeeten' Bandkeramiek: Een Odyssee naar de oudste neolithische bewoning in Nederland*, Leiden, 517-526).
- Verbaas, A. & A.L. van Gijn** 2007: Querns and other hard stone tools from Geleen-Janskamperveld, in: P. van de Velde (ed.), *Excavations at Geleen-Janskamperveld 1990-1991*, Leiden (Analecta Praehistorica Leidensia 39), 191-204.
- Verlinde, A.D. & R.R. Newell** 2006: A multicomponent complex of mesolithic settlements with late mesolithic grave pits at Mariënberg in Overijssel, in: B.J. Groenwoudt, R.M. Van Heeringen & G.M. Scheepstra (eds), *Het zandeilandenrijk van Overijssel. Bundel verschenen ter gelegenheid van de pensionering van A.D. Verlinde als archeoloog in, voor en van Overijssel*, Amersfoort (Nederlandse Archeologische Rapporten 22), 83-270.

- Verlinde, A.D. & R.R. Newell** 2013: *The Mesolithic cemetery at Marienberg (NL), a rebuttal to alternative interpretations*, Amersfoort (Nederlandse Archeologische Rapporten 42).
- Veit, U.**, 1996: Studien zum Problem der Siedlungsbestattung im europäischen Neolithikum, Münster.
- Verhart, L.B.M.**, 2000: Times fade away: The neolithization of the southern Netherlands in an anthropological and geographical perspective, Leiden.
- Vromen, H.**, 1982: Lineairbandkeramische graven in Haesselderveld-West te Geleen, *Archeologie in Limburg* 14, 10-14.
- Wahl, J.**, 1982: Leichenbranduntersuchungen. Ein Übersicht über die Bearbeitungs-, und Aussagemöglichkeiten von Brandgräbern, *Prähistorische Zeitschrift* 57, 1-125.
- Wahl, J.**, 1988: Menschenknochen, in: J. Wahl & M. Kokabi (Hrsg.), *Das römische Gräberfeld von Stettfeld I. Osteologische Untersuchung der Knochenreste aus dem Gräberfeld*, Stuttgart (Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg 29).
- Wahl, J.**, 2008: Investigations on Pre-Roman and Roman cremation remains from southwestern Germany; results, potentialities and limits, in: C.W. Schmidt & S.A. Symes (red.), *The analysis of burned human remains*, London, 145-161.
- Waters-Rist, A.L., R. Schats, J. Palmer, E. de Kok & M.L.P. Hoogland (eds.)** 2016: *Manual for the laboratory assignment MSc, Methods used in the skeletal recording form*. Laboratory for Human Osteoarchaeology, Leiden University.
- Waterbolk, H.T.**, 1959: Die bandkeramische Siedlung von Geleen. *Palaeohistoria* VI/VII, 121-162.
- Wentink, K.**, 2020: Stereotype. The role of grave sets in Corded Ware and Bell Beaker funerary practices, Leiden.
- Whittle, A.**, 1998: Problems in Neolithic archaeology, Cambridge.
- Whittle, A.**, 2012: Being Alive and Being Dead: House and Grave in the LBK, in: A.M. Jones & J. Gardiner (eds), *Image, memory and monumentality*. Archaeological engagements with the material world: a celebration of the academic achievements of Professor Richard Bradley, Oakville, 194-206 (Prehistoric Society research paper no. 5).
- Wilhelm-Schramm, M.**, 2009: Das Totenritual der Linearbandkeramik östlich des Rheins, Saarbrücken (Urgeschichtliche Studien 3).
- Workshop of European Anthropologists** 1980: Recommendations for age and sex diagnoses of skeletons, *Journal of Human Evolution* 9, 517-549.
- Zeeb-Lanz, A., R.-M. Arbogast, F. Haack, M.N. Haidle, C. Jeunesse, J. Orschiedt, D. Schimmelpfennig, & S. van Willigen** 2009: *The LBK settlement with pit enclosure at Herxheim near Landau (Palatinate)*, in: D. Hofmann & P. Bickle (eds), *Creating communities. New advances in central European Neolithic research*, Oxford, 199-215.
- Zeeb-Lanz, A. & F. Haack** 2016: Diversity in ritual practice at the end of the LBK, in: L. Amkreutz, F. Haack, D. Hofmann & I. van Wijk (eds), *Something out of the ordinary? Interpreting diversity in the Early Neolithic Linearbandkeramik and beyond*, Newcastle-upon-Tyne, 247-279.
- Zimmermann, A.**, 2010: Migration oder Adaption? Zur Entwicklung vom Mesolithikum zur Bandkeramik im Rheinland, in: D. Gronenborn & J. Petrasch (eds), *Die Neolithisierung Mitteleuropas. Internationale Tagung Mainz 24.-26. Juni 2005*, Mainz, 509-515 (RGZM-Tagungen Band 4).
- Zimmermann, A.**, 2012: Das Hofplatzmodell. Entwicklung, Probleme, Perspektiven, in: S. Wolfram & H. Stäuble (eds), *Siedlungsstrukturen und Kulturwandel in der Bandkeramik*. Beiträge der Internationalen Tagung, Neue Fragen zur Bandkeramik oder Alles beim Alten?. Leipzig 23.-24. September 2010, Dresden, 11-19 (Arbeits- und Forschungsberichte zur sächsischen Bodendenkmalpflege, Beiheft 25).
- Zvelebil, M., & P. Pettitt** 2008: Biosocial archaeology of the Early Neolithic: Synthetic analyses of a human skeletal population from the LBK cemetery of Vedrovice, Czech Republic, *Journal of Anthropological Archaeology* 32, 313-329.
- Zvelebil, M., A. Lukes, & P. Pettitt** 2010: The emergence of the LBK: search for the ancestors, in: D. Gronenborn & J. Petrasch (eds), *Die Neolithisierung Mitteleuropas. Internationale Tagung Mainz 24.-26. Juni 2005*, Mainz, 509-515 (RGZM-Tagungen Band 4).

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Appendix I Bandkeramik burial grounds in the Netherlands

I.M. van Wijk

Geleen-Haesselderveld West

A second burial ground became known in 1979 when during construction works at Geleen-Haesselderveld West four graves were recognised by local archaeologist H. Vromen.⁶⁸⁴ The construction works were monitored by various local archaeologists⁶⁸⁵ who uncovered the remains of a Bandkeramik settlement dating to the youngest phase of the LBK (ceramic phase IIc/IIId). The four graves were located approximately 50 m north of this settlement on a relatively flat terrain sloping to the south. Because the observations were restricted to the construction trenches no assumptions could be made about the size of this burial ground.

The four graves, of which only the bottoms of the pits were preserved (10–20 cm below the archaeological level), were characterised by their oval shapes, complete vessels as well as an adze, and the presence of ochre covering the bottom of one of the graves (feature 50).⁶⁸⁶ Apart from one grave where a possible corpse shadow was noticed (grave 50c, Fig. 1.1), no skeletal remains were preserved. At least feature 50, 50a and 50c can be interpreted as inhumation graves. These features all have different orientations, ranging from NW-SE, NE-SW and N-S. The fill is almost identical and homogenous with a little bit of charcoal present. The classification of feature 50b as a grave remains uncertain due to its smaller size, although the fill is similar to the other features.

Grave goods were only present in grave 50 (Fig. 1.2) and consisted of large fragments of an almost complete pot of Limburg ware.⁶⁸⁷ Next to it an amphibolite adze was found. Based on the adze (type 1), the grave was dated to the youngest phase of the LBK (ceramic date IIId), although this remains uncertain.

Maastricht-Lanakerveld

In the autumn of 2007, a large test trenching campaign was conducted in the Lanakerveld, a 61 hectares large rural area just north-east of the city of Maastricht.⁶⁸⁸ During this campaign the remains of at least three LBK settlements as well

as a LBK burial ground were found. The settlements were distributed along the streams of the Zouw and Heeserwater which divide the Caberg middle terrace. This area is known for at least four more LBK settlements making it a densely populated area in the Early Neolithic.⁶⁸⁹ It is also the area where two potential LBK burials were found (see also §3.3.1) at the site Maastricht-De Waal, located ca. 2 km to the south-east.

The burial ground is located on the higher slopes of the Zouw valley, approximately 150 m north of the nearest LBK settlement. At the location various test trenches were dug, but only one trench revealed the outlines of thirteen features, of which eleven are believed to be Bandkeramik graves. The graves are preserved under a 30 cm thick topsoil which covered a 10 cm thick layer of colluvium. All features are characteristically oval-shaped and of similar dimensions (Table 1.1). Because of the prospective nature of the excavation, only one grave -the smallest- was excavated (feature 68.12) and its fill sieved (mesh width 3 mm). The depths of the other features were determined by coring, which showed that approximately 15–50 cm of the fill remained. Noteworthy is the pairing of the graves, akin to the burial ground of Elsloo-Koolweg. The main orientation is NW-SE while two graves have a perpendicular orientation (NE-SW) and two others a N-S orientation. The extent of the burial ground remains unknown and can only be assumed by the absence of features in the surrounding trial trenches. Geophysical research carried out with a combination of electromagnetic induction, large-scale fluxgate gradiometer survey as well as small scale caesium total field magnetometry could not find any trace of graves.⁶⁹⁰

Three grave pits yielded find material (Table 1.1). During the deepening of the test trench undecorated sherds were found in the fills of graves 68.03, 68.05 and 68.12. A flattened piece of red ochre with grinding facets all around was recovered from grave 68.05 as well. Minuscule, calcined bone fragments were found in graves 68.01 and 68.06. A burned flint core was also found in the vicinity of the test trench which can be seen as an indication that more cremation graves are to be expected, and that the burial ground is larger than the eleven graves discovered; an amphibolite adze was found just to the north-west during a field survey.

⁶⁸⁴ Vromen 1982, 10.

⁶⁸⁵ Sluys, Vromen & Geel 1978; Vromen 1982.

⁶⁸⁶ Vromen 1982, 10.

⁶⁸⁷ Vromen 1982, 11; Bakels & Van den Broeke 1981.

⁶⁸⁸ Meurkens & Van Wijk 2009.

⁶⁸⁹ Meurkens & Van Wijk 2009; Van Wijk, Amkreutz & Van de Velde 2014.

⁶⁹⁰ Van Wijk & Laan 2020.

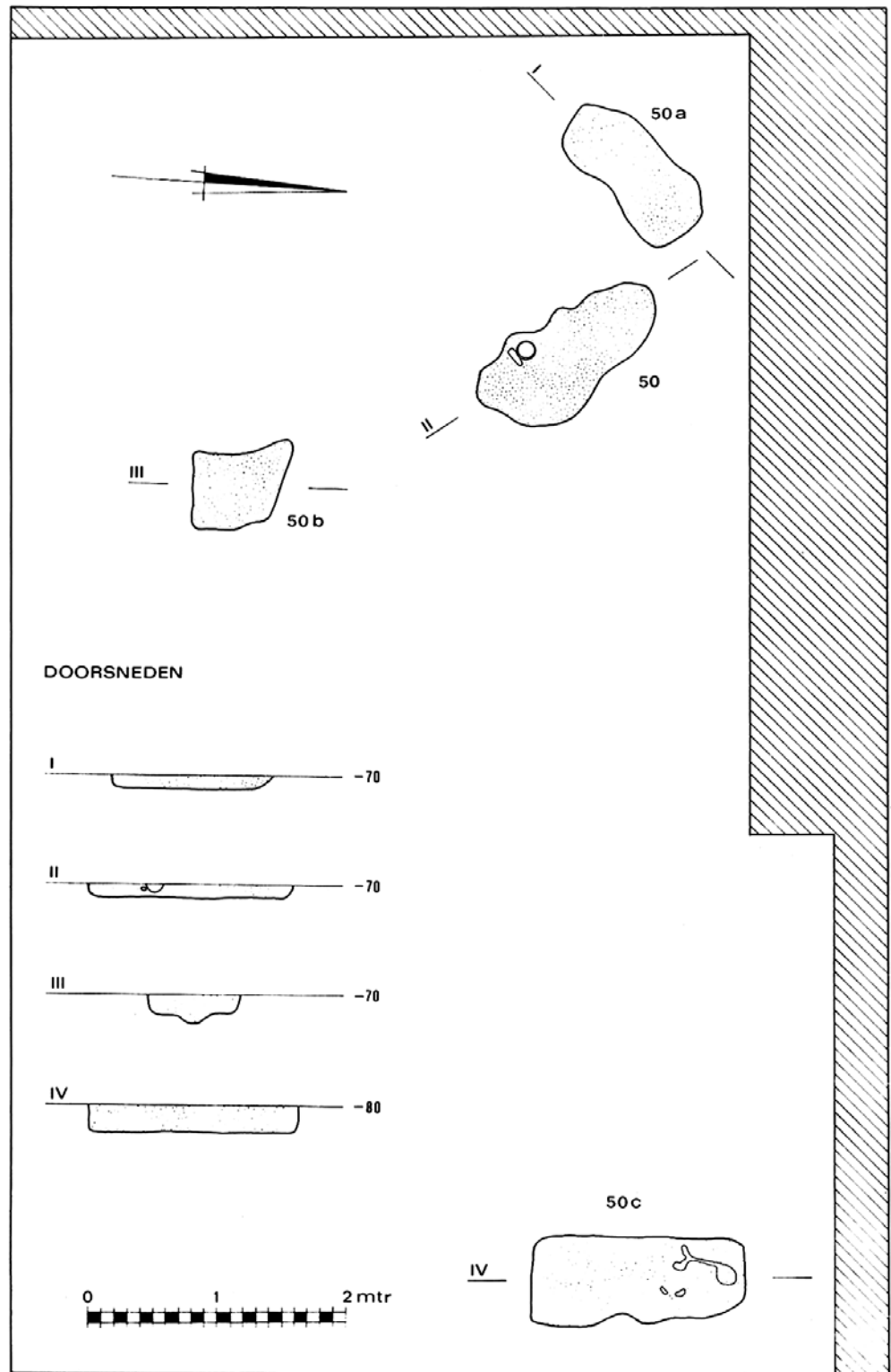


Fig. 1.1 Overview of the four graves of Geleen-Haesselderveld West (source: Vromen 1982, figure 2).

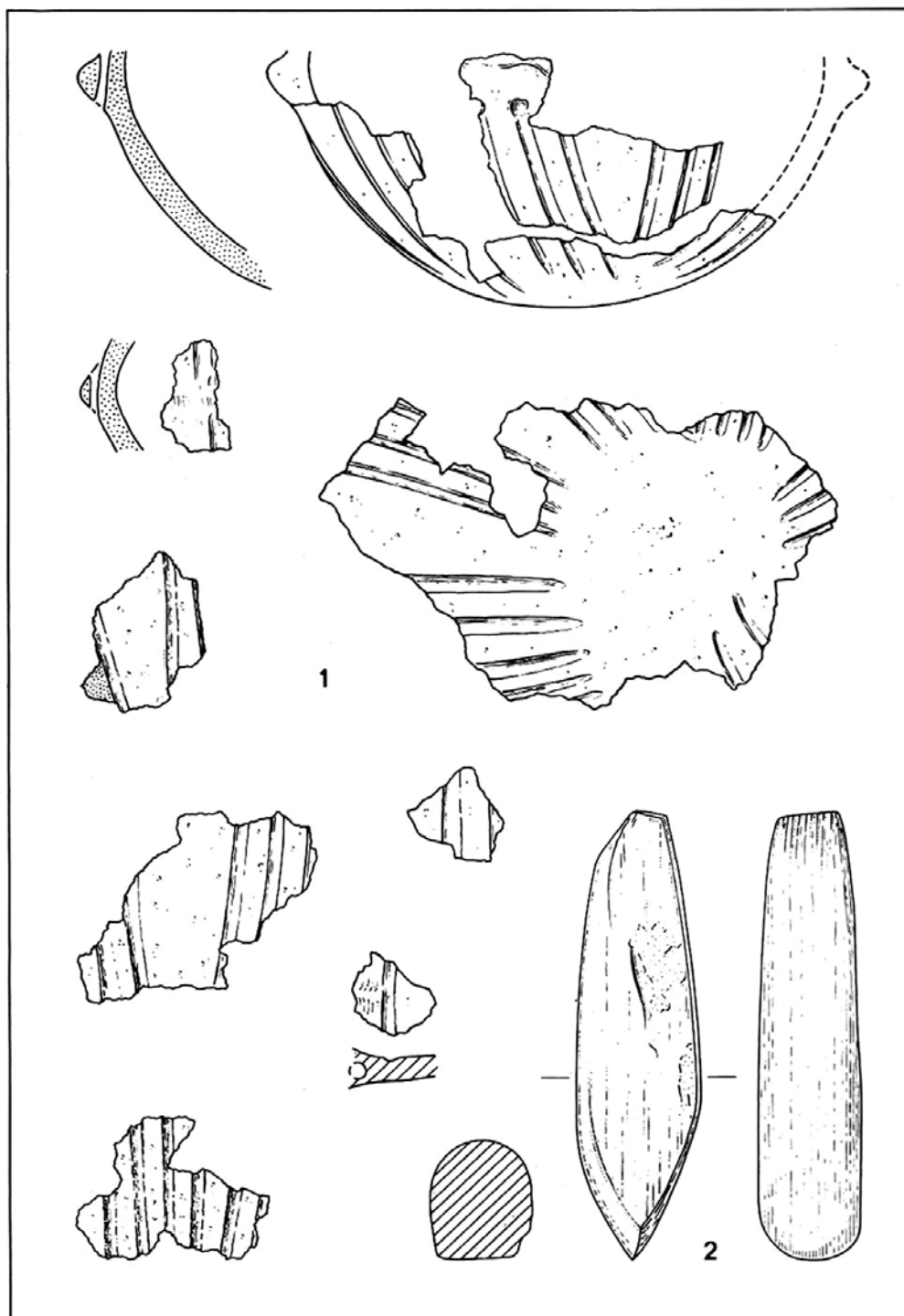


Fig. 1.2 Finds from grave 50 (source: Vromen 1982, figure 3).

Grave 68.12 (Fig. 1.5) yielded six different objects: a large fragment of a decorated vessel (dated to ceramic phase IIa or IIb), a quern of quartzite with a lump of red ochre, a basalt flat adze (type III), a flint strike-a-light and a small decortication flake of Banholt flint (Fig. 1.4). The objects were clustered in two separate groups, one of which consisted of the vessel, the quern and the lump of ochre; the other included the adze, the strike-a-light and the flake. The adze and the strike-a-light were partly covered and sealed with a grainy, rust-coloured material of an unclear nature. A similar material was found in the cemetery of Elsloo (grave 21)⁶⁹¹ and in several graves in Niedermerz on the

Aldenhovener Platte.⁶⁹² Here, too, in a number of cases it sealed other grave goods. It may be a remnant of pyrite, which partly dissolves in the descaling loess.⁶⁹³ Such an interpretation for this material, especially in combination with the strike-a-light, is not inconceivable. The fills were checked (mesh width 0.5 mm) for organic macro-remains, but none were found.

It is remarkable that even the smallest grave already held so many grave goods, which in comparison with Elsloo-Koolweg could be considered an exceptionally richly furnished grave. The small dimensions of the pit could be an indication of a rather small corpse being buried in a crouched position, possibly an infant.

⁶⁹¹ Modderman 1970.
⁶⁹² Dohrn-Ihmig 1983.
⁶⁹³ Dohrn-Ihmig 1983, 89-91.

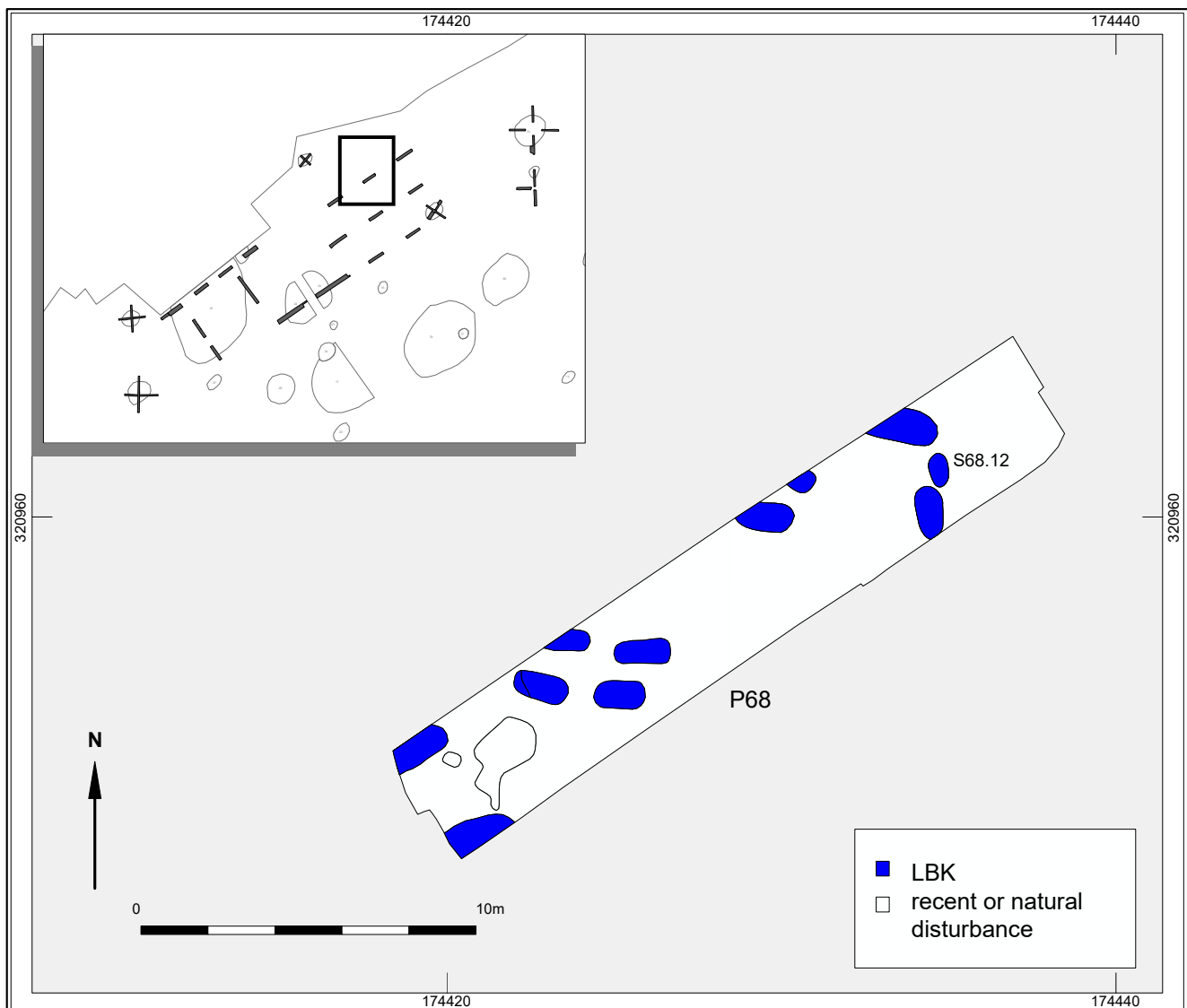


Fig. 1.3 Overview of the LBK graves of Maastricht-Lanakerveld (source: Van Wijk & Meurkens 2008, Fig. 6. 17).

Table I. Sizes and inventory of the Lanakerveld burials (source: Van Wijk & Meurkens 2008).

Feature	Length in cm	Width in cm	Depth in cm below topsoil	Inventory	Orientation
1	>190	>90	40-50	calcined bone	NE-SW
3	>171	>78	40	pottery fragments (undecorated)	NE-SW
5	165	79	-	lump of red ochre, pottery fragments (undecorated)	NWW-SEE
6	154	83	15-20	calcined bone	E-W
7	>127	64	-	-	E-W
8	169	68	15-20	-	E-W
9	>154	85	-	-	NWW-SEE
10	>54	72	20-30	-	NW-SE
11	156	80	50-60	-	N-S
12	95	57	15	lump of red ochre, quern, decorated vessel, adze, strike-a-light, flake	N-S
13	>187	100	-	-	NWW-SEE

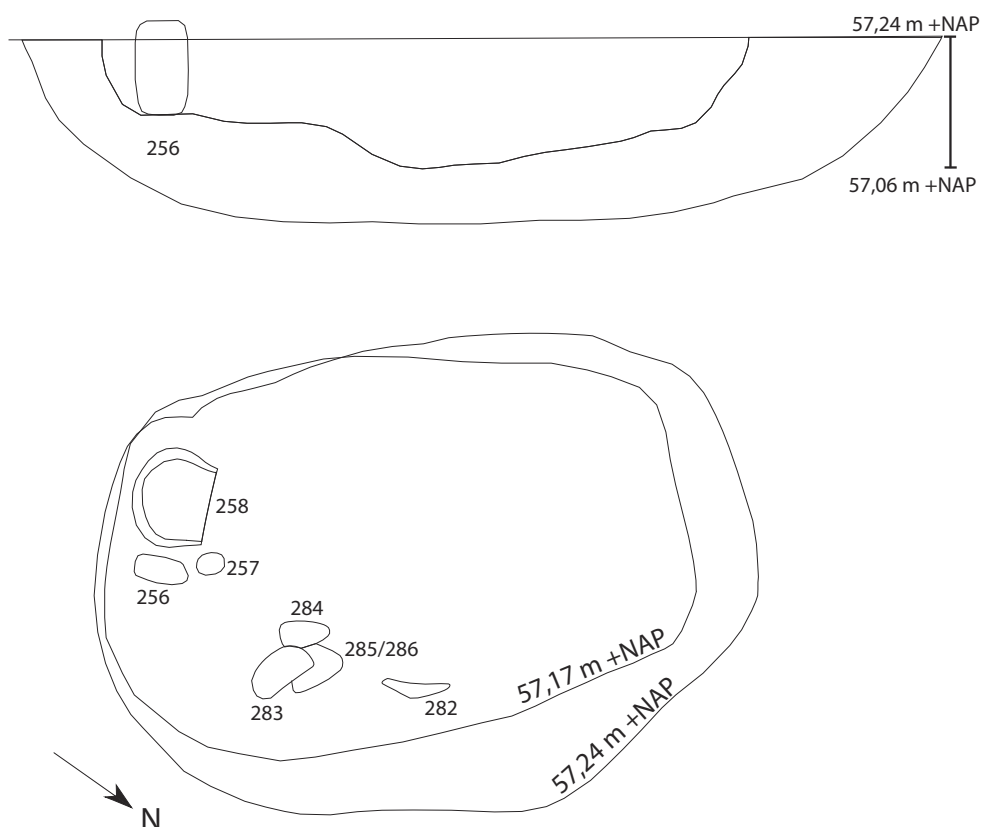


Fig. 1.4 Grave 68.12 in plan and profile, with position of grave goods, scale 1:50 (source: Van Wijk & Meurkens 2008, Fig. 6.21).

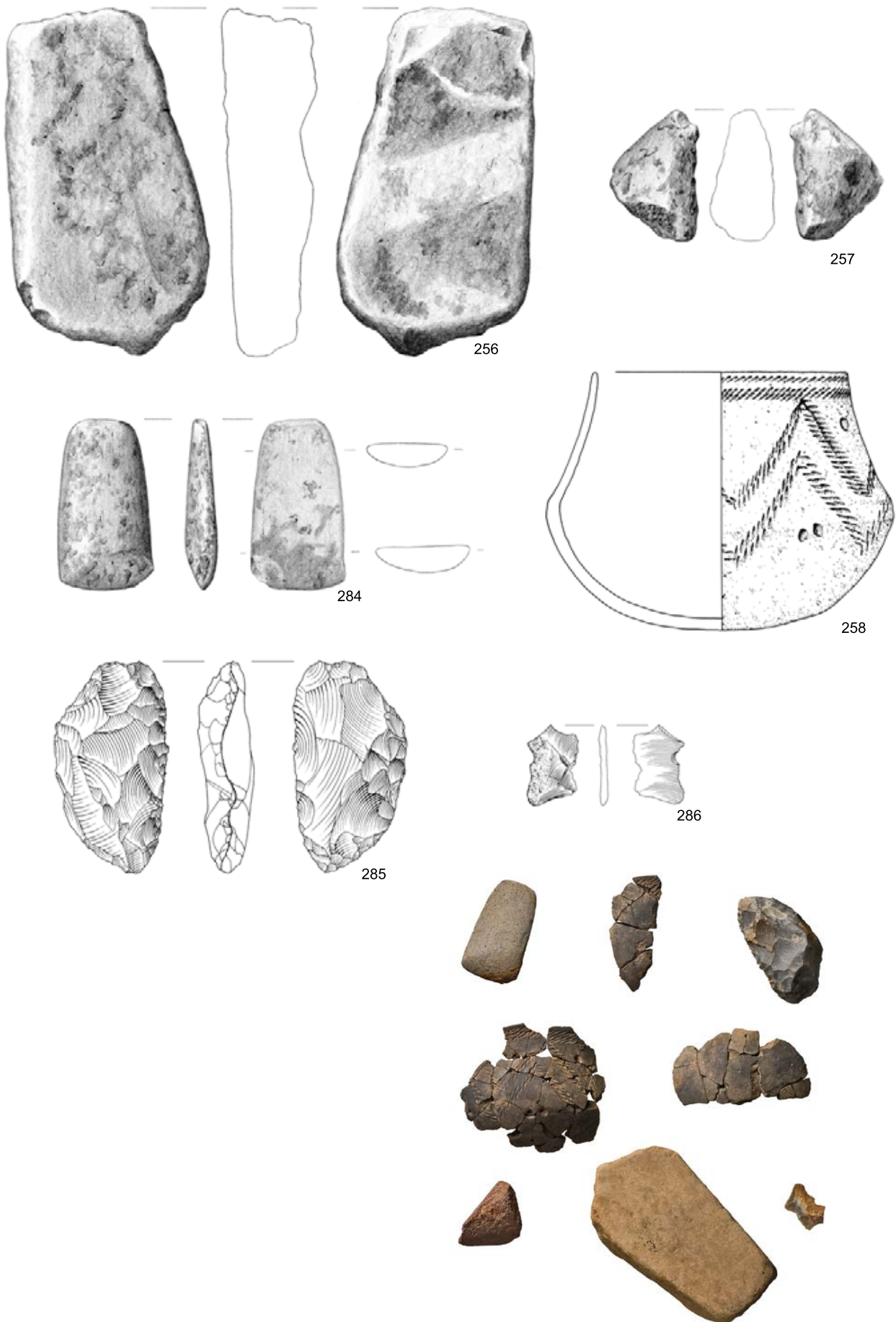


Fig. I.5 Grave inventory of grave 68.12; scale 1:2 (source: Van Wijk & Meurkens 2008, Fig. 6.22).

Appendix II Bandkeramik burial grounds in the Rhineland

Arnoldsweiler-Ellebach

During road construction works for the A4 motor highway Aachen-Köln a large burial ground was found and excavated in 2009.⁶⁹⁴ Eventually it turned out to be the largest and best preserved LBK cemetery in the Rhineland to date. The site Arnoldsweiler-Ellebach is situated in the Hambach region and is named after the Ellebach, originally a dry valley carrying water semi-periodically, and a tributary of the Ruhr.⁶⁹⁵ The site lies in the lowlands of the Ellebach on relatively flat ground. This geographic position is probably the reason why the burials are so well preserved.

The burial ground is located only 15–35 m north-west of a larger LBK settlement of which 42 house structures have been excavated⁶⁹⁶ out of a possible 50–80 houses.⁶⁹⁷ Both sites are separated by a wooden palisade which seems to mark the outer settlement limits. The burial ground covers an area of 110 by 80 metres and comprises a total of 229 graves: 222 inhumations and seven (possible) cremations. The seven cremation graves with an average length of 42 cm and 29 cm width are significantly smaller and a little shallower than the inhumation graves, as well as having an oval to round shape in plane. The cremation graves are distributed evenly throughout the burial ground. Graves 3412, 3432 and 4954 contained a “dense nest of burnt bones”. The homogeneous fill of most of the inhumation graves suggests a rapid anthropogenic infill. There are no indications that the graves were left open and gradually filled due to natural sedimentation.⁶⁹⁸

During the 1980s many surface finds like arrowheads, numerous adzes, a quern and three fragments of red ochre were retrieved on the same spot as the burial ground.⁶⁹⁹ They provide an indication that more shallow (cremation) graves were originally present but are now lost due to agricultural activities. The potential minimum number of graves (inhumation and cremation) ranges from around 240 to 320. Several other Bandkeramik features (n=59) other than graves were found which seem to belong to the burial ground as well.⁷⁰⁰

The orientation of the graves is subject to large variation, although most graves have a NW-SE orientation. The second most frequent is

a W-E orientation.⁷⁰¹ The alternative orientations N-S and NE-SW are also present, albeit in lesser numbers. The head of the bodies is mostly oriented towards the north/north-west or west. A division seems to exist, whereby in the northern part of the burial ground most heads are pointed towards the south-west and in the southern part towards the north-west. Almost all the graves are within a certain distance of each other, without intercutting. Two dateable cremation graves date to the Middle and Late LBK. Overall, the burial ground was in use from the Oldest LBK until the Late LBK.⁷⁰²

Most striking is the considerable bone preservation in the graves (Fig. II.1), a first among the burial grounds in the area between the Rhine and Meuse. Mostly only corpse shadows and some tooth enamel remain, like in Elsloo (§6.5) or Niedermerz, or even a few bone remains in a grave at Bergheim-Zieverich. The decalcified loess normally dissolves any bones present. Statements about physical aspects of individuals have therefore been hard to make. But the favourable preservation conditions in Arnoldsweiler-Ellebach made it possible to gather information on body position, age and gender for a larger group of individuals. Still, in comparison with other well-preserved burial grounds in southern or eastern Europe the bone preservation is only minimal.

For 190 out of 220 inhumations, bones, bone fragments, teeth- or other skeletal evidence could be gathered (Appendix IV Inventory list of the Arnoldsweiler-Ellebach burial ground). Reliable evidence of a human corpse could be established for 165 graves. In 154 of these, individual bone elements, such as long bones, skull fragments, the jaw area, the pelvis, or combinations of these skeletal elements partly remain, but there are also almost complete skeletons. Furthermore, seven graves only yielded dental remains, corpse shadows were found in three graves and another two graves also included dental remains.⁷⁰³ Most of the bodies were buried in a crouched position (88 graves) of which 66 were buried on their left side and 22 on their right side.⁷⁰⁴ Ten individuals were buried in an extended position, of which one was buried on his or her front.

Due to the favourable preservation conditions, it was even possible to document pathological features of one skeleton and

⁶⁹⁴ Cziesla & Ibeling 2014.

⁶⁹⁵ Gerlach *et al.* 2011, 65; Gerlach *et al.* 2014, 62; Gerlach & Meurers-Balke 2015, 25.

⁶⁹⁶ Cziesla & Ibeling 2014; Balkowski 2018.

⁶⁹⁷ Balkowski 2018, 127.

⁶⁹⁸ Peters 2018, 263.

⁶⁹⁹ Cziesla & Ibeling 2014, 147–148.

⁷⁰⁰ Peters 2018; Cziesla & Ibeling 2014.

⁷⁰¹ Cziesla & Ibeling 2014, 131.

⁷⁰² Balkowski 2018, 131.

⁷⁰³ Peters 2018, 297.

⁷⁰⁴ Peters 2018, 315.



Fig. II.1 Double burial (top) of a neonate and an adult in crouched position and single burial (bottom) of an adult woman in crouched position (source: Cziesla *et al.* 2010, Fig. 5 and 6).

traumata on two other individuals. The adult woman in grave 3421 had an ossified spine, which indicates a bone disease such as Bechterew's disease (*ankylosing spondylitis*). She must have suffered from severe back pain and was restricted in her movement. The curvature of the spine causes some Bechterew patients to develop a "hump". Interestingly, the corpse was positioned stretched on its back in the grave with the left leg almost outstretched and the right one slightly crouched. The unusual and very large burial pit, which is widest at the foot end, creates the impression that the burial pit was specially adapted, and that the individual could not be laid down in a crouched position due to the ossifications.⁷⁰⁵ In grave 3937 a late adult to senile was buried with her lower leg

(tibia and fibula) broken.⁷⁰⁶ The fracture does not seem to have healed, as no newly formed bone could be detected. It is unclear if the trauma occurred while the person was alive or during the burial ritual. For the individual buried in grave 4929 it is apparent that the left forearm was healed after it was broken, presumably because of falling flat on a stretched hand (so-called Colles fracture).

The preservation of teeth made it possible to detect some anomalies. Three adult or juvenile individuals have a suspected tooth defect due to caries (graves 5413, 5831, 6207). An adult woman (grave 3376) had a tooth mispositioned in the right upper jaw and for a juvenile or adult individual (grave 5917) the posterior premolars in the upper and lower jaw

⁷⁰⁵ Cziesla & Ibeling, 131-132; Peters 2018, 344.

⁷⁰⁶ Cziesla & Ibeling, 131-132; Peters 2018, 344.

were missing. Another adult individual (grave 714) had a milk tooth persistence. Tooth abrasion was observed in almost all individuals studied, even the milk teeth of the toddler (grave 741; infans I, ca. 3-4 years) had abrasion. This could be an indication that children were breastfed until the age of three.⁷⁰⁷

The relatively good bone preservation also made it possible to make statements about sex, based on skeletal characteristics (pelvis or skull). This was achieved for 34 individuals (Table II.1).⁷⁰⁸ All sex-determined individuals are adults or adolescents.⁷⁰⁹ The determination of child graves remains problematic, as is the case at other burial grounds as well.⁷¹⁰ Age could be determined based on body size and dental characteristics.⁷¹¹ This provided a heterogeneous dataset, due to variations in accuracy, of 141 individuals with an estimated age (Table II.2). For these 141 individuals, a statement can be made as to whether they can be ascribed to a child or an adult in the sense of a sexually mature person over the age of 13. For 24 children, it was possible to distinguish whether they belonged to the age category infans I or infans II. In total, one infant (neonate, grave 4925), eleven children under 6 years of age and twelve children between 7-12 years of age have been identified.

Gender determination was not possible for the sub-adult individuals. The adult age category consists of four juveniles and 79 individuals over the age of 20. Among those over the age of 20, only 17 can be aged more precisely. Of these, ten are under 40 (adult) and seven are older than 40 (mature or senile).⁷¹²

Although the majority of the graves contain single bodies, some graves appear to encompass more individuals, like a woman buried together with a premature baby (grave 4925, Fig. II.1 top). In two other graves (graves 3932 and 3372) it appears that an adult is also buried together with a child. More distinctive is grave 3354, where the corpse of an adult was buried together with the skull and lower jaw of another adult. Interestingly, the head of this second individual lies on a charred block of wood on the feet of the first individual.⁷¹³ In another grave (grave 5840) an individual is buried on his front with his arms stretched and feet raised. Between the feet and the edge of the grave, the complete jaw of a toddler was found.⁷¹⁴ It appears that double burials mostly consist of an adult together with complete bodies or body parts, especially (parts of the) skulls, or with a child; as is also known from other burial grounds.⁷¹⁵

Table II.1 Sex differentiation for the Arnoldsweiler-Ellebach burial ground.

	N	%	Adult	Res.	
Male	18	52.9	17	0.2	X ² =0.1, FG=1, p=0.73
Female	16	47.1	17	0.2	
Subtotal	34	100			
Indet	198	85.3			
Total	232	100			

Source: Peters 2018, Abb. 336

⁷⁰⁷ Peters 2018, 345.

⁷⁰⁸ Czesla & Ibeling 2014, 131-132; Peters 2018, 329.

⁷⁰⁹ It should be noted, however, that for 20 of the 34 individuals the assessment "rather male" or "rather female" was made, i.e. the sex determination was classified as quite insecure.

⁷¹⁰ Herrmann *et al.* 1990, 85.

⁷¹¹ Czesla & Ibeling 2014, 131-132; Peters 2018, 336.

⁷¹² Peters 2018, 338.

⁷¹³ Czesla & Ibeling 2014, 141; Peters 2018, 313.

⁷¹⁴ Czesla & Ibeling 2014, 142; Peters 2018, 313.

⁷¹⁵ Nieszety 1995, 83.

⁷¹⁶ Peters 2018, 367-369.

Table II.2 Distribution of age-determined individuals among age groups.

General	Child			Young adults and adults							Indet	Total	
	34			107							91	232	
Detail	infans			juvenile			adult		mature/senile		indet	indet	total
	34			4			10		7		86	81	232
Fine detail	inf. I	inf. II	indet	juvenile	young adult	adult	indet	mature	senile	indet	indet	indet	total
	12	12	10	4	6	1	3	1	0	6	86	91	232

Source: Peters 2018, Abb. 334

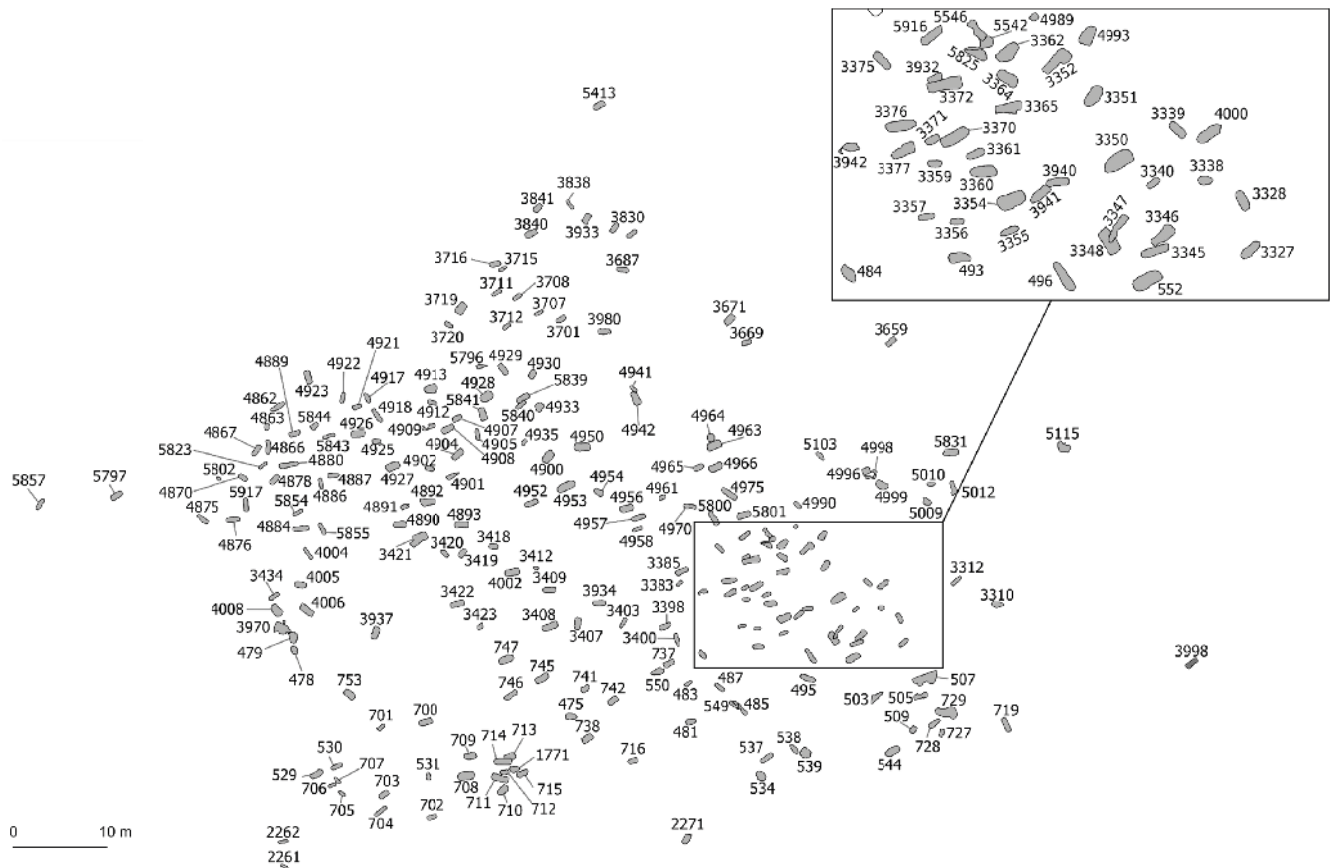


Fig. II.2 Plan of the burial site Arnoldsweiler-Ellebach as excavated in 2009 (source: Peters 2018, Abb. 234).

About 58 percent of the 229 graves contained grave goods ($n=137$), which means that 42 percent did not contain any – as far as could be determined, as organic grave goods were not preserved (Appendix IV Inventory list of the Arnoldsweiler-Ellebach burial ground). There is also a connection between the number of grave goods and the preservation degree. Graves where skeletal remains were present were often dug deeper and also yielded more grave goods.⁷¹⁶ This could be an explanation for the many surface finds of possible grave goods which were reported in the 1980s.

Pottery (251 pots) forms the most common grave good and has been found in 107 graves. It was the only grave good in 65 graves. The assemblage contained large decorated and undecorated vessels as well as miniature decorated vessels, sometimes complete and sometimes fragmented. Twenty-seven adzes were found in as many graves. They are made from amphibolite ($n=13$), basalt ($n=12$), Grauwacke ($n=1$) and Revinienquarzite ($n=1$).⁷¹⁷

Ochre (15 pieces) and querns (3 fragments) were only found in seven and two graves respectively. Three pieces of ochre were found inside a ceramic vessel (grave 5797). Both arrowheads (40 pieces) and flakes (44 fragments) are found in 19 graves; blades (24 fragments) in 12 graves. Most flint artefacts that ended up in the graves were made from Rijckholt flint ($n=74$). Other flint sources, like Rullen ($n=12$), Schotter ($n=7$) and Belgian grey flint ($n=2$) were found as well, but only in some graves.⁷¹⁸ Arrowheads and thus probably arrows and bows often formed a grave good, in total 39 arrowheads were found in as many as 19 graves. One grave (grave 708) of an adult male (25–30 years old) contained eight arrowheads which probably belonged to a bundle of arrows placed on the chest of the deceased. The arrowheads were made from Rijckholt and Rullen flint.⁷¹⁹ Multiple arrowheads have been found in nine other graves (graves 3372, 4904, 4006, 5825: three arrowheads, graves 716, 3941, 4893, 4956, 4963: two arrowheads), sometimes placed together or

⁷¹⁷ Peters 2018, Anhang 9, 623–624.

⁷¹⁸ Peters 2018, 206.

⁷¹⁹ Czesla & Ibeling 2014, 136.

⁷²⁰ Peters 2018, Katalog der Grabefunde,

evenly distributed on the corpse or in the backfill. Animal bone was recovered from seven graves.⁷²⁰ Charred wood or charcoal layers were documented in eleven graves. Oak (*Quercus*) seems to be the only species used.⁷²¹

Peters has carried out an elaborate analysis of grave goods and possible connections regarding age, sex, position and assemblage composition.⁷²² There seems to be no significant distinction between female and male graves with respect to unfurnished graves. However, it is apparent that infant graves are most likely (59%) to receive no grave goods.⁷²³ Regarding posture, no differences could be observed. A distinction is made between inhumation and cremation graves, in that only two out of seven cremation graves included ceramics, while around half the inhumation graves had ceramics at their base or in the backfill. Two adzes, five unmodified flakes and one stone were recovered from the seven cremation burials. Both adze blades show traces of thermal influence, which means that they were probably burned together with the deceased. Other stone artefacts such as arrowheads or ochre have not been found in the cremation graves.

There are substantial differences in ceramic grave goods between adult individuals and children. Ceramics in children's graves are underrepresented. Decorated pottery occurs in fewer graves of children than in adult graves. Among adults, 39 percent of the individuals have a decorated pot in the grave and among children only 19 percent. On the other hand, there is no connection between the occurrence of ceramics and the sex of the individuals.

The occurrence of stone finds in general is not gender-specific in Arnoldsweiler-Ellebach. Only arrowheads and adzes are more common in men's than in women's graves. Grave goods made from polished or chipped stone have been found more frequently in adult graves than in children's graves. Arrowheads were recovered from 13 percent of the adult graves. This category of finds is missing for individuals under 12 years of age. About 21 percent of the adult graves contained an adze, while only one was found in the 32 known children's graves. The occurrence of adzes and arrowheads are more common in men's graves than in women's.

It is evident that Arnoldsweiler-Ellebach is the most important burial ground with respect to preservation and thus crucially contributes to

the discussion on the division of grave goods between the sexes and issues of gender, but also regarding the demography of who was buried, in what way and when. It provides an excellent case study to compare with other burial grounds in the Maas and Rhineland area, as has already partly been carried out by various researchers.⁷²⁴

Aldenhoven-Niedermerz

The burial ground of Aldenhoven-Niedermerz (Niedermerz 3) is the oldest known and first excavated cemetery in the Rhineland. The construction of a main water pipeline initiated the first rescue excavation in 1969, which resulted in the excavation of several graves. Consequent excavations lasted until 1975 with a total area of 5600 m² excavated.⁷²⁵

The burial ground is located in the Niederrheinische Bucht, about 7 kilometres from the town of Jülich, on the flanks of the Merzbach valley, about 250 m from the Merzbach stream. There are seven settlements located in close proximity (400 meters), but it remains unclear which, if any, had a connection to the burial ground. The cemetery is not large enough to represent all the inhabitants of these settlements. Studies of similarities in pottery tried to tie these settlements to the burial ground, but no obvious connection could be made.

The site has been partly eroded, which resulted in several graves being affected. Nowadays it is covered by an 8 m thick colluvium layer.⁷²⁶ The site has been disturbed by agricultural activities, tree roots from an orchard, test pits for mining activities and WWII trenches and bomb craters.

The burial ground spans an area of ca. 110 by 70 metres (5600 m²) and stretches in a SW-NE direction.⁷²⁷ Its edges seem to have been reached on all sides except the north-east. In total 113 graves were excavated: 102 inhumation graves and (possibly) 11 cremation graves (Fig. II.3). The cremation graves were identified on the basis of particles of burned wood and calcined bone and the presence of burial goods, but there were no large concentrations of calcined bone. The majority of the graves have an overall depth of 0.8 – 1.2 m below surface. Some graves were only preserved some 10 cm below the topsoil. The main orientation of the graves is NE-SW

650-686.

⁷²¹ Tegtmeier 2011.

⁷²² Peters 2018, 367-409.

⁷²³ Peters 2018, 367.

⁷²⁴ Bickle & Whittle 2013; Balkowski 2018; Peters 2018.

⁷²⁵ Dohrn-Ihmig 1983, 53-54.

⁷²⁶ Dohrn-Ihmig 1983, 48.

⁷²⁷ Dohrn-Ihmig 1983, 56.

⁷²⁸ Dohrn-Ihmig 1983, 61.

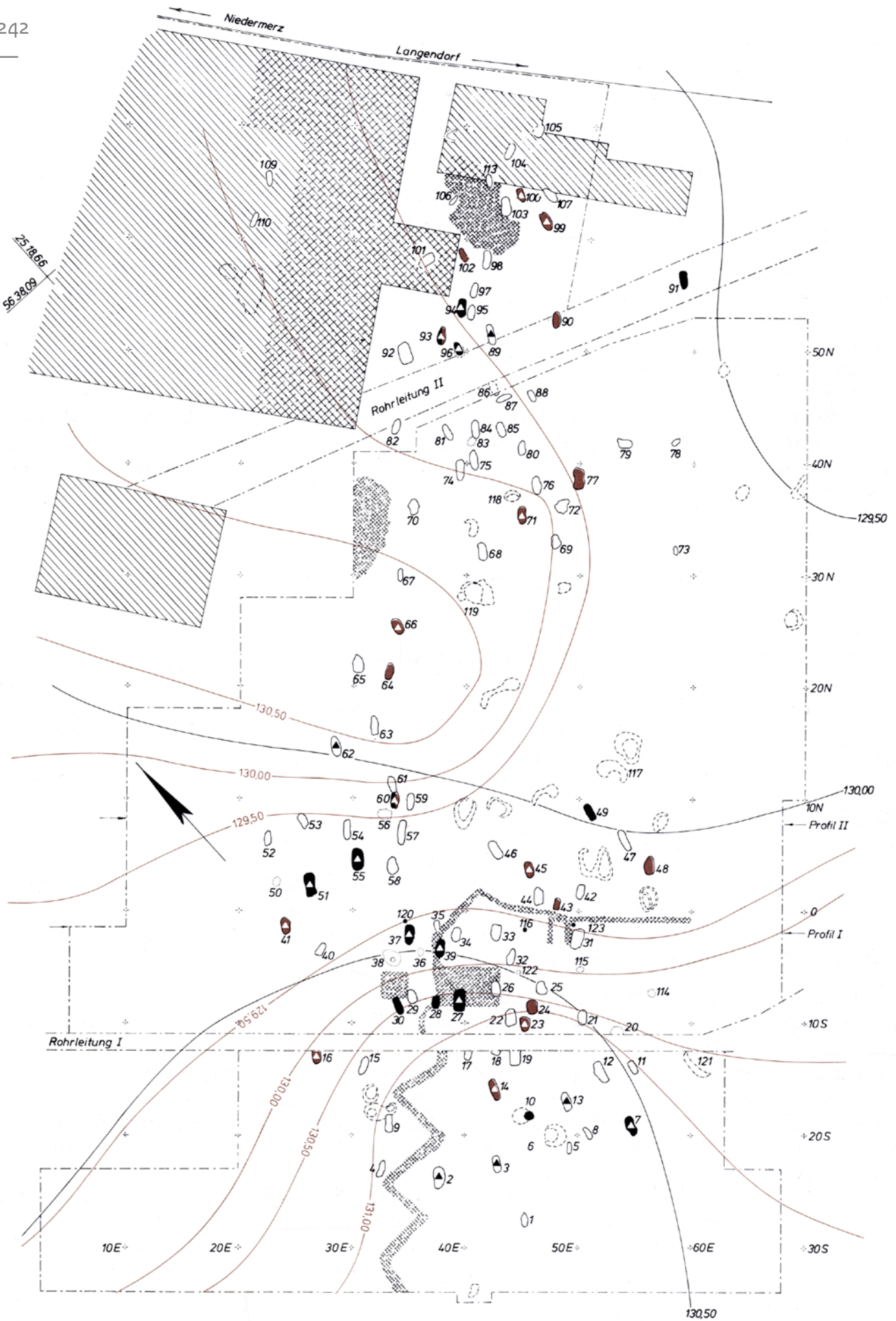


Fig. II.3 Overview of the burial ground of Niedermerz. Inhumation graves are represented with continuous lines, cremation graves with dotted lines. Hatched areas are recent disturbances. Graves marked in black contain high adzes and brown graves flat adzes. Triangles represent graves with arrowheads (source: Dohrn-Ihmig 1983, Abb. 6).

(ranging from ENE-WSE to NNE-SSW), but variations do exist, with some graves oriented N-S or E-W.⁷²⁸ Only two graves cut each other: grave 60 cuts grave 61 and grave 84 cuts grave 83. Sherds and burned bone at the base of grave 84 probably belong to the cremated remains in Grave 83. Grave 37 originally seems to have been an inhumation grave which was later cut by a cremation grave.⁷²⁹ All the other graves respect each other's position within the burial ground.

Due to the decalcified loess hardly any skeletal remains were preserved apart from some dental enamel or skulls. In a few graves more body parts were preserved, but poorly. Only graves which had been dug deep enough (into the C horizon) had such preservation.⁷³⁰ Often only body shadows (44 graves) remained, which at least made it possible to reconstruct in which direction the head lay (towards N: 23 graves; S: 20 graves; W: one grave), and to a lesser extent what the position of the body was (left crouched: 19 graves; right crouched: two graves and one possibly in a flexed position). In the southern part of the burial ground the deceased were generally buried with their heads towards the south and in the northern parts with their heads towards the north.⁷³¹ Based on the dental records an attempt was made to specify sex for several graves, but in hindsight questions can be raised concerning the reliability of this kind of analysis. Another attempt to determine the sex of the burials was made using the burial goods.⁷³² This was merely based on the assumption that certain grave goods like arrowheads and adzes belong to male graves, while pottery and grinding stones represent female graves. Peschel identified 63 female inhumations, six female cremations, 42 male inhumations and five male cremations (62% female, 38% male). Twelve juveniles and two children were identified.⁷³³ Dohrn-Ihmig stated that there was a high correlation between graves with adzes and flint tools as well as graves with adzes and ochre, indications that these were male graves. Female graves would be represented by pottery.⁷³⁴

Burial goods such as ceramics (74 burials), adzes (33 burials), arrowheads (24 burials), other stone tools (22 burials), hematite (20 burials) and querns (10 burials) were present in the fill or at the base of the grave in 91 cases (Appendix V Inventory list of the Aldenhoven-Niedermerz burial ground). Most graves without any goods

were found in the northern part of the burial ground, which is probably the result of the vast recent disturbances as well as erosion processes in this part.⁷³⁵ In grave 55 a vessel was found on an earth bank ca. 40 cm above the grave bottom, as was also the case for grave 12.⁷³⁶ In some graves ochre powder or pyrite (six burials) was found. Lumps of ochre or ochre powder have even been found inside some ceramic vessels (graves 13, 16, 23, 35, 37 and 45). Burials with many grave goods were dug deeper than those with fewer goods, i.e. between 1.10 m and 1.40 m. Noteworthy are three graves (graves 2, 3 and 93) which yielded many stone and flint artefacts.⁷³⁷ Grave 3 contained 20 arrowheads (primarily Rijckholt flint as well as Belgian grey flint), of which only some seem to have been hafted. Grave 2 held as many as 11 arrowheads. Grave 93 is extremely well equipped with 4 basalt and amphibolite adzes and 23 flint artefacts (3 scrapers, 14 blades, 2 arrowheads, 2 flakes and 1 core). The flint artefacts were stuck together on a lump of pyrite.

Based on the analysis of the ceramic vessels a continuous use of the burial ground is proposed, starting in the Oldest LBK (phase Ic) and lasting until the Late LBK (phase IIc). The southern half of the cemetery appears to be younger than the northern half.⁷³⁸

Bergheim-Zieverich

In Bergheim-Zieverich a LBK burial ground was excavated in the summer of 2004. The city of Bergheim is located on the loess soils of the Niederrheinische Bucht. On a relatively flat agricultural area a total of 30 graves, of which 26 were identified as definite graves, were discovered just a few metres north-east of a Bandkeramik settlement (Fig. 11.4). The settlement is partly excavated (225 x 42 m) and comprises at least nine houses; this is just a fraction of a larger settlement dated to the transition from the Older to the Late LBK.⁷³⁹

The orientation of the graves is predominantly ENE-WSW (17 graves) and slightly shifts to a NE-SW orientation (six graves) and eventually to an E-W orientation (five graves). Two graves are oriented N-S. The overall dimensions of the graves differ (depths range from less than 10 cm up to 80 cm) because of

⁷²⁹ Dohrn-Ihmig 1983, 65.

⁷³⁰ Dohrn-Ihmig 1983, 64.

⁷³¹ Dohrn-Ihmig 1983, 69.

⁷³² Peschel 1992, 18.

⁷³³ Peschel 1992, 18; Trautmann 2006, 52.

⁷³⁴ Dohrn-Ihmig 1983, 72.

⁷³⁵ Dohrn-Ihmig 1983, 68.

⁷³⁶ Dohrn-Ihmig 1983, 123 and 154; Peters 2018, 255-256.

⁷³⁷ Dohrn-Ihmig 1983, 70.

⁷³⁸ Dohrn-Ihmig 1983, 96.

⁷³⁹ Heinen 2005, 43.

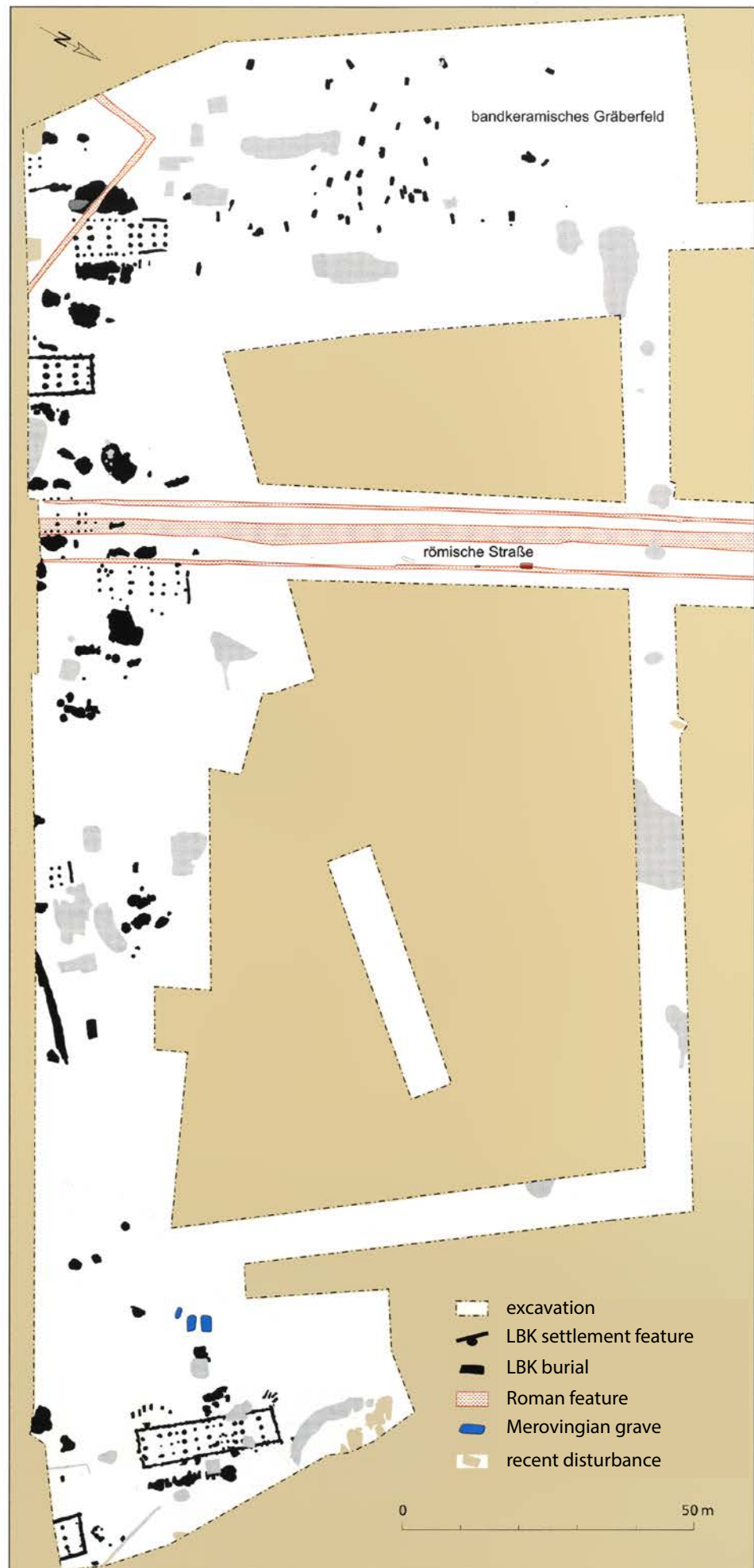


Fig. II.4 Plan of the burial site Bergheim Zieverich as excavated in 2004 (source: Heinen & Nehren 2005, Fig. 19).



Fig. II.5 Grave goods from two graves (left: grave 7; right grave 189) including a bundle of arrowheads, a blade, one quern covered with ochre, two adzes and a fragment of red ochre (source: Heinen & Nehren 2005, Fig. 21).

agricultural use, which exacerbated erosion processes. Up to one meter of topsoil is presumed to have disappeared, which led researchers to believe that more graves originally existed but are now gone.⁷⁴⁰ It also offers an explanation for why no cremation graves were found. Still, compared to other burial grounds the bone preservation was slightly better. Dental enamel was present in fourteen graves and body shadows could be identified in ten graves, although only shadows of the skull remained together with teeth and some of the lower body parts or spine. The most north-westerly grave (grave 199), however, even yielded actual bone remains, a rarity for this region. The relatively good preservation is due to the great depth of the grave, which was dug into the calcified loess C-horizon. Bones from the upper body (neck vertebrae, sternum, clavicle, shoulder blade and ribs), parts of the skull and some teeth were preserved.⁷⁴¹ Based on the anatomy it seems that the deceased was buried in an extended position on his or her back. Nothing could be inferred regarding the burial position of the deceased in the other graves. The body shadows and recovered teeth show that most heads (eleven graves) were

buried towards the ENE and three towards the WSW.

Grave goods were found in 15 graves and comprise pottery, arrowheads, flint blades and flakes, adzes, fragments or powder of red ochre and querns or quern fragments (Appendix VI Inventory list of the Bergheim-Zieverich burial ground).⁷⁴² Some querns were covered with red ochre powder. Grave 189 held four arrowheads, probably a bundle of arrows, together with an adze. This is presumed to be a male burial. Pottery was found in six graves, but the preservation was poor. Only fragments (sherds) were found, but complete vessels are absent. Only two graves held decorated sherds, which date the burial ground to the transition from the Older to Late LBK, similar to the settlement.⁷⁴³

Inden-Altdorf

The burial ground of Inden-Altdorf (Altdorf A) was discovered in advance of the open-cast lignite mines of Weisweiler. An enclosure (Altdorf B) was located about 300 m away on the same side of the valley. On the opposite side (ca.

⁷⁴⁰ Heinen 2005, 43.

⁷⁴¹ Heinen 2005, 17.

⁷⁴² Heinen 2005, 19.

⁷⁴³ Heinen 2005, 33.

⁷⁴⁴ Grajewski & Rupprecht 2001; Heller 2014.

⁷⁴⁵ Heller 2014, 343.

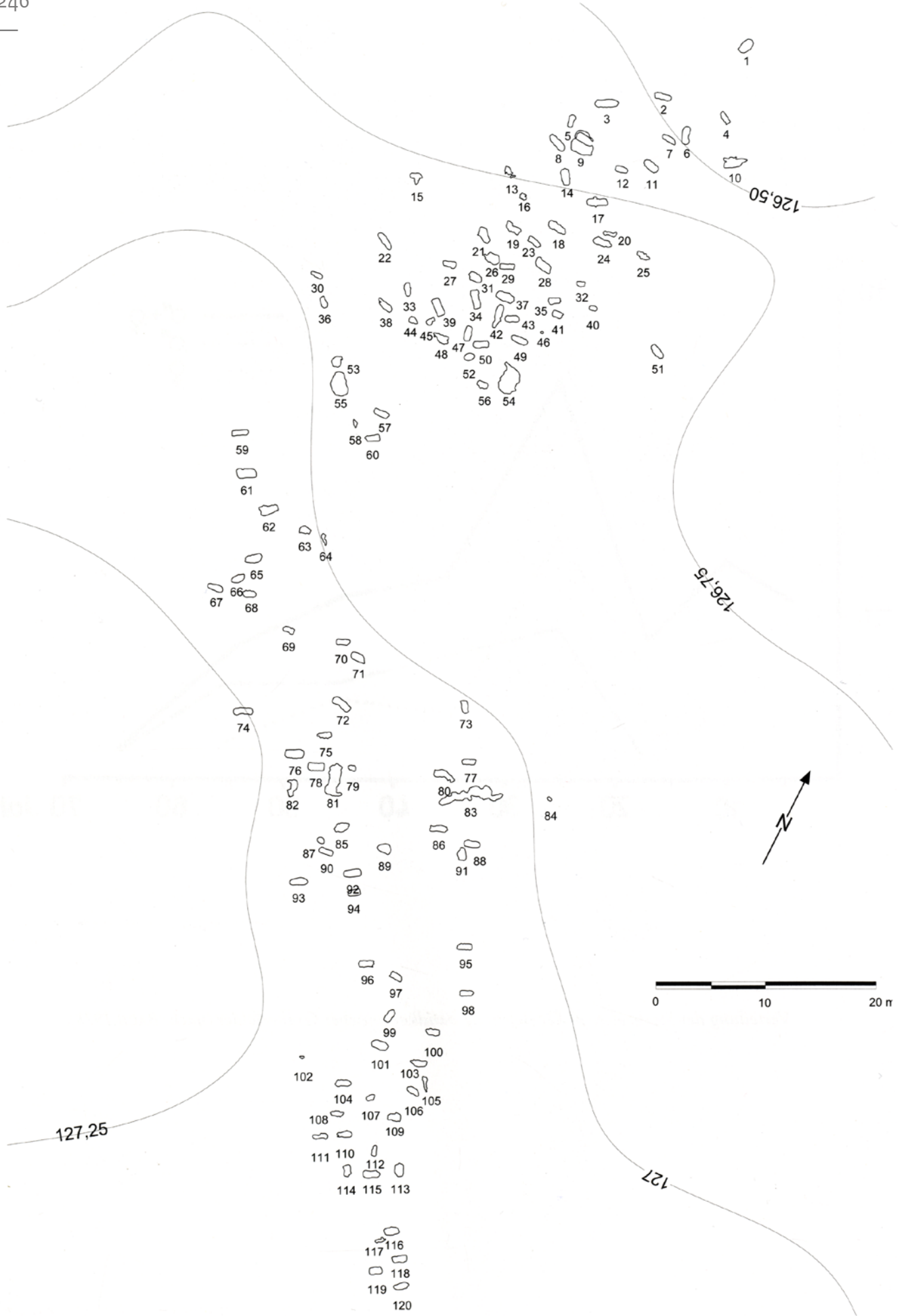


Fig. II.6 Overview of the Inden-Altendorf burial ground (source: Heller 2014, Taf. 17).

500 m) there was also a presumably associated settlement (Altdorf D). At the time, this was the second burial site discovered in this region; the burial ground of Niedermerz is located only four kilometres away.

From 2000 until 2001 large-scale excavations took place near the town of Inden-Altdorf, which is situated in the Niederrheinische Bucht.⁷⁴⁴ The sites are located on the eastern edge of the Aldenhovener Platte within the fertile loess zone, which stretches between Cologne and Aachen. The burial ground itself lay on a hill that stood out only slightly from its surroundings on the edge of the Altdorfer Tälchen, a dry valley which eventually merges

with the Inde.⁷⁴⁵ The site seems to have been subjected to large-scale erosion processes. In the northern half some colluvium remains, but most of the topsoil has been eroded.

The burial ground spans an area of 116 by 53 m (6400 m²) and consists of 176 features of which 120 are burials: 118 inhumation graves and two cremation graves (Fig. II.6). Some of these graves were disturbed by marl pits. Due to the decalcified soil, no skeletal remains were preserved apart from tooth enamel, which was found in fourteen graves. No body shadows were found either, despite appropriate excavation techniques.⁷⁴⁶ This is probably due to the shallow depth of the graves (max. 55 cm)

⁷⁴⁶ Grajewski & Rupprecht 2002, 33.

⁷⁴⁷ Heller 2014, 349.



Fig. II.7 Decorated and undecorated vessels (restored) from the Inden-Altdorf graves (source: Heller 2014).

which only reaches as far as the B-horizon, which is disturbed by roots and soil formation processes. The graves' dimensions average 1.4 m in length, 0.6 m in width and 0.15-0.65 in depth. The main orientation of the graves is NE-SW (30% of the graves) but many (24%) are oriented E-W.⁷⁴⁷ The grave fills are mainly homogenous but some are heterogenous or layered. As no body shadows were found it was impossible to make any comments about the position of the body (i.e. left or right crouched). Heads were mostly placed towards the east (six graves), the west (three graves) and north (one grave). Both cremation graves (graves 46 and 102) were characterised by irregular round pits with a concentration of calcined bones.⁷⁴⁸

Grave goods were present in 82 graves⁷⁴⁹ and consisted of 23 (complete!) ceramic vessels (Fig. II.7), sixteen adzes, 21 arrowheads and other flint artefacts such as blades, ten querns, twelve fragments of red ochre, and fifteen fragments of marcasite nodules, which can be used like pyrite (Appendix VII Inventory list of the Inden-Altendorf burial ground). Two pieces of flint are thought to be strike-a-lights.⁷⁵⁰ One grave (grave 78) held one ceramic vessel, two arrowheads, two flint blades, a flint core, a piece of red ochre and an adze.⁷⁵¹ Several graves contained up to three complete ceramic vessels. Ceramics were the only grave goods found in 44 graves. Three pieces of red ochre are perforated and were probably used as pendants, and another piece was remarkably large and weighed 1840 g.⁷⁵² The other 53 graves held almost no grave goods apart from some loose ceramic sherds, which could all be attributed to the LBK. In total 343 different vessels have been identified: 133 decorated and 210 undecorated vessels. Six vessels had traces of incrustation.⁷⁵³ Analysis of the ceramic vessels in relation to the settlement material known in the wider region shows that the undecorated vessels from the burial ground are distinctly smaller and fired at lower temperatures, as if they were made or selected especially for the burial rite.⁷⁵⁴ The same seems to apply to the stone tools, which are largely complete and hardly used. Rijckholt flint was the main source for flint, alongside Maasschotter flint.⁷⁵⁵ Most arrowheads were made of Rijckholt flint but Maasschotter and even Rullen and Valkenburg flint are also represented.⁷⁵⁶ Adzes were made primarily of amphibolite (fifteen adzes) and basalt (nine

adzes) and can be categorised as type 1 (flat) and type 2 (high) adzes.⁷⁵⁷ Amphibolite adzes were only found in the northern part of the burial ground and basalt adzes only in the southern part.⁷⁵⁸ The graves in the southern part are generally oriented in a NE-SW direction while there seems to be no such trend in the northern part.⁷⁵⁹

Jüchen-Holz

In 2010 and 2011 a burial site was excavated east of the village of Jüchen-Holz in the area of the Garzweiler open cast mine.⁷⁶⁰ Over an area of approximately 4000 m² 75 Bandkeramik features were found (Fig. II.8). The burial ground was situated on the north-eastern slope of a hill. The nearest well-known LBK settlements are located in the area of the Elsbach Valley, more than 500 m south of the burial ground.⁷⁶¹

The burial ground consists of 59 burial pits: presumably 58 inhumation graves and one cremation grave. Ten other features (other pits, pits shaped like graves but empty, postholes, natural features) could also be related to the burial ground. The burial pits, most of which had an elongated to rectangular shape, were mainly oriented along a north-west to south-east axis, but some have an E-W orientation. The fact that no body shadows have been found might have been the result of the excavation method, as the pits were excavated in quarter squares and not in complete horizontal layers, due the narrow time frame of the rescue excavations.⁷⁶² But this method resulted in whole vertical profiles of each burial pit, which showed that the fills were not homogenous but contained layers of different kinds of sediments.⁷⁶³

This burial ground differs from all others in the Rhineland, where graves predominantly have a south-west - north-east orientation. A special feature of this site was the relatively good preservation of the burial pits, the majority of which had depths of more than one meter and in individual cases of up to two meters below the present surface. Unfortunately, due to the soil condition, bone preservation was poor. In almost all cases only small fragments of burned bones remained.⁷⁶⁴ Five graves held these remains but only one is thought to be an actual cremation grave.⁷⁶⁵

⁷⁴⁸ Heller 2014, 354.

⁷⁴⁹ Heller 2014, 385.

⁷⁵⁰ Heller 2014, 379.

⁷⁵¹ Graiewski & Rupprecht 2002, 34.

⁷⁵² Graiewski & Rupprecht 2002, 33.

⁷⁵³ Heller 2014, 370.

⁷⁵⁴ Heller, 2014, 383-384.

⁷⁵⁵ Heller 2014, 370.

⁷⁵⁶ Heller 2014, 371.

⁷⁵⁷ Heller 2014, 375.

⁷⁵⁸ Heller 2014, 386.

⁷⁵⁹ Heller 2014, 396.

⁷⁶⁰ Richter 2011, 57.

⁷⁶¹ Hartel 2011, 1-5; Hartel in prep.

⁷⁶² Personal comment F. Hartel.

⁷⁶³ Hartel in prep.

⁷⁶⁴ Hartel 2011, 1.

⁷⁶⁵ Personal comment F. Hartel.

⁷⁶⁶ Hartel 2011, 2.

Artefacts were found in 36 burial pits (Appendix VIII Inventory list of the Jüchen-Holz burial ground). The spectrum is characteristic of LBK grave goods. Some were situated directly under the topsoil, which suggests that grave goods were also deposited in the upper part of some of the pits. The artefacts found in the burial pits are mainly ceramic vessels, ceramic sherds, adzes, as well as blades and arrowheads made of flint (Fig. II.9). In a smaller number of graves, artefacts of predominantly red-coloured iron oxide minerals were also found (presumably red ochre), which were apparently used to produce dyes or for direct colouring of surfaces. In addition, eight grinding stones were found in

the area of the burial site, of which only three can be assigned to a burial pit. The grave with most finds (grave 31) held 14 arrowheads (Rijckholt and Belgian grey flint), one vessel, two flint cores, some flakes and four blades.

As mentioned, many ceramic vessels have been found. Two vessels contained burned bone fragments as temper. This is a feature of the Limburg and La Hoguette groups. Another vessel has Hinkelstein ornaments (triangle motif) together with LBK motifs, and another had a Bandkeramik motif together with several strange-looking motifs.⁷⁶⁶ Such vessels are not yet known from any other burial ground.

On the basis of the decorated pottery, the

⁷⁶⁷ Hartel 2011, 2.

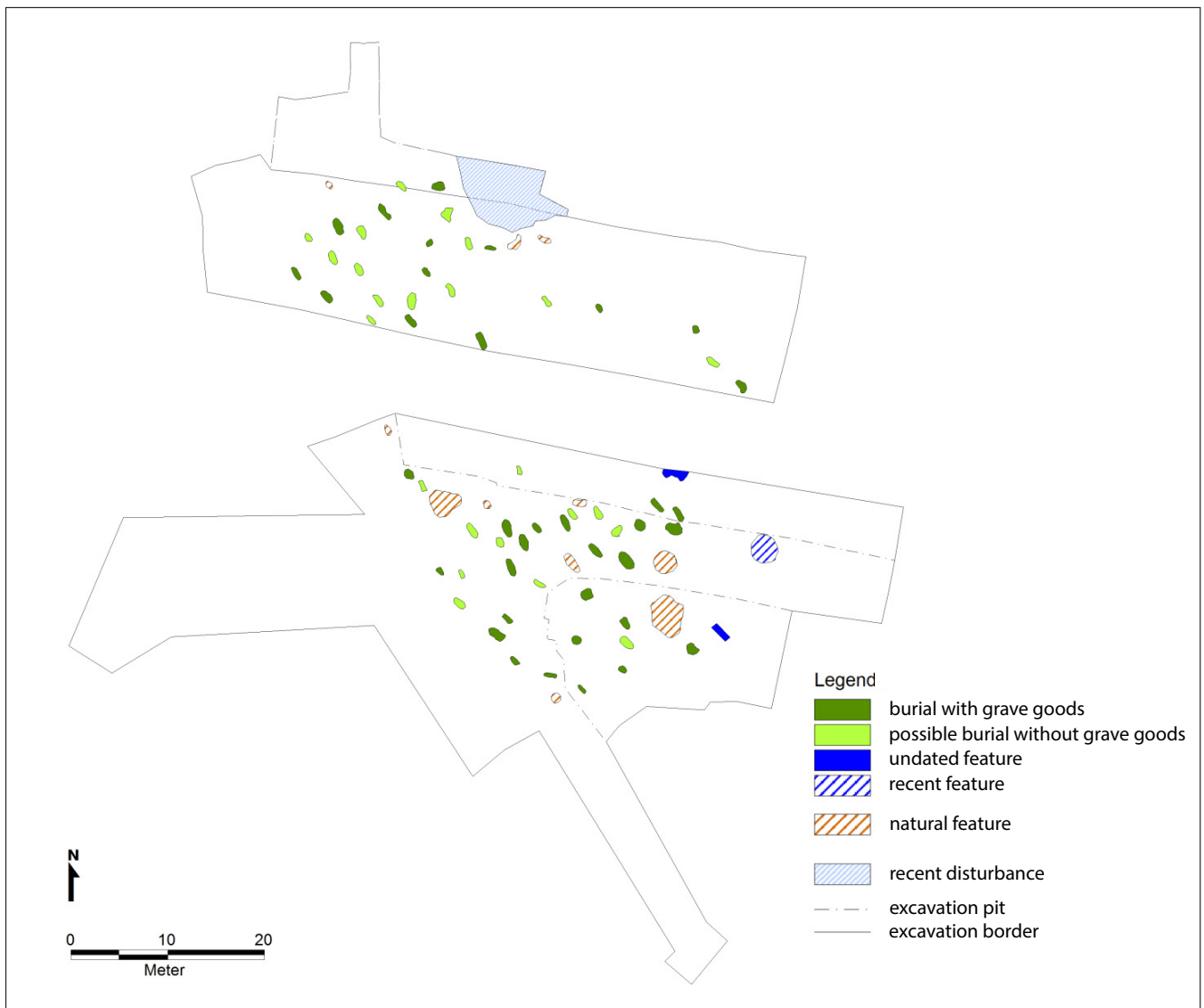


Fig. II.8 Plan of the burial site Jüchen-Holz as excavated in 2010 and 2011 (source: Hartel 2012, Abb. 2).

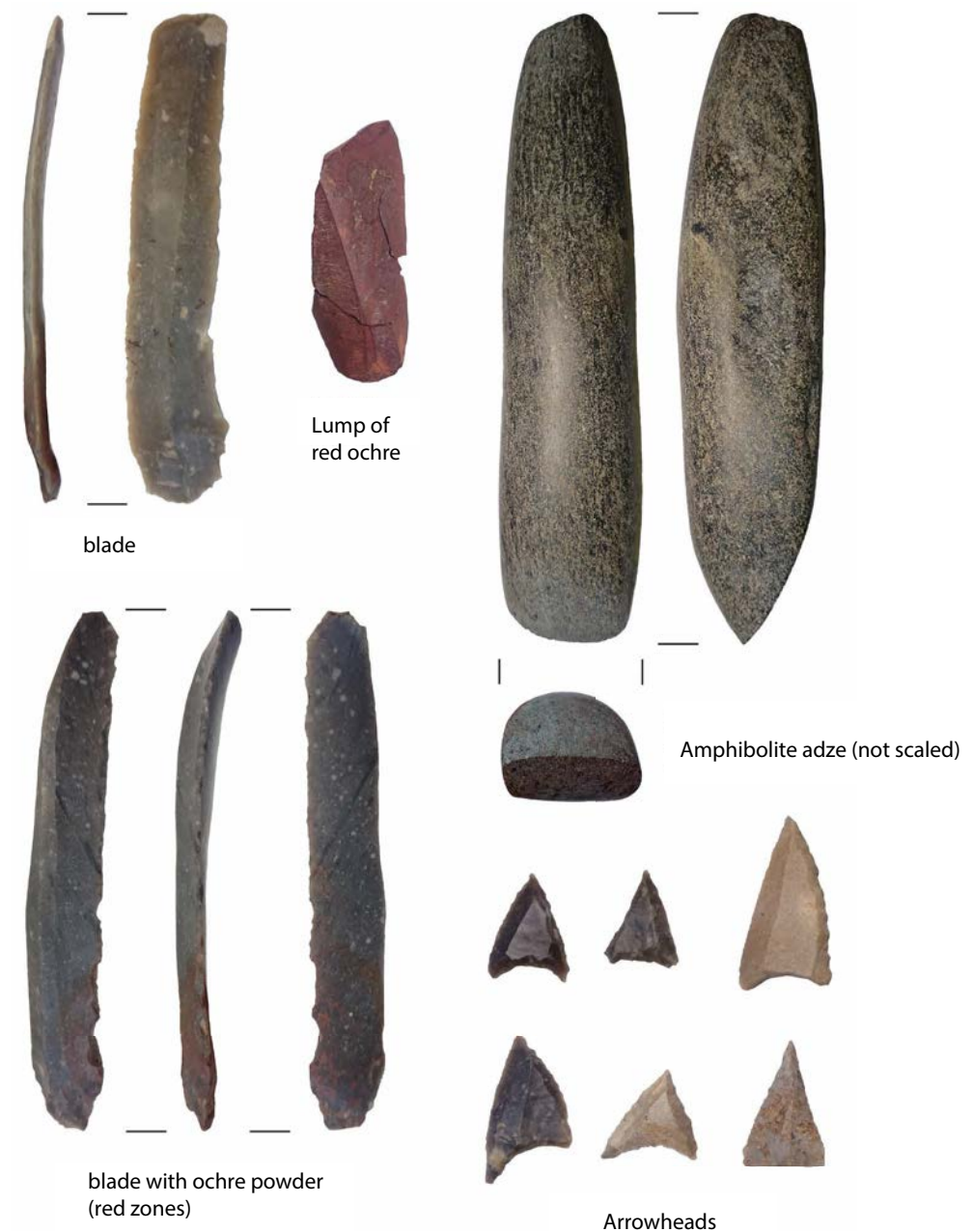


Fig. II.9 Selection of stone and flint artefacts from Jüchen-Holz (source: Hartel 2011, Abb. 4).

use of the burial site can be dated to a period beginning in the Late LBK until the Final LBK. The burial ground probably was only in use for two or three generations.⁷⁶⁷

Merzenich-Morschenich

On the higher plateaus of the Hambach region, in the vicinity of the city of Düren, large mining

activities made it possible to excavate a LBK burial ground and settlement before it was impacted by the open cast mining.⁷⁶⁸ The excavations started in 2006 and lasted, with interruptions, until 2010. A full analysis of the results has unfortunately not taken place due to changes in personnel. A complete site plan and grave catalogue are still in progress.⁷⁶⁹ A preliminary report, published in 2009, provided some information on the first 158 graves that were excavated. Up to now over 280 graves are

⁷⁶⁸ Gaitzsch & Janssens 2010, 39.

⁷⁶⁹ Personal comment H.-C. Strien.

⁷⁷⁰ Gaitzsch & Janssens 2010, 39.

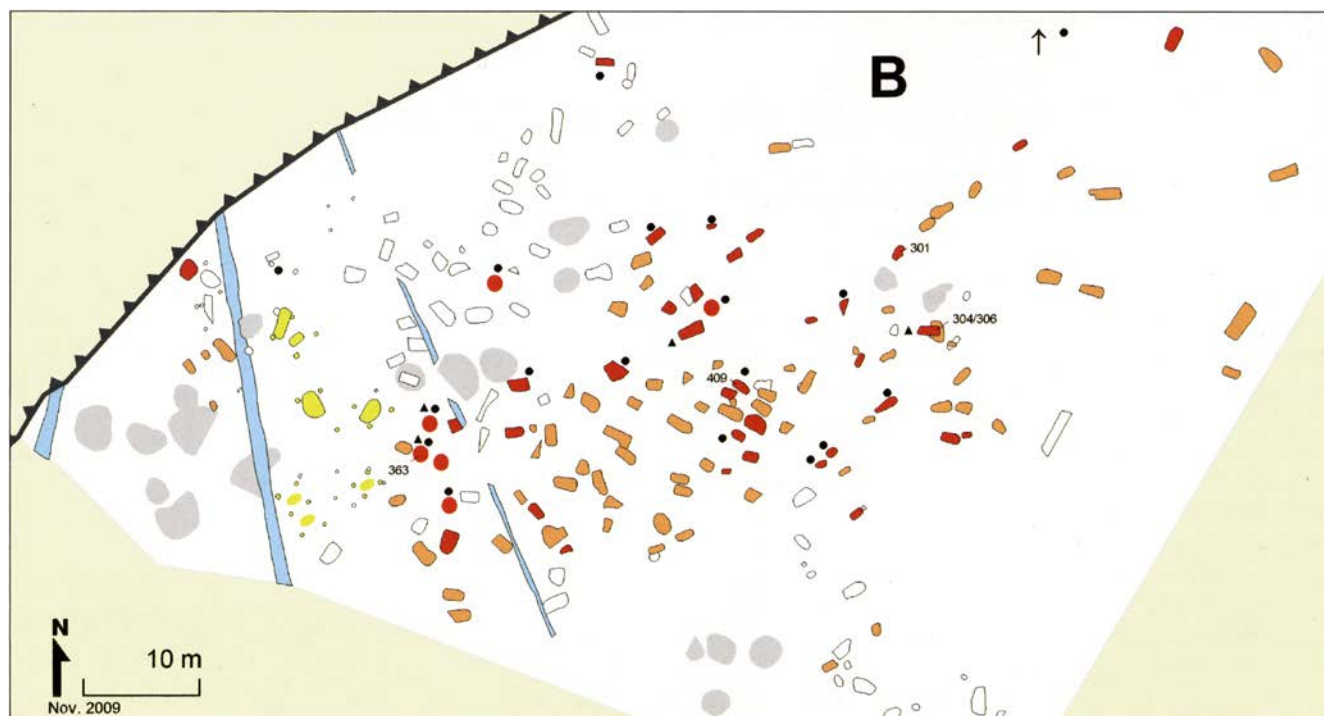


Fig. II.10 Plan of (parts of) the burial site Merzenich-Morschenich as excavated between 2006 and 2009 (source: Gaitzsch & Janssens 2010, Fig. 38). Findless graves are presented in orange, graves with finds in red (adzes represented as a black dot and arrowheads as triangles). Yellow (Iron Age) and blue (Roman Age) colours represent features from younger periods, or disturbances (grey).

known, which makes this the largest known burial ground in the Rhineland.

The location of the cemetery is on the high loess-covered terraces of the Niederrheinische Bucht, far from water courses. The Ellebach is situated ca. 4 km south-west of the site, and dry valleys are located 1-1.5 km south and west of the settlement. The relatively large distance to water provided no problems for the early settlers, as a large settlement (of which only a 310 x 230 m area has been excavated) is situated approximately 100 m south of the burial ground. An eight metres deep well, located between the burial ground and settlement, provided access to water.⁷⁷⁰ The site has been subjected to erosive processes, so that only graves dug into the gravel have survived; these are only preserved to a depth of 10-40 cm in the subsoil.⁷⁷¹ Shallower graves have probably been lost.

Although preliminary, some remarks can be made regarding the layout of the burial ground, the orientation of the (already published) graves and the grave contents (Fig. II.10). Most graves (260 graves) are inhumation graves and 12-19 graves are considered cremation graves.⁷⁷² The latter seem to be concentrated in the central part. It is however not clear whether these are cremation graves or represent calcined bone and charcoal fragments left in inhumation graves.⁷⁷³ The decalcified loess held no other skeletal

remains apart from dental enamel and calcined bones.

The burial ground seems to be divided into two parts (east and west). The western part yielded primarily graves which are oriented NW-SE, whereas in the eastern part the graves are oriented either NE-SW or ENE-WSW. This could be an indication that the burial ground was in use during different phases.⁷⁷⁴

Grave goods were found in 41 out of 158 graves, a low number probably caused by the poor preservation of the burials. The number of furnished graves will most probably increase when final analysis has taken place, but is still low when compared to burial grounds like Niedermerz and Elsloo. So far, 33 adzes have been found, of which five were in the cremation graves and at least two were paired with arrowheads. A particularly large (38 cm length) and intact adze made from basalt was found in (cremation) grave 363. The type 2 high adze was broken into three pieces before deposition in the grave.⁷⁷⁵ Remarkably, one of the three pieces was put in the wrong order, suggesting it was an intentional broken object that was deposited.⁷⁷⁶ Grave 409 also contained an intact amphibolite adze with a length of 10 cm. Ten graves yielded arrowheads and another ten had ochre lumps. Grinding stones were present in thirteen graves, and ceramics in at least 14 graves.⁷⁷⁷

⁷⁷¹ Gaitzsch & Janssens 2010, 40.

⁷⁷² Personal comment H.-C. Strien.

⁷⁷³ Personal comment H.-C. Strien.

⁷⁷⁴ Gaitzsch & Janssens 2010, 40.

⁷⁷⁵ Bakels 1987.

⁷⁷⁶ Gaitzsch & Janssens 2010, 40-41 and Abb. 39.

⁷⁷⁷ Personal comment H.-C. Strien.

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation	Orientation head	Nr burials	Age	Age category	Sex	Teeth	Crouched position	Date	Nr vessels	Complete vessel	Decorated	Undecorated	Sherds
39	cremation						single	20-40	adult	male?								
40	cremation						single	30-50	adult	female??								1
41	inhumation	140	50	92	SW-NE		single						Middle LBK	1	1	1		1
42	inhumation	160	60	87	NW-SE		single							1	1			1
43	inhumation	88	52	51	NW-SE		single							1			1	
44	cremation						single											
45	cremation						single	0-6	infans	child								1
46	cremation						single											
47	cremation						single	40-50	matur	male			Middle - Late LBK	1	1	1		1
48	cremation						single	18+	adult	female??								
49	inhumation	160	60	99	W-E	W	single					left sided		1				1
50	inhumation	160	55	118	NW-SE		single											
51	cremation						single	18+	adult	male??								
52	cremation						single	18-25	adult	unknown								
53	cremation						single											1
54	cremation						single											
55	inhumation	130	60	65	NW-SE		single							1				1
56	inhumation	173	68	117	NW-SE		single						Middle - Late LBK	2	1	1	1	1
57	cremation						single	12-25	juvenil/adult	unknown				1				1
58	inhumation	130	60	65	NW-SE		single											1
59	inhumation	173	68	117	NW-SE		single											
60	inhumation						single											
61	inhumation						single											
62	cremation						single	30-50	adult	male?								1
63	cremation	132	80	81	NNW-SSE		single				1							1
64	cremation	130	75	76	W-E		single	18+	adult	female??				1				1
65	inhumation	100	55	79	NW-SE		single							2			1	1
66	cremation						single	18+	adult	male?								1
67	inhumation	160	60	77	NW-SE		single						Final LBK	3	1	3		1
68	inhumation	170	110	103	NW-SE		single											1
69	cremation						single							5				1
70	cremation						single											1
71	cremation						single	20-40	adult	unknown			Late - Final LBK	4		1	1	1
72	cremation	90	70	45	NNW-SSE		single	40-60	matur/senil	female				3				1
73	cremation	63	53	45	SW-NE		single	20-40	adult	female?			Late - Final LBK	3		2		1
74	cremation						single	7-12	juvenil	unknown				1				1
75	cremation						single											1
76	inhumation	100	45	101	NW-SE		single							2				1

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation	Orientation head	Nr burials	Age	Age category	Sex	Teeth	Crouched position	Date	Nr vessels	Complete vessel	Decorated	Undecorated	Sherds	
77	cremation						single												
78	inhumation	135	60	91	NNW-SSE	NW	single					left sided							
79	inhumation	100	48	66	NNW-SSE		single												
80	cremation						single												
81	inhumation	70	40	72	NNW-SSE		single							1	1			1	
82	inhumation	100	60	56	NNW-SSE		single						Late LBK	3	1	1			1
83	inhumation	130	90	146	NW-SE	NW	single					left sided	Final LBK	1	1	1			
84	inhumation	130	100	90	NW-SE		single												
85	cremation						single	18+	adult	unknown				1					
86	inhumation	130	50	117	NNW-SSE		single							1	1				
87	inhumation	125	70	118	WNW-ESE	NW	single					left sided	Final LBK	7	2	1		2	
88	inhumation	115	55	100	WNW-ESE	NW	single				1								
89	inhumation	130	70	134	NW-SE	SE	single					left sided	Final LBK	1	1	1			1
90	inhumation	125	55	101	NW-SE	SE	single						Final LBK	2	2	2			
91	inhumation	110	60	76	WNW-ESE		single												
92	inhumation	125	68	113	NW-SE		single						Final LBK	1	1	1			1
94	inhumation	190	55	95	NW-SE	SE	single					left sided		2					1
95	inhumation	70	50	80	W-E		single												
96	inhumation	125	68	82	NNW-SSE		single				1		Final LBK	3	3	3			1
97	inhumation	80	45	55	NW-SE		single						Late LBK	1	1	1			
98	inhumation	100	65	129	NNW-SSE	SE	single				1			1					1
99	inhumation	120	55	107	NW-SE		single												
100	inhumation	180	65	145	WNW-ESE	E	single					extended	Final LBK	3	1			1	1
101	inhumation	147	50	123	NW-SE		single												1
102	inhumation	145	63	147	WNW-ESE		single				1		Middle - Late LBK	1	1	1	1		
103	inhumation	130	65	100	NW-SE		single												
104	inhumation	120	70	100	NW-SE	NW	single				1	left sided	Late LBK	2		1			1
105	inhumation	135	65	100	NW-SE	SE	single	25+	adult	unknown	1	right sided		1	1			1	
106	inhumation	160	85	120	NW-SE	NW	single					left sided	Middle LBK	1	1	1			1
107	inhumation	135	70	113	NW-SE	SE	single					left sided		1				1	1
108	cremation						single												
109	inhumation	140	55	95	NW-SE	SE	single				1			1	1			1	1
110	inhumation	130	70	96	WNW-ESE	E	single				1	left sided	Final LBK	1					1
111	cremation						single	30-50	adult	female??				4					1
112	inhumation	112	50	61	NW-SE		single						Late LBK	5	2	3			1
113	cremation						single	18+	adult	unknown	1								
114	cremation						single	20-30	adult	unknown				2	1				

	Animal bone	Grinding stone	Stone various	Ochre	Adze		Adze raw material		Adze length	Adze type I	Adze type II	Adze type III		Set of same artifacts	Scraper	Blade	Arrowhead	Flake or various	Core	Strike-a-light		Charcoal	Calcined bone	Number grave goods	Number grave categories		
																						0.2	0	0			
																					a lot		0	0			
																							0	0			
																						0.2	0	0			
																		1					1	1			
		1	1	3	lydit		5/5.8/11.4			1						1							4	2			
																					a lot		0	0			
					1	basalt		10		1													24.5	2	2		
				?																				1	1		
		1	1	2	basalt, lydiet		4.6/12.2		1	1						2	1							14	6		
					1	lydit		10.6		1													7.2	1	1		
		1	1																					3	3		
																					a lot			2	1		
					1	amphibolite		9		1														0	0		
																								2	2		
																								2	1		
																								0	0		
																								3	1		
	container sample																							1	1		
		1	1	1	amphibolite		4.2		1																4	4	
					1	lydit										1									2	2	
					2	lydit		7.6/7.2		1	1					1	2								8	4	
					1																				1	1	
																									1	1	
																									0	0	
																									2	1	
		1	1													1									4	4	
		1	1	1	basalt		8.2		1							3	1	1							9	7	
																									1	1	
																								2.1	0	0	
					1	1	basalt		5	1						1									4	4	
					1																				2	2	
					1	1	amphibolite		7	1															135.2	3	3
					1	1	basalt		4.6	1							1								7	3	
					1	1	basalt		8.2	1						1									30.1	3	3
					1				9.6									4	1						103	4	3

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation	Orientation head	Nr burials	Age	Age category	Sex	Preservation details	Preservation	Pathologica	Skull	Teeth	Upper body	Lower body	Upper_extremities	Lower_extremities
708	inhumation	189	94	18	WSW	W	single	25-30	adult	male	bones	mediocre bone preservation		1	1	1	1	1	1
709	inhumation	132	66	18	ENE	E	single	20-70	adult		bones	mediocre bone preservation		1	1	1	1	1	1
710	inhumation	134	81	13	NNE		single				none	no bones present							
711	inhumation	189	75	11	W		single				some bones	rudimentary							
712	inhumation	93	50	17	ENE		single				none	no bones present							
713	inhumation	135	83	8	NE	ENE	single				bones	mediocre bone preservation		1	1	1	1	1	1
714	inhumation	193	64	34	W	W	single	25-35	adult		bones	mediocre bone preservation		1	1	1	1	1	1
715	inhumation	173	76	30	NE	ENE	single	15-40	adult		bones	mediocre bone preservation		1	1	1	1	1	1
716	inhumation	104	56	20	ENE	ENE	single	35-45	adult		bones	mediocre bone preservation		1	1	1	1	1	1
719	inhumation	162	56	10	NW		single				none	no bones present							
727	inhumation	106	64	13	S		single				none	no bones present							
728	inhumation	136	75	12	NE	NE	single	20-70	adult	female	bones	mediocre bone preservation				1	1	1	1
729	inhumation	240	120	26	W		single				none	no bones present							
737	inhumation	128	64	7	NE	ENE	single	20-70	adult		bones	mediocre bone preservation		1		1	1	1	1
738	inhumation	124	47	12	NE	NE	single				bones	rudimentary		1					
741	inhumation	103	64	28	NE	NE	single	3-4	infans		bones	rudimentary		1	1				
742	inhumation	140	65	22	NE	NE	single	20-70	adult		bones	bad preservation		1	1	1	1		1
745	inhumation	157	70	35	NE	ENE	single	25-35	adult		bones	bad preservation		1	1				1
746	inhumation	158	58	29	NE	ENE	single	25-35	adult		bones	mediocre bone preservation		1	1			1	1
747	inhumation	162	84	20	ENE	ENE	single	20-70	adult		bones	rudimentary		1	1	1	1	1	1
753	inhumation	132	83	35	ESE	SE	single	35-45	adult	male	bones	good preservation		1	1	1	1	1	1
1771	inhumation	120	75	5	ENE		single				none	no bones present							
2261	inhumation	87	32	7	WNW		single	0-12	infans		bones	rudimentary		1			1		
2262	inhumation	109	32	16	WSW	W	single	0-12	infans		bones	rudimentary		1			1		1
2271	inhumation	133	73	20	NNE		single				body shadow	rudimentary							
3310	inhumation	128	61	10	E		single				none	no bones present							
3312	inhumation	137	42	14	NE	NE	single	20-70	adult		bones	bad preservation						1	1
3327	inhumation	173	52	21	NE	NE	single	13-70	adult		bones	bad preservation		1	1				1
3328	inhumation	113	52	21	NW		single	6-12	infans		bones	bad preservation		1	1				
3338	inhumation	80	47	19	WSW	W	single	1-6	infans		bones	bad preservation		1	1				
3339	inhumation	108	46	16	WNW		single				none	no bones present							
3340	cremation	78	34	22	NE		single				some bones	cremation							
3345	inhumation	157	45	36	WSW	WSW	single	20-70	adult		bones	bad preservation		1	1	1	1	1	
3346	inhumation	144	70	21	SW	SW	single	20-70	adult	female	bones	mediocre bone preservation		1	1	1	1	1	1
3347	inhumation	168	40	14	NNE	NE	single	0-6	infans		bones	bad preservation		1	1				
3348	inhumation	146	77	37	NW		single				some bones	cremation							
3350	inhumation	179	83	48	SW	SW	single	20-70	adult		bones	mediocre bone preservation		1	1		1	1	1
3351	inhumation	128	69	24	NNE		single				none	no bones present							
3352	inhumation	166	82	38	NNE	NE	single	20-70	adult	male	bones	mediocre bone preservation		1	1	1	1	1	1
3354	inhumation	155	79	52	SW	WSW	double	20-70	adult		bones	mediocre bone preservation		1	1	1	1	1	1
3355	inhumation	122	35	40	SW	WSW	single	8-10	infans		bones	bad preservation		1	1	1			1
3356	inhumation	75	34	14	E		single				some bones	rudimentary							

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation	Orientation head	Nr burials	Age	Age category	Sex	Preservation details	Preservation	Pathologica	Skull	Teeth	Upper body	Lower body	Upper_extremities	Lower_extremities
3357	inhumation	89	33	8	ENE		single				some bones	rudimentary							
3359	cremation	79	36	20	E		single				some bones	cremation							
3360	inhumation	144	60	26	ENE	E	single	20-70	adult		bones	mediocre bone preservation		1	1			1	1
3361	inhumation	103	43	15	NE		single				none	no bones present							
3362	inhumation	134	75	19	SW	SW	single	6-8	infans		bones	bad preservation		1	1	1		1	1
3364	inhumation	122	65	46	WNW	NW	single	20-70	adult	male	bones	good preservation		1	1	1	1	1	1
3365	inhumation	143	63	44	ENE	E	single	40-59	matur/senil	male	bones	good preservation		1	1	1	1	1	1
3370	inhumation	164	60	24	ENE	ENE	single	20-70	adult		bones	mediocre bone preservation		1	1	1	1	1	1
3371	inhumation	80	47	5	NE		single				some bones	rudimentary							
3372	inhumation	188	59	37	ENE	ENE	single	20-70	adult	male	bones	good preservation		1	1	1	1	1	1
3375	inhumation	122	45	26	NW		single				some bones	rudimentary							
3376	inhumation	166	56	45	WSW	W	single	20-70	adult	female	bones	mediocre bone preservation	present	1	1	1	1	1	1
3377	inhumation	131	52	48	SW	WSW	single	20-70	adult	female	bones	bad preservation		1	1	1	1	1	1
3383	inhumation	80	35	17	NE	NE	single	0-6	infans		bones	bad preservation		1	1			1	1
3385	inhumation	144	61	34	NE	ENE	single	20-70	adult		bones	bad preservation		1	1	1	1	1	1
3398	inhumation	136	59	16	NE		single				none	no bones present							
3400	inhumation	145	50	53	SSE	SSE	single	20-70	adult	male	bones	mediocre bone preservation		1	1	1	1	1	1
3403	inhumation	119	42	31	NNE	NNE	single	20-70	adult		bones	good preservation		1	1	1	1	1	1
3407	inhumation	131	73	45	N		single				none	no bones present							
3408	inhumation	195	71	35	ENE		single				some bones	rudimentary							
3409	inhumation	144	60	34	WSW	W	single				body shadow	rudimentary							
3412	cremation	56	35	14	E		single				bones	cremation							
3418	inhumation	98	57	17	E	E	single	0-12	infans		bones	bad preservation		1	1				
3419	inhumation	107	62	12	NNE		single				none	no bones present							
3420	inhumation	103	50	9	NW		single				none	no bones present							
3421	inhumation	210	106	41	NE	ENE	single	20-70	adult	female	bones	mediocre bone preservation	present	1	1	1	1		1
3422	inhumation	149	63	22	ENE	ENE	single				bones	rudimentary		1					
3423	inhumation	85	51	32	SW	WSW	single	0-12	infans		bones	bad preservation		1	1				
3432	cremation	28	28	15			single				bones	cremation							
3434	inhumation	129	49	37	NE	NE	single	4-8	infans		bones	bad preservation		1	1		1	1	1
3659	inhumation	123	60	40	NE	NE	single	8-12	infans		bones	bad preservation		1	1				1
3669	inhumation	110	55	30	ENE	ENE	single	20-70	adult	female	bones	good preservation		1	1	1	1	1	1
3671	inhumation	133	75	18	NNE	NE	single	20-70	adult		bones	mediocre bone preservation					1	1	1
3687	inhumation	135	55	33	E	E	single				bones	bad preservation		1	1		1	1	1
3701	inhumation	113	54	15	NE		single				none	no bones present							
3707	inhumation	100	38	37	SW	WSW	single	6-10	infans		bones	bad preservation		1	1	1			1
3708	inhumation	109	45	13	SW	SW	single	13-70	adult		bones	bad preservation		1	1				
3711	inhumation	115	44	17	NE		single				none	no bones present							
3712	inhumation	93	43	30	NE	NE	single	20-70	adult		bones	bad preservation		1	1				
3715	inhumation	99	40	26	NE		single	20-70	adult		teeth only	bad preservation		1					
3716	inhumation	120	57	27	ENE		single				some bones	rudimentary							
3719	inhumation	137	91	19	NNE		single				none	no bones present							

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation	Orientation head	Nr burials	Age	Age category	Sex	Preservation details	Preservation	Pathologica	Skull	Teeth	Upper body	Lower body	Upper_extremities	Lower_extremities	
4990	inhumation	97	46	28	NW		single				none	no bones present								
4993	inhumation	112	75	36	NNE		single				body shadow	rudimentary								
4996	inhumation	122	84	26	NNW		single				none	no bones present								
4998	inhumation	96	50	11	S		single				none	no bones present								
4999	inhumation	147	84	18	ESE		single				none	no bones present								
5009	inhumation	109	70	18	NW		single				none	no bones present								
5010	inhumation	98	39	14	E		single				none	no bones present								
5012	inhumation	152	75	12	NNW		single				none	no bones present								
5103	inhumation	110	47	14	NW		single				none	no bones present								
5115	inhumation	147	109	25	WNW		single				none	no bones present								
5413	inhumation	163	67	20	WSW	WSW	single	40-70	matur/senil		bones	mediocre bone preservation	present	1	1	1	1	1	1	
5542	inhumation	167	57	30	ENE	ENE	single	20-70	adult		bones	good preservation		1	1	1		1		
5546	inhumation	127	49	33	NNW	NNW	single	20-70	adult		bones	bad preservation		1	1	1				
5796	inhumation	109	47	28	WSW	WSW	single	20-70	adult		bones	mediocre bone preservation		1	1	1	1	1	1	
5797	inhumation	140	61	23	NE	ENE	single	20-70	adult	male	bones	good preservation		1	1	1	1	1	1	
5800	inhumation	180	76	54	NW	NNW	single	20-70	adult		bones	good preservation		1	1	1	1	1	1	
5801	inhumation	165	68	51	ENE	ENE	single	20-70	adult	male	bones	good preservation		1	1	1	1	1	1	
5802	inhumation	53	50	17	WNW		single	20-70	adult		bones	bad preservation		1	1					
5823	inhumation	110	50	13	NE	NE	single	8-12	infans		bones	bad preservation		1	1					
5825	inhumation	136	59	30	WNW	WNW	single	20-70	adult	male	bones	good preservation				1	1	1	1	
5831	inhumation	166	72	26	ENE	E	single	20-70	adult	male	bones	good preservation	present	1	1	1	1	1	1	
5839	inhumation	152	61	17	NE	NE	single	20-59	adult		bones	good preservation		1	1		1	1	1	
5840	inhumation	133	52	23	SW	SW	double	20-70	adult		bones	mediocre bone preservation		1	1	1	1	1	1	
5841	inhumation	143	72	48	NNW	NNW	single	29-70	matur/senil		bones	good preservation		1	1	1	1	1	1	
5843	inhumation	133	40	25	ENE	ENE	single	40-70	matur/senil		bones	mediocre bone preservation		1	1	1	1	1	1	
5844	inhumation	92	63	13	NE		single				some bones	rudimentary								
5854	inhumation	117	38	6	NE	ENE	single	13-70	adult	female	bones	good preservation		1	1	1	1	1		
5855	inhumation	135	46	18	NW	NNW	single	20-70	adult		bones	mediocre bone preservation		1	1	1	1	1	1	
5857	inhumation	140	56	25	NNE	NNE	single	20-70	adult		bones	bad preservation		1			1	1	1	
5916	inhumation	145	50	10	NE	NE	single	20-70	adult	female	bones	mediocre bone preservation				1	1		1	
5917	inhumation	107	48	14	NNW	N	single	13-70	adult		bones	good preservation	present	1	1	1	1	1	1	
6207	inhumation				NNW	N	single	13-16	juvenil		bones	mediocre bone preservation		1	1	1		1	1	

Crouched position	Date	Nr vessels	Animal bone	Grinding stone	Stone various	Ochre	Adze	Adze raw material	Adze lenght	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Strike-a-light	Charcoal	Calcined bone	Number grave goods	Number grave categories
																						0	0
	Late LBK	2																				2	1
																						0	0
		1																				0	0
																						1	1
																						0	0
																						0	0
																						0	0
left sided		1				2	1	amphibolite	9.5	1		1			8	1	1					14	3
							1	basalt	12.1	1												1	1
	Late LBK	1																				1	1
		4																				4	1
left sided	Middle LBK	1				3	1	basalt	14.3	1												5	2
extended	Middle or Late LBK	4				3	1	Grauwacke	8.7	1				2								10	3
right sided	Early LBK	7					1	amphibolite							2							10	3
																						0	0
left sided																						0	0
left sided	Late LBK	1											1		2	3						6	2
left sided		1																		1		2	2
right sided		1	1																			2	2
extended	Middle or Late LBK	2																		1		3	2
right sided		1																				1	1
																						0	0
																						0	0
		1																				1	1
left sided																						0	0
																	1					1	1
right sided		2																				2	1
left sided		1																				1	1
	Early - Middle LBK	2					1	amphibolite	4.5			1										3	2
		251	7	2	18	15	27	0					1	1	24	40	44	1	11	4			

Adze	Adze raw material	Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Fire Lighter	Charcoal	Calcined bone	Number grave goods	Number grave categories
															0	0
						1			11				1		11	1
									20						21	2
															1	1
													1		0	0
													1		1	1
1	amphibolite	8.2		1				5	1				1		9	4
						1		5							5	1
													1		0	0
1	basalt	9.3		1				1		1			1		4	3
													1		2	1
								1					1		2	2
									3				1		7	4
1	amphibolite	10.5		1					1				1		4	4
															1	1
1	amphibolite	8	1					4					1		6	3
															1	1
															0	0
										1					2	2
														1	3	1
															3	1
						1		2		1	1	1			7	3
1	basalt	8.2	1						2						6	5
1	amphibolite	4.1	1												1	1
															1	1
															1	1
1	amphibolite	11.9		1		1		2	5						9	3
1	amphibolite	9.7		1											2	2
								1					1		2	2
1	amphibolite	7.1		1											2	2
								1					1		7	3
													1	1	5	2
													1	1	1	1
															5	1
															4	1
													1	1	0	0
									4						5	2
1	amphibolite	8.5		1				2	2	1	1		1	1	11	4
													1	1	0	0
2	amphibolite	11.2	1	1		1		4	2	1	1				15	5
															3	1
2	amphibolite+basalt			1				1	1						5	3
															0	0
1	amphibolite	6.1	1					1						1	2	2
															2	2
1	basalt	7	1						1						5	4
															3	1
															0	0
3	amphibolite			3		1		1		1					6	3

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Nr burials	Skull	Teeth	Upper body	Lower body	Upper_extremities	Lower_extremities	Crouched position	Date	Nr vessels	Complete vessel	Decorated	Undecorated	Sherds	Animal bone	Grinding stone	Stone various	Ochre
N-049	inhumation	145	70	90	N-S	single	1	1	1	1	1	1	left crouched		2	2	2				1		1
N-050	cremation	100	55	10	N-S	single																	
N-051	inhumation	175	55	25	N-S	single		1					left crouched		1	1	1						
N-052	too disturbed	140	55	50	NE-SW	single																	
N-053	inhumation	145	55	40	N-S	single									1	1			1				
N-054	inhumation	180	60	20	NE-SW	single									4	3	1		1				
N-055	inhumation	195	115	90	NE-SW	single	1	1	1	1	1	1	left crouched		5	5			14			1	
N-056	cremation			65		single									2	1	1		2				
N-057	inhumation	190	65	77	NE-SW	single									1	1	1		5				
N-058	inhumation	125	70	50	NE-SW	single									2	1	1		2				
N-059	inhumation	155	70	80	NE-SW	single									1	1	1		6			1	
N-060	inhumation	200	80	70	NE-SW	single	1	1					right crouched		4	1	1		10		1		1
N-061	inhumation	150	60	60	NNE-SSW	single									2	2			2				
N-062	inhumation	190	70	40	NNE-SSW	single									1				2				
N-063	inhumation	185	60	42	NE-SW	single									1				2				
N-064	inhumation	125	50	43	ENE-WSW	single									1				3				
N-065	inhumation	160	70	35	NE-SW	single		1															
N-066	inhumation	165	80	50	N-S	single	1	1					left crouched		1			1	7				1
N-067	inhumation	105	45	18	NE-SW	single		1															
N-068	inhumation	170	70	15	NE-SW	single									2	1	1		7				
N-069	inhumation	110	60	40	NE-SW	single									1	1	1		5			1	
N-070	cremation	120	0	30	NE-SW	single									2		2		2				
N-071	inhumation	140	55	35	NE-SW	single	1	1					left crouched		1	1			1				
N-072	inhumation	120	60	35	NNE-SSW	single	1	1					right crouched		1				1				
N-073	inhumation	80	40	20	NE-SW	single		1															
N-074	inhumation	205	75	60	NE-SW	single									1	1			3			1	
N-075	inhumation	115	70	35	NE-SW	single									2		2		3			1	
N-076	inhumation	160	50	85	NE-SW	single	1	1	1	1	1	1	left crouched		2	1		1	2				
N-077	inhumation	150	75	40	NE-SW	single	1	1							3	1	3		4			1	1
N-078	too disturbed	70	40	10	W-E	single																	
N-079	too disturbed	120	70	60	NW-SE	single									1				2				
N-080	too disturbed	130	60	20	ENE-WSW	single																	
N-081	inhumation	145	50	35	N-S	single									2	1	1		4	5			
N-082	too disturbed	130	60	20	ENE-WSW	single																	
N-083	cremation	50	45	28	ENE-WSW	single									1		1		1			1	
N-084	inhumation	160	55	38	NE-SW	single		1							2	1	1		4			1	1
N-085	too disturbed	125	50	35	NNE-SSW	single									1	1			1			1	
N-086	too disturbed					single																	
N-087	inhumation	165	60	60	W-E	single	1	1							1		1		3			1	
N-088	too disturbed	125	65	10	N-S	single																	
N-089	inhumation	175	75	50	N-S	single																	1
N-089	cremation					single									1	1			5				2
N-090	inhumation	145	70	10	NE-SW	single																	
N-091	inhumation	175	57	100	NNE-SSW	single	1	1	1	1	1	1	left crouched		2	1	1		2				1
N-092	inhumation	180	100	65	NNE-SSW	single	1	1	1	1	1	1	left crouched				1		2				
N-093	inhumation	160	55	50	NE-SW	single																	1
N-094	inhumation	190	80	70	NE-SW	single	1	1					left crouched		2	1	1		3		1		
N-095	too disturbed	105	70	25	NNE-SSW	single																	
N-096	inhumation	80	45	25	NNE-SSW	single									2	1	1	1	1			1	

Adze	Adze raw material	Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Fire Lighter	Charcoal	Calined bone	Number grave goods	Number grave categories
1	amphibolite	7		1				1		1					7	5
														1	0	0
1	amphibolite	10.1		1						3					5	3
															0	0
															1	1
															4	1
1	amphibolite	22		1				2	2						11	4
													1	1	2	1
													1	1	1	1
										1			1		3	2
1	basalt														3	3
2	amphibolite	9.8	1	1						2					10	5
															2	1
										1					2	2
															1	1
1	amphibolite	5.2	1												2	2
															0	0
1	amphibolite	10.5	1				1	4	4						12	4
															0	0
															2	1
													1	1	2	2
															2	1
1	amphibolite	8.4	1							3					5	3
															1	1
															0	0
								1					1		3	3
															3	2
								1		1				1	4	3
1	amphibolite	7.5		1				1							7	5
													1		0	0
															1	1
															0	0
													1	1	2	1
															0	0
													1	1	2	2
													1	1	4	3
													1	1	2	2
1	amphibolite			1											1	1
										1			1	1	3	3
									1	1			1	1	3	2
													1	1	3	2
2	amphibolite +basalt			2											2	1
2	Wetzschiefer				1			1					1		6	4
															1	1
4	amphibolite +basalt			3	1		1	3	14	2	3	1			28	3
1					1					2					6	4
													1		0	0
1	basalt	11			1					1			1		5	4

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Nr burials	Skull	Teeth	Upper body	Lower body	Upper_extremities	Lower_extremities	Crouched position	Date	Nr vessels	Complete vessel	Decorated	Undecorated	Sherds	Animal bone	Grinding stone	Stone various	Ochre	
N-097	inhumation	130	50	32	ENE-WSW	single		1																
N-098	inhumation	170	45	55	NE-SW	single									2	1	1	1	2			1		
N-099	inhumation	180	70	70	N-S	single	1	1	1	1	1	1	left crouched		5	3	4	1	3		1		1	
N-100	inhumation	135	65	40	N-S	single	1								1	1	1		1			1	1	
N-101	too disturbed					single																		
N-102	inhumation	125	50	35	N-S	single	1								2	1	1		3			1		
N-103	inhumation	160	80	24	NNE-SSW	single									1				2					
N-104	too disturbed	150	70	15	ENE-WSW	single																		
N-105	too disturbed	115	50	25	NE-SW	single																		
N-106	too disturbed	110	30	10	W-E	single									1				2				1	
N-107	inhumation	135	60	55	N-S	single		1							1		1		2			1	1	
N-109	too disturbed	120	50	10	NE-SW	single																		
N-110	too disturbed	150	50	10	NE-SW	single																		
N-113	inhumation	140	45	35	NNE-SSW	single		1												1				
N-114	cremation			50		single									3	1	3	1	4					
N-115	cremation			50	NE-SW	single									2		1	1	1					
N-122	cremation			50											1	1	1							

	Adze	Adze raw material	Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Fire Lighter	Charcoal	Calcined bone	Number grave goods	Number grave categories
																0	0
														1	1	3	2
	1	amphibolite	6	1						1						9	5
	1	amphibolite	8.5	1						1		1				6	5
																0	0
	1	basalt	6	1							1					5	4
																1	1
																0	0
																0	0
																2	2
														1		3	3
																0	0
																0	0
														1		1	1
														1	1	3	1
														1		2	1
														1	1	1	1

Appendix VI Inventory list of the Bergheim-Zieverich burial ground

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Nr burials	Preservation	Skull	Teeth	Upper body	Lower body	Upper_extremities	Lower_extremities	Crouched position
4	inhumation					single	no bones preserved							crouched
7	inhumation					single	no bones preserved							crouched
11	inhumation					single	no bones preserved							crouched
186	inhumation					single	no bones preserved							crouched
188	inhumation					single	no bones preserved							crouched
189	inhumation					single	no bones preserved							crouched
190	inhumation					single	no bones preserved							crouched
196	inhumation					single	no bones preserved							crouched
197	inhumation					single	no bones preserved							crouched
199	inhumation					single	rudimentary bone preservation	1	1	1		1		flexed position
202	inhumation					single	no bones preserved							crouched
203	inhumation					single	no bones preserved							
204	inhumation					single	no bones preserved							
205	inhumation					single	no bones preserved							
283	inhumation					single	no bones preserved							
x1	inhumation					single	no bones preserved							
x10	inhumation					single	no bones preserved							
x12	inhumation					single	no bones preserved							
x13	inhumation					single	no bones preserved							
x14	inhumation					single	no bones preserved							
x15	inhumation					single	no bones preserved							
x16	inhumation					single	no bones preserved							
x17	inhumation					single	no bones preserved							
x18	inhumation					single	no bones preserved							
x2	inhumation					single	no bones preserved							
x3	inhumation					single	no bones preserved							
x5	inhumation					single	no bones preserved							
x6	inhumation					single	no bones preserved							
x8	inhumation					single	no bones preserved							
x9	inhumation					single	no bones preserved							

Appendix VII Inventory list of the Inden-Altdorf burial ground

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Orientation head	Nr burials	Teeth	Date	Nr vessels	Complete vessel	Decorated	Undecorated	Sherds	Animal bone	Grinding stone	Stone various	Ochre	Adze	Adze raw material	
la-001	inhumation	150	88	35	NNE-SSW		single														
la-002	inhumation	155	55		ENE-WSW		single														
la-003	inhumation	205	66		NE-SW		single														
la-004	inhumation	133	52	10	NW-SE		single											1			
la-005	inhumation	117	58	22	N-S		single														
la-006	inhumation	161	66	65	NNW-SSE		single														
la-007	inhumation	133	49	25	E-W		single														
la-008	inhumation	173	62	48	NW-SE		single														
la-009	inhumation	195	113	28	W-E		single			2			2	2							
la-010	inhumation	211	110	40	NE-SW		single														
la-011	inhumation	142	70	22	ENE-WSW		single			2	2		2								
la-012	inhumation	114	57	30	ENE-WSW		single														
la-013	inhumation	140	50	23	NW-SE		single		Late LBK	3	1	1	2	2							
la-014	inhumation	150	70	54	SSE-NNW		single		Late LBK	2	2	1	1	2		1		1	1	1	amphibolite
la-015	inhumation	110	45		ENE-WSW		single			1				1					1		basalt
la-016	inhumation	130	60	29	NW-SE		single														
la-017	inhumation	185	65	45	SW-NE		single			1			1								
la-018	inhumation	170	70	48	E-W		single													1	amphibolite
la-019	inhumation	140	60	55	E-W	W	single	1	Late LBK	3	2	1	2								
la-020	inhumation	120	30	40	E-W		single														
la-021	inhumation	155	90	62	NW-SE	SE	single	1	Late LBK	2		2		2				1	1	1	amphibolite
la-022	inhumation	150	50	45	NW-SE		single			1			1							1	amphibolite
la-023	inhumation	130	45	40	ENE-WSW		single			1			1								
la-024	inhumation	185	67	30	E-W		single			1			1								
la-025	inhumation	125	50	37	E-W		single		Middle LBK	1	1	1									
la-026	inhumation	150	90	40	E-W		single			2			2	2		1					
la-027	inhumation	120	45		ENE-WSW		single														
la-028	inhumation	200	77	65	WNW-ESE	W	single	1		1			1							1	amphibolite
la-029	inhumation	125	50	37	NE-SW		single														
la-030	inhumation	100	50	28	W-E		single			1			1								
la-031	inhumation	120	75	33	E-W		single		Late LBK	3	3	2	1								
la-032	inhumation	80	44	34	NE-SW		single														
la-033	inhumation	120	50		NNW-SSE		single														
la-034	inhumation	170	75	63	NNW-SSE		single	1							1			1	1	1	amphibolite
la-035	inhumation	107	55	30	NE-SW		single		Late LBK	1		1									
la-036	inhumation	100	50	19	NW-SE		single														
la-037	inhumation	165	80	18	E-W	E	single	1		1			1								
la-038	inhumation	140	60	33	WNW-ESE		single		Late LBK	6	1	2	4								
la-039	inhumation	160	68	48	NW-SE		single														
la-040	inhumation	73	40	20	ENE-WSW		single									1					
la-041	inhumation	98	58	30	E-W		single									1		1			
la-042	inhumation	220	60		N-S		single		Late LBK	14	1	14		13							
la-043	inhumation	120	55	45	NE-SW		single			3			3	3						1	amphibolite
la-044	inhumation	140	50	48	SE-NW		single	1													
la-045	inhumation	80	50	20	NNE-SSW		single	1	Late LBK	2		1	1	1							
la-046	cremation	24	16	13			single														
la-047	inhumation	130	60	50	N-S	N	single	1													
la-048	inhumation	140	75	45	E-W		single			3			3	2							
la-049	inhumation	150	55	36	E-W		single	1	Late LBK	3	3	2	1	1		1			1		

Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Strike-a-light	Charcoal	Calcined bone	Number grave goods	Number grave categories	remarks
											1		0	0	
											1		0	0	
													0	0	
						1							2	2	
													0	0	
											1		0	0	
													0	0	
											1		0	0	
													2	1	
													0	0	
											1		2	1	
													0	0	
													3	1	
12.5		1				1	2			1			8	5	
9.3		1									1		2	2	
													0	0	
											1		1	1	
11.8	1												1	1	
													3	1	
											1		0	0	
10.2						2	1				1	bone splinters	7	4	
11.5		1											2	2	
													1	1	
													1	1	
													1	1	
											1		3	2	
													0	0	
6.2											1		2	2	
													0	0	
													1	1	
													3	1	
											1	bone splinters, daub	0	0	
													0	0	
13					1	1	4		1	1			9	4	
													1	1	
											1		0	0	
													1	1	
											1		6	1	
													0	0	
											1		1	1	
											1		2	2	
							1						15	2	
10.5		1							1				5	3	
								1					0	0	
													3	2	
											1		0	0	
													0	0	
													3	1	
11.6													5	3	

Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Strike-a-light	Charcoal	Calcined bone	Number grave goods	Number grave categories	remarks
													7	1	
												1	1	1	
												1	2	1	
												1	3	1	
								1					4	2	
												1 calcined bone	13	1	
								1					4	2	
													0	0	
												1	4	1	
													16	1	
													3	2	haematite perforated
													18	1	
19.6			1										3	1	
													2	2	
9.4		1											0	0	
													4	2	
													0	0	
													0	0	
													0	0	
												1	0	0	
													0	0	
14.7			1										2	2	haematite perforated
													0	0	
													0	0	
													0	0	
												1 calcined bone, daub	5	2	
												1	9	1	
													2	1	
												1 calcined bone, daub	2	1	
												1	3	1	
								1				1	2	2	
												1 calcined bone	9	2	
												1	3	1	
11.2		1										1	10	2	
													1	1	
													1	1	
												1	3	3	haematite perforated
													1	1	
													1	1	
													2	2	
												1	11	2	
													0	0	
												1 calcined bone	3	1	
												1	0	0	
													5	2	
								2					0	0	

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Orientation head	Nr burials	Teeth	Date	Nr vessels	Complete vessel	Decorated	Undecorated	Sherds	Animal bone	Grinding stone	Stone various	Ochre	Adze	Adze raw material	
la-095	inhumation	130	53	15	WNW-ESE		single			1			1								
la-096	inhumation	130	55	30	SW-NE		single		Final LBK	2	1	1	1								
la-097	inhumation	115	55	35	E-W	E	single	1	Older LBK	1		1									
la-098	inhumation	124	48	12	SW-NE		single		Late LBK	3		2	1								
la-099	inhumation	120	54	14	N-S		single														
la-100	inhumation	120	53	29	W-E		single		Middle - Late LBK	1	1		1	1							
la-101	inhumation	150	60	35	W-E		single			1			1	1							
la-102	cremation	38	22				single											1			
la-103	inhumation	146	55	13	WNW-ESE		single														
la-104	inhumation	142	50	38	NE-SW		single			2			2	2							
la-105	inhumation	136	40	32	NW-SE		single			1			1	1							
la-106	inhumation	126	50	35	W-E		single			2			2	2					1	basalt	
la-107	inhumation	77	43	8	NE-SW		single			2			2	2				1			
la-108	inhumation	108	48	22	ENE-WSW		single		Late LBK	6		4	2	2							
la-109	inhumation	115	61	42	ENE-WSW		single														
la-110	inhumation	125	56	15	SW-NE		single			2			1	1							
la-111	inhumation	128	41	25	NE-SW		single			1	1			1							
la-112	inhumation	88	37	15	NNW-SSE		single														
la-113	inhumation	115	75	15	NNW-SSE		single														
la-114	inhumation	100	49	40	NW-SE		single	1	Late LBK	2	1	2		1							
la-115	inhumation	151	54	28	SW-NE		single														
la-116	inhumation	140	73	30	NE-SW		single		Middle - Late LBK	3	1	1	2	1							
la-117	inhumation	98	40	14	NE-SW		single														
la-118	inhumation	132	64	58	NE-SW		single			2			2	2					1	basalt	
la-119	inhumation	115	65	31	SW-NE		single		Late LBK	3	2	3		1							
la-120	inhumation	137	54	35	NE-SW		single		Final LBK	2		2		1							

Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Strike-a-light	Charcoal	Calcined bone	Number grave goods	Number grave categories	remarks
											1		1	1	
													2	1	
				1			5						6	2	
													3	1	
											1		0	0	
											1		1	1	
						1						calcined bone	1	1	
													2	2	
													0	0	
													2	1	
													1	1	
5.8				1			3				1		6	3	
													3	2	
								1			1	calcined bone	7	2	
													0	0	
													2	1	
													1	1	
											1		0	0	
						1					1		1	1	
													2	1	
													0	0	
													3	1	
													0	0	
10.3	1						3						6	3	
													3	1	
											1		2	1	


Appendix VIII Inventory list of the Jüchen-Holz burial ground

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Orientation head	Nr burials	Preservation	Pathologica	Date	Nr vessels	Complete vessel	Decorated	Undecorated
007-10	inhumation				N-E		single	none						
007-11	inhumation				NW-SE		single	none			1	1		
007-12	inhumation				NNW-SSE		single	none						
007-13	inhumation				NW-SE		single	none						
007-15	inhumation				NW-SE		single	none						
007-16	inhumation				NW-SE		single	none			1			
007-19	inhumation				NW-SE		single	none						
007-20	inhumation				NW-SE		single	none			2			
007-21	cremation						single	calcified bone fragments						
007-22	inhumation				NW-SE		single	none						
007-23	inhumation				E-W		single	none						
007-25	inhumation				NNW-SSE		single	none						
007-26	inhumation				NNW-SSE		single	none						
007-27	inhumation						single	none			1	1		
007-28	inhumation				NNW-SSE		single	none						
007-29	inhumation						single	none						
007-30	inhumation				E-W		single	none			1			
007-33	inhumation				NW-SE		single	none						
007-34	inhumation				WNW-ESE		single	none			2			1
007-35	inhumation				NW-SE		single	none			1			
007-36	inhumation				NNW-SSE		single	none			1	1		
007-37	inhumation				WNW-ESE		single	none						
007-5	inhumation				WNW-ESE		single	none			4			
007-7	inhumation				WNW-ESE		single	none						
007-8	inhumation				NW-SE		single	none						
007-9	inhumation				WNW-ESE		single	none			2			
037-11	inhumation				NW-SE		single	none			2	1		
037-12	inhumation				NW-SE		single	none			1	1		
037-13	inhumation						single	none			2			
037-14	inhumation				NNW-SSE		single	none						
037-15	inhumation				NNW-SSE		single	none						
037-16	inhumation				NNW-SSE		single	none						
037-17	inhumation				NNW-SSE		single	none			1	1		
037-18	inhumation				NNW-SSE		single	none						
037-19	inhumation				NW-SE		single	none			1	1		
037-20	inhumation				NNW-SSE		single	calcified bone fragments			3			
037-21	inhumation				NW-SE		single	none						
037-23	inhumation				NW-SE		single	none						
037-24	inhumation				NW-SE		single	none			1			
037-25	inhumation				NW-SE		single	none			4	2		
037-26	inhumation				NE-SW		single	none						
037-27	inhumation						single	none			1	1		
037-28	inhumation				NW-SE		single	none			1	1		
037-31	inhumation						single	calcified bone fragments			1	1		
037-35	inhumation						single	none			2			
037-36	inhumation				NNW-SSE		single	none						
037-37	inhumation				NW-SE		single	none						
037-39	inhumation				NNW-SSE		single	none						

	Sherds	Animal bone	Grinding stone	Stone various	Ochre	Adze	Adze raw material	Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Fire Lighter	Charcoal	Calcined bone	Number grave goods	Number grave categories	Remarks	
																					0	0		
																					1	1		
																				1	0	0		
																					0	0		
	1																				1	1		
																					0	0		
	3																				2	1		
						1	amphibolite														1	0	0	
																					0	0		
						1	Quarzit							1						1	2	2		
																					0	0		
																					1	1		
																					0	0		
	1																			1	0	0		
																					1	1		
	2																				2	1		
	2																			1	1	1		
																1					2	2		
																					0	0		
	8					1	amphibolite							2	1						8	3		
																					0	0		
																				1	0	0		
	2																				2	1		
	2				1																3	2	haematite perforated	
																					1	1		
	2																				2	1		
																					0	0		
																					0	0		
															1						1	1		
			1		1	1	amphibolite							1						1	6	5		
						3	amphibolite							1							4	2		
						1	basalt														2	2		
	5																				1	3	1	
																					0	0		
																					0	0		
																					1	1		
	2																				4	1		
																					0	0		
																					1	1		
																				1	1	1		
						1	basalt					1		4	14	1	2			1	23	3		
	1																				2	1		
																					0	0		
																					0	0		
																					0	0		

Grave nr	Grave type	Length (cm)	Width (cm)	Depth	Orientation (degrees)	Orientation head	Nr burials	Preservation	Pathologica	Date	Nr vessels	Complete vessel	Decorated	Undecorated
037-41	inhumation				WNW-ESE		single	none			1			
037-42	inhumation				NW-SE		single	none			1			
037-43	inhumation				E-W		single	none			1	1		
037-44	inhumation				WNW-ESE		single	none						
037-45	inhumation						single	calcified bone fragments			3	1		
037-46	inhumation						single	none			3	1		
037-47	inhumation				NW-SE		single	calcified bone fragments			5			
037-48	inhumation				WNW-ESE		single	none						
037-49	inhumation				WNW-ESE		single	none			1			
037-51	inhumation						single	none			1			
037-52	inhumation				NW-SE		single	none			2			
037-54	inhumation				NW-SE		single	none			2	2		
037-55	inhumation				NW-SE		single	none						
037-56	inhumation				NW-SE		single	none			1			
037-57	inhumation				WNW-ESE		single	none						

	Sherds	Animal bone	Grinding stone	Stone various	Ochre	Adze	Adze raw material	Adze length	Adze type I	Adze type II	Adze type III	Set of same artifacts	Scraper	Blade	Arrow head	Flake or various	Core	Fire Lighter	Charcoal	Calined bone	Number grave goods	Number grave categories	Remarks
					2	1	basalt							3		1					8	4	
	1																				1	1	
					1	1	basalt														3	3	
																					0	0	
	3				3															1	6	2	
	3					1	amphibolite							2							6	3	
	3					1	amphibolite								1	2					9	3	
																					0	0	
																					1	1	
	1																				1	1	
	1																				2	1	
																					2	1	
																			1		0	0	
																					1	1	
																					0	0	



The Early Neolithic burial ground of Elsloo is the oldest burial ground in the Netherlands (5250-4950 cal BC) and belonged to the Linear Bandkeramik Culture (LBK). It was excavated by the Cultural Heritage Agency of the Netherlands and Leiden University in 1959 and 1966. The burial ground consists of 63 inhumation graves and 50 cremation graves of which 36 are unambiguously identified as such, resulting in a total of 97 and potentially 113 graves. The initial analysis of the burial ground of Elsloo has formed an important basis for current knowledge on colonisation, hereditary succession, burial tradition, and the origin of LBK communities in the south of the Netherlands and beyond. Now, after 60 years, the burial ground is subjected to additional and science-based research within the framework of the Knowledge for Archaeology program of the Cultural Heritage Agency of the Netherlands. This new research has further underlined and demonstrated the existence of patterning that does not easily relate to classical interpretations of prehistoric burial customs along lines of gender and age.

This scientific report is intended for archaeologists, as well as for other professionals and amateur enthusiasts involved in archaeology.

The Cultural Heritage Agency provides knowledge and advice to give the future a past.