Daniel Groß · Harald Lübke · John Meadows · Detlef Jantzen (eds.)

Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe



Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum

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Band 10

Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum aus dem Museum für Archäologie Schloss Gottorf und dem Zentrum für Baltische und Skandinavische Archäologie in der Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorf Band 10

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Vorwort der Herausgeber

Die Schriftenreihe "Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein" wurde von dem ursprünglichen Herausgeber Jürgen Hoika vor mittlerweile 25 Jahren im Jahre 1994 begründet, um am damaligen Archäologischen Landesmuseum Schleswig (ALM) und heutigem Museum für Archäologie Schloss Gottorf (MfA) ein Publikationsorgan für die Veröffentlichung von Forschungsergebnissen zur Steinzeit Schleswig-Holsteins zu schaffen. Dabei sollte es sich zum einen um Sammelwerke mit Beiträgen von vorzugsweise auf Schloss Gottorf veranstalteten Symposien, Workshops und Tagungen mit steinzeitlicher Thematik und zum anderen um zumeist in Dissertationen zusammengestellte ausführliche Materialvorlagen handeln. Entsprechend enthielt der 1994 vorgelegte erste Band der Reihe die Beiträge zum 1. Internationalen Trichterbechersymposium, welches, von Jürgen Hoika gemeinsam mit Jutta Meurers-Balke initiiert, 1984 am Archäologischen Landesmuseum in Schleswig stattgefunden hatte. In der Folge wurden dann aber beginnend mit den Arbeiten der beiden heutigen Herausgeber nunmehr acht überwiegend am Institut für Ur- und Frühgeschichte der Christian-Albrechts-Universität zu Kiel fertiggestellte Dissertationen veröffentlicht, die ganz wesentlich mit der wissenschaftlichen Vorlage und Auswertung von Forschungsgrabungen in Schleswig-Holstein und - seit der Beteiligung des Zentrums für Baltische und Skandinavische Archäologie an der Herausgeberschaft – aus dem gesamten Ostseeraum befasst sind.

Deshalb ist es eine besondere Freude für die Herausgeber, mit dem vorliegenden Band 10 "Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe" der Schriftenreihe "Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum" wiederum einen Sammelband mit den Beiträgen eines Workshops vorlegen zu können, der vom 14. bis 16. März 2016 auf Schloss Gottorf stattgefunden hat. Dabei handelt es sich um den Abschlussworkshop des von der Deutschen Forschungsgemeinschaft geförderten Projektes "Neubewertung von Chronologie und Stratigraphie des frühholozänen Fundplatzes Hohen Viecheln (Mecklenburg-Vorpommern) unter besonderer Berücksichtigung der diagnostischen Knochenartefakte" (DFG-Projektnummer 271652103) unter Leitung von Daniel Groß, Harald Lübke, John Meadows (alle ZBSA) und Detlef Jantzen (Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern; Landesarchäologie). Entsprechend enthält dieser Band neben dem Abschlussbericht des Forschungsprojektes insgesamt 17 Beiträge der eingeladenen Workshop-Teilnehmer, die entweder ergänzende Studien zum Fundplatz Hohen Viecheln enthalten oder sich grundsätzlich mit verwandten Themen zur Erforschung des frühholozänen Mesolithikums im nördlichen Europa befassen.

Alle Beiträge wurden nach internationalem Standard von jeweils zwei anonymen Gutachtern in einem Peer-review-Verfahren bewertet und danach den Autoren zur erneuten Überarbeitung übergeben, bevor die abschließende redaktionelle Bearbeitung der Manuskripte erfolgte. Die Textredaktion für alle Beiträge wurde von Gundula Lidke durchgeführt, Jana Elisa Freigang und Jorna Titel leisteten dabei unterstützende Arbeiten. Das Layout übernahm Daniel Groß, Titelbild und Umschlag entwarf Jürgen Schüller. Die meisten Karten und Zeichnungen wurden von den Autoren selbst bereitgestellt. In einzelnen Fällen erfolgte eine Überarbeitung durch Daniel Groß. Allen sei dafür an dieser Stelle herzlich gedankt.

Neu im Rahmen der Schriftenreihe ist, dass die Beiträge unmittelbar nach Fertigstellung und Freigabe der Autoren in einem "online-first"-Verfahren auf der Homepage des Verlages im Open Access zum freien Download bereitgestellt wurden. Für die Umsetzung dieser Forderung der Herausgeber danken wir dem Wachholtz Verlag, insbesondere Herrn Henner Wachholtz, sehr. Besonderer Dank gilt dem Vorstand des Zentrums für Baltische und Skandinavische Archäologie Schleswig, besonders dem Direktor, Claus von Carnap-Bornheim, und der Forschungsleiterin, Berit Valentin Eriksen, die die Veröffentlichung dieses Bandes durch die Bereitstellung der erforderlichen Mittel für den Druck der Arbeit maßgeblich unterstützten.

Sönke Hartz und Harald Lübke Schleswig, im Oktober 2019

Editors' Preface

The series 'Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein' was founded by its first editor, Jürgen Hoika, in 1994, 25 years ago, in order to establish a possibilty to publish Stone Age research results from Schleswig-Holstein at the then Archaeological State Museum (Archäologisches Landesmuseum [ALM]), today's Museum for Archaeology (Museum für Archäologie, Schloss Gottorf [MfA]). Publications should, on the one hand, reflect proceedings of symposia, conferences and workshops with Stone Age topics primarily held at Gottorf Castle, on the other hand, dissertations presenting comprehensive material. According to that, the first volume, published in 1994, contained the contributions to the 1st International Funnelbeaker Symposium, which, initiated by Jürgen Hoika and Jutta Meurers-Balke, had taken place at the Archaeological State Museum in 1984. Following that, eight dissertations, mainly accomplished at the Institute for Pre- and early History at the Christian-Abrechts-University Kiel, were published, starting with those by today's editors. All these volumes contributed substantially to the scientific presentation and analysis of excavation materials from Schleswig-Holstein and – since 2012, when the Centre for Baltic and Scandinavian Archaeology (ZBSA) also became involved in editig the series – the whole of the Baltic Sea area.

Therefore the editors are especially happy to once more present conference proceedings with volume 10 of the series 'Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum': 'Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe' collects contributions to a workshop held at Gottorf Castle on 14th–16th March, 2016. This represented the closing workshop of the DFG-funded project 'Neubewertung von Chronologie und Stratigraphie des frühholozänen Fundplatzes Hohen Viecheln (Mecklenburg-Vorpommern) unter besonderer Berücksichtigung der diagnostischen Knochenartefakte' (DFG project no. 271652103), directed by Daniel Groß, Harald Lübke, John Meadows (all ZBSA) und Detlef Jantzen (Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern; Landesarchäologie). In addition to the project's final report the volume contains 17 papers by researchers invited to participate in the workshop, representing either additional studies on material from the site Hohen Viecheln or related topics in research of the early Holocene Mesolithic in northern Europe.

Each paper was, according to international standards, peer-reviewed by two anonymous reviewers and then returned to the author for reworking before final editorial work. Copy-editing was performed by Gundula Lide, supported by Jana Elisa Freigang and Jorna Titel. Daniel Groß realised the layout; cover and cover illustration were designed by Jürgen Schüller. Most maps and figures were provided by the authors themselves, some were reworked by Daniel Groß. We express our sincere thanks to all involved!

It is a novelty for the series to have papers published online first immediately after completion and authors' approval in open access for free download on the website of Wachholtz Publishers. We would like to thank Henner Wachholtz, Wachholtz Publishers, very much for making this possible!

Special thanks are due to the board of the Centre for Baltic and Scandinavian Archaeology (ZBSA) Schleswig, particularly to the director, Claus von Carnap-Bornheim, and the head-of-research, Berit Valentin Eriksen, who substantially supported this publication by providing financial means for its printing.

Sönke Hartz and Harald Lübke Schleswig, October 2019

Grusswort des Landesarchäologen von Mecklenburg-Vorpommern

Mit seinen großflächigen, oft noch weitgehend unberührten Niederungen und Binnengewässern bietet Mecklenburg-Vorpommern beste Voraussetzungen, um die gewässeraffinen Kulturen des Mesolithikums zu erforschen. Die Überreste ihrer Wohn- und Jagdstationen sind im feuchten Milieu hervorragend erhalten geblieben. Störungen durch Torfabbau, Begradigung von Gewässern oder Meliorationsmaßnahmen blieben im Wesentlichen auf das 19. und 20. Jahrhundert beschränkt. Sie haben zwar einen gewissen Schaden angerichtet, aber, weil sie zumindest im 20. Jahrhundert oft von aufmerksamen ehrenamtlichen Bodendenkmalpflegern beobachtet wurden, überhaupt erst zur Entdeckung vieler Fundstellen geführt.

Welche Fundstellen eingehender erforscht werden und damit das Bild einer Epoche besonders prägen, unterliegt oft dem Zufall. Hohen Viecheln rückte in den Fokus der Forschung, weil die Entdeckung mehrerer Knochenharpunen zu Beginn der 1950er Jahre auf eine günstige Konstellation traf: 1953 war aus der Vorgeschichtlichen Abteilung des Staatlichen Museums das Museum für Ur- und Frühgeschichte Schwerin entstanden, das auch für die Bodendenkmalpflege in den drei Nordbezirken der DDR zuständig war. Der ehrgeizige Direktor des Museums, Ewald Schuldt, hatte sich durch Ausgrabungen auf der Burgwallinsel Teterow einen Namen gemacht und war nun auf der Suche nach einem geeigneten Fundplatz für ein eigenes Forschungsprojekt.

Wegen der sehr guten Erhaltungsbedingungen versprach Hohen Viecheln, zusätzlich zu dem bekannten Spektrum an Steinartefakten auch ein umfangreiches Geräteinventar aus organischen Materialien bergen zu können. Die ebenfalls ausgezeichnet erhaltenen Tierknochen sollten Aufschluss über das Jagdwild geben. Hinzu kam die Aussicht, aus der Stratigraphie neue Erkenntnisse zur Chronologie und zu den Veränderungen der naturräumlichen Verhältnisse zu gewinnen. Diese Erwartungen wurden nicht enttäuscht: Hohen Viecheln entwickelte sich zu einem der bedeutendsten Plätze mesolithischer Forschung, gleichrangig mit Duvensee, und inspirierte weitere Forschungen, u. a. in Friesack und Rothenklempenow.

Hohen Viecheln gehört nach wie vor zu den legendären archäologischen Fundstellen in Mecklenburg-Vorpommern, auch wenn es aus heutiger Sicht nicht mehr so einzigartig dasteht. Dank einer intensiv betriebenen ehrenamtlichen Bodendenkmalpflege ist die Zahl der bekannten mesolithischen Fundplätze im Land deutlich gestiegen, von denen vermutlich mehrere ein ähnliches Potenzial wie Hohen Viecheln aufweisen. Verändert haben sich aber nicht nur die Verbreitungskarten, sondern auch die Möglichkeiten archäologischer Forschung. Es drängte sich deshalb geradezu auf, Hohen Viecheln noch einmal unter die Lupe zu nehmen, bisherige Erkenntnisse kritisch zu prüfen und neue hinzuzufügen. Der DFG und allen Projektpartnern gebührt herzlicher Dank dafür, dass sie das ermöglicht haben.

So wird Hohen Viecheln auch weiterhin als exemplarischer Fundplatz für das Mesolithikum in der norddeutschen Tiefebene stehen – eine hochinteressante Umbruchszeit, in der Klimawandel, Anstieg des Meeresspiegels und andere Veränderungen eine ständige Anpassung der Menschen an ihre Umwelt erzwangen.

Detlef Jantzen Schwerin, im September 2019

Welcome address by the State Archaeologist of Mecklenburg-Western Pomerania

Mecklenburg-Western Pomerania with its large, often unspoiled lowlands and inland waters offers outstanding possibilities for research into the water-oriented cultural groups of the Mesolithic. Remains of their settlement and hunting sites are often well preserved in wet conditions. Disturbances by peat extraction, straightening of watercourses or melioration measures mainly took place during the 19th and 20th centuries. They did some damage, but – as at least during the 20th century they were often supervised by vigilant amateur archaeologists – many sites were discovered this way in the first place.

But often it is left to chance which sites can be thoroughly investigated to largely characterise the picture of a whole timespan. Hohen Viecheln became the focal point of research interest under favourable circumstances: the discovery of several bone points there at the beginning of the 1950s fell together with the establishment of the Museum of Pre- and Early History in Schwerin (out of the former Department of Prehistory at the State Museum) which was also responsible for the preservation and care of field monuments in the three northern districts of the GDR.

The ambitious museum director, Ewald Schuldt, had already gained reputation through his excavations of the Slavic ring wall island near Teterow, and he was looking for a suitable site for another research project. Due to the very good preservation conditions at the site, Hohen Viecheln promised, in addition to the spectrum of artefacts known from other places, a substantial organic inventory. The wellpreserved animal bones were expected to shed light on game species and hunting strategies. Furthermore, important results were expected concerning chronology and environmental changes. These hopes were not disappointed: Hohen Viecheln has become, alongside Duvensee, one of the most important sites for Mesolithic research, and research there has inspired further excavations, e.g. at Friesack or Rothenklempenow.

Hohen Viecheln is still one of the legendary archaeological sites in Mecklenburg-Western Pomerania, even if it no longer stands alone. Thanks to intensive voluntary archaeological surveys the number of Mesolithic sites has increased significantly; and several of these may have a potential similar to that of Hohen Viecheln. But not only distribution maps have changed during the last years, but also the possibilities of archaeological research. Therefore, the idea to have another look at Hohen Viecheln, to challenge old results and add new ones, suggested itself. I want to thank the German Research Foundation (DFG) and all project contributors for having made this possible. In this way, Hohen Viecheln will continue to be an exemplary North German Lowland site of the Mesolithic – a highly interesting time when climate change, sea-level rise and other changes enforced constant human adaptions to the environment.

Detlef Jantzen Schwerin, September 2019

Acknowledgements

This volume of the series 'Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum' represents the proceedings of a workshop held at the Centre for Baltic and Scandinavian Archaeology (ZBSA) in Schleswig in March 2016. It is a part of the editors' project 'Neubewertung von Chronologie und Stratigraphie des frühholozänen Fundplatzes Hohen Viecheln (Mecklenburg-Vorpommern) unter besonderer Berücksichtigung der diagnostischen Knochenartefakte', funded by the German Research Foundation (DFG) under the project number 271652103.

While the project was dealing with the re-evaluation of the site Hohen Viecheln 1 for chronological and stratigraphical aspects, this volume does not only cover its final publication but comprises additional modern studies about the site by different scholars. These are furthermore embedded into the international research landscape by adjacent studies covering an area from modern day Britain in the west to the Urals in the east.

All contributions are representing the authors' point of view and respective terminologies. Therefore differences in the vocabulary may appear to the careful reader. While a homogenisation of terms and data recording is relevant for comparative studies, it was beyond the scope and means of this project. As a consequence, terminologies may differ between the contributions, as exemplified by the terms 'uniserial' and 'uni-lateral' bone points: both are characterised by barbs or notches on one lateral side. At the British site Star Carr those have ever since been named uni-serial, whereas uni-lateral is a more common term in other parts of Europe.

We, as editors, would like to thank all contributors for being part of this volume and their interesting and high-quality articles; also we are grateful for the voluntary support of all anonymous peerreviewers and their help in improving the articles. Furthermore, we thank the German Research Foundation (DFG) for funding our research and the workshop as well as the Centre for Baltic and Scandinavian Archaeology represented by its director, Claus von Carnap-Bornheim, and the head-of-research, Berit Valentin Eriksen, for support of the project and its presentation in the current form. A tremendous help in the course of making this book was Gundula Lidke who was responsible for text editing, proofreading, and correspondence with the authors and publishers. Thank you very much! Further editorial support was provided by Jana Elisa Freigang, Jorna Titel, Matthias Bolte, Isabel Sonnenschein and Jürgen Schüller. The latter is also responsible for the cover drawing. Much help and support was provided by Peter Teichert-Köster with respect to handling the finds and accessing them in the depot of the Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern; Landesarchäologie in Schwerin. Close collaboration with Mathieu Boudin of the Royal Institute for Cultural Heritage, Brussels, improved our radiocarbon measurements and the analysis of the consolidant.

We thank all people, mentioned and unmentioned here, who were involved in this book and the different research projects, who helped by further pushing the boundaries of our understanding of the cultural remains and chronologies of the past.

Daniel Groß, Harald Lübke, John Meadows, Detlef Jantzen Schleswig, October 2019

EXCAVATIONS AT STAR CARR: PAST AND PRESENT

Barry Taylor, Nicky Milner and Chantal Conneller

Abstract

Star Carr is a world renowned site first excavated in the late 1940s by Grahame Clark. These excavations revealed organic remains which are incredibly rare, though there are some parallels with sites in Germany and Denmark. The evidence from Star Carr has been debated over the decades, but in 2004 new excavations commenced with the aim of answering some of the questions which had been posed about this important Mesolithic site. One of the alarming discoveries was that the site had deteriorated badly. However, some organic materials remained, though in a very fragile condition. Some of the most spectacular of these are large wooden platforms which had been constructed on what would have been the margins of the lake. In addition, 'house' structures were discovered for the first time on the dry land. With a scientific programme including Bayesian modelling and environmental sampling it has been possible for the first time to construct a picture of life in the Mesolithic at Star Carr through time (MILNER et al. 2018a; b).

1 Introduction

Star Carr is an Early Mesolithic site located on the shore of the palaeo-Lake Flixton, a large (and now infilled) lake. Excavations at the site by Grahame Clark from 1949–1951 recorded a large assemblage of faunal material, and bone and antler artefacts that had been preserved within the organic muds and peat that had formed at the edge of the lake (CLARK 1954). The interpretation of this material allowed Clark to write the first detailed account of life in the British Mesolithic, which revolutionised our understanding of the period and has shaped the way that subsequent generations of scholars have viewed it. However, in the past few decades there has been considerable debate over the interpretation of the site (e.g. ANDRE-SEN et al. 1981; CAULFIELD 1978; CONNELLER 2000; JACOBI 1978; LEGGE/ROWLEY-CONWY 1988; PITTS 1979; PRICE 1982) as well as concerns over the deteriorating levels of organic preservation (BOREHAM et al. 2011a; b; HIGH et al. 2016; MILNER 2007; MILNER et al. 2011a; b). As a result new research has been carried out at Star Carr which has led to a fundamentally new understanding of the site.

2 Earlier excavations

Star Carr and the palaeo-Lake Flixton are located in the eastern Vale of Pickering (North Yorkshire, UK), approximately 8 km from the modern North Sea coast (Fig. 1). The area was glaciated during the Late Glacial Maximum, resulting in a complex undulating landscape of hollows (kettle holes) and ridges of sand and gravel (the remains of kames and eskers). As water drained into the hollows it created a large body of water



Fig. 1. The location of Star Carr and the palaeo-Lake Flixton.

(the palaeo-Lake Flixton), with the sand and gravel ridges becoming a series of islands and peninsulas. Wetland vegetation colonised the lake at the start of the Late Glacial Interstadial, leading to the formation of calcareous sediments (marl) within the deeper hollows. From the start of the Holocene the lake began to infill through a process of hydroseral succession as organic sediments (detrital muds and peats) began to accumulate. At around the same time, peat forming wetlands expanded over the surrounding dryground, burying areas of the Mesolithic landscape. By 5500 cal. BC the lake had almost entirely disappeared, leaving an extensive wetland landscape of reed swamp, fen and carr, interspersed with streams and pools of open water.

Evidence for Mesolithic activity around Lake Flixton was first recorded by John Moore, a local archaeologist who had been carrying out surveys of the area in the late 1940s. Moore identified ten prehistoric sites around the edge of the former lake and on two small islands, several of which could be dated to the Early Mesolithic on typological grounds (MOORE 1950). In some instances these sites were sealed beneath the peat that had formed within and around the edges of the lake, preserving organic materials such as bone and antler.

Moore made his discoveries known to Grahame Clark, a lecturer at the University of Cambridge who had undertaken the first surveys of the British Mesolithic (CLARK 1932). Clark was well aware of the significance of Moore's discoveries. His previous work had highlighted the poverty of the archaeological evidence from mainland Britain, which at the time consisted of poorly contextualised lithic scatters and isolated finds of bone and antler artefacts. In contrast, excavations at wetland sites on the North European mainland had produced well preserved assemblages of faunal material and organic material culture that provided a far richer record of Mesolithic life (e.g. BROHOLM 1924; FRIIS JOHANSEN 1919; SCHNEIDER 1932; SCHWANTES et al. 1925; SCHWANTES 1928). Moreover, palaeo-environmental data collected from deposits associated with the archaeological material was being used to place these sites within a broader chronological framework by relating them to the known sequence of postglacial plant succession (e.g. NILSSON 1947). In Britain, this method had already been used to demonstrate the contemporaneity of a barbed point recovered from the North Sea with early Maglemosian sites in Northern Europe

Fig. 2. Clark's excavations at Star Carr (Image courtesy of Scarborough Archaeological and Historical Society, after MILNER et al. 2018a, fig. 2.2).

(GODWIN/GODWIN 1933), demonstrating its potential to place mainland British sites into a wider European chronology.

Clark identified Star Carr as a site where there was good potential for the survival of organic material of Early Mesolithic date. Clark worked at Star Carr between 1949 and 1951, excavating a series of trenches (referred to as 'Cuttings') through the deposits that had formed at the edge of the lake. Within these deposits Clark recorded a large assemblage of bone and antler artefacts, including barbed antler projectile points, bone scraping tools, bodkins, and antler frontlets, along with animal bone, antler working waste and worked flint (Fig. 2). This material was associated with a layer of unworked branches which Clark interpreted as



a deliberately constructed platform (CLARK 1954).

Interpreting the site, Clark argued that the artefacts and animal bone represented the remains of *in situ* activities undertaken on the platform, which palaeo-environmental analysis indicated had been laid down in an area of reed swamp at the edge of the lake (CLARK 1954). Based on the range of different activities that were represented by the artefacts, he argued that this had been a residential site inhabited by a small number of family groups (CLARK 1954). The stratigraphic relationship of some of the artefacts and typological differences in the barbed points indicated that it had been revisited on more than one occasion. The faunal assemblage and the large numbers of projectile points indicated an economy based on the hunting of large mammals, which Clark suggested would have necessitated a degree of seasonal mobility. It was suggested that occupation had taken place in winter and spring, given the presence of shed red deer antler. This point was developed several decades later when he argued that the inhabitants of the site had moved seasonally onto the uplands of the surrounding Yorkshire Moors in the summer months as they followed herds of migrating red deer (CLARK 1972).

Whilst Clark's work at Star Carr has had a profound effect upon the way the Mesolithic was studied in Britain, his interpretations of the site have not gone unchallenged. To begin with, a number of researchers have argued that the area that Clark had investigated would have been underwater at the time the site was occupied, and that the faunal assemblage and material culture was deposited as waste from



Fig. 3. Areas of Early Mesolithic activity around the palaeo-Lake Flixton.



activity areas on the adjacent dry ground (PRICE 1982). At the same time, reassessments of the faunal data led to new interpretations as to the season of occupation (LEGGE/ROWLEY-CONWY 1988), the economic importance of particular species (CAULFIELD 1978; JACOBI 1978), and the function of the site itself (CAULFIELD 1978; JACOBI 1978; LEGGE/ROWLEY-CONWY 1988; PITTS 1979; PRICE 1982).

New excavations at Star Carr also began to show that the nature of activity at the site may have been different

Fig. 4. N. Milner (in trench), B. Taylor (in trench) and M. Taylor the wood specialist (on side of the trench) excavating the wetland deposits in 2007. The cut of Clark's trench runs down the centre of the excavated area. to that envisaged by Clark. In 1985, a single trench was excavated 25 m further along the lake shore, in which part of a large platform made of deliberately split timbers was recorded (Mellars/Dark 1998). This work, along with fieldwalking and test-pitting in the early 1990s, and a new programme of palaeo-environmental analysis and radiocarbon dating, showed that activity extended far beyond the area investigated by Clark, and that the site had been revisited over a period of several centuries (Mellars/Dark 1998).

Moreover, large scale programmes of excavation and survey in the surrounding area began to show that Star Carr was very different to other sites in the area (CONNELLER/SCHADLA-HALL 2003; MIL-NER et al. 2011a; b). Whilst 14 Early Mesolithic sites were recorded around the lake (Fig. 3), there was no indication of comparable assemblage of faunal material, objects made of bone or antler, or large timber structures within the wetlands (CONNELLER 2000; CONNELLER/SCHADLA-HALL 2003; LANE/ SCHADLA-HALL forthcoming; SCHADLA-HALL 1987; 1988; 1989). This led some to suggest that Star Carr was unique in this landscape, and had been a special place where the remains of animals, and objects made of them, were deposited (CHATTERTON 2003; CONNELLER 2000; 2004; CONNELLER/SCHADLA-HALL 2003; POLLARD 2000).

3 The 2004–2015 excavations

By the early 2000s it had become obvious that the existing archaeological data from Star Carr was insufficient to resolve the debates surrounding its interpretation, and that a much larger excavation was necessary if we were to properly understand the site. To this end, a new programme of work was undertaken between 2004 and 2015 (see also MILNER et al. 2018a; b).

The first phase of the project took place between 2004 and 2010, and aimed to establish the nature and extent of any surviving archaeology. An auger survey was carried out to map the buried Mesolithic land surface and to record the



Fig. 5. Dryland excavation in 2008. Note plough damage in the trench in the form of dark straight lines (photograph taken from a kite).

sequence of wetland deposits that had formed across it. A series of trenches were then excavated through the sediments that had formed at the lake edge, and two earlier trenches (VP85A and Clark's Cutting II) were re-excavated (Fig. 4). This work was complemented by a programme of insect and plant macrofossil analysis that established the nature of the local environment and provided the first accurate estimate of the level of the lake and the position of the Mesolithic shoreline. The area that would have been dry ground during the Mesolithic was initially investigated by fieldwalking and the excavation of a series of small trial trenches, before larger, open area excavations were carried out in 2007 and 2008 (Fig. 5).



Fig. 6. The post-built structure on the dry ground recorded in 2008.



Fig. 7. The site during the final year of the excavation (2015). Clark's trenches are situated beneath and to the left of the white tent.

At the same time a new programme of scientific dating was undertaken, which – with the application of Bayesian modelling – aimed to provide a more precise chronology for the occupation of the site.

This first phase of work provided the first indications of the full scale of Mesolithic activity at Star Carr. The work on the dry ground showed that occupation was far more extensive than had been previously thought, with scatters of worked flint recorded across an area of 19,500 m². It also provided the first architectural evidence from the site, with the discovery of a circular postbuilt structure just above the approximate extent of the Early Mesolithic shore line, and just 35 m from the area investigated by Clark (Fig. 6).

Activity within the wetlands was also more extensive, with small quantities of bone, antler and worked flint present along a 40 m stretch of the lake shore. Moreover, part of a second timber platform, again made of deliberately split timbers, was recorded during the 2007 excavations, running into the area investigated by Clark. Unfortunately, this work also showed that the levels of orga-

nic preservation were very poor; the few pieces of antler and bone found were severely desiccated and in some cases had turned to jelly. Scientific analysis showed that this had been brought about by a lowering of the water-table caused through drainage, and subsequent changes to the soil chemistry causing a massive increase in acidity (BOREHAM et al. 2011a; b; HIGH et al. 2016; MILNER 2007; MILNER et al. 2011a).

Given the deteriorating levels of preservation there was a clear need for a more complete excavation of the site. This was undertaken between 2013 and 2015, and resulted in the full excavation of 60 m of the lake shoreline and the adjacent wetland and dryland areas, including the parts of the site originally investigated by Clark (Fig. 7). An integral feature of this work was the application of a suite of analytical techniques to maximise the amount of information that could be recorded from the site.



Fig. 8. A plan of the trench area. The trench excavated by Clark is shown by dotted lines at the left hand side of the trench. The thin, long trench between areas 7 and 8 was a trench (VP85A) excavated in the 1980s (MELLARS/DARK 1998). The key discoveries of the recent excavations: 1 – western dryland structure; 2 – central dryland structure(s); 3 – eastern dryland structure; 4 – Clark's baulk; 5 – western platform; 6 – detrital wood scatter; 7 – central platform; 8 – eastern platform.

These included an extensive programme of refitting that was carried out to unpick the specific episodes of activity represented by the flint assemblage, and residue and microwear analysis on lithic, osseous and wooden artefacts to establish how they had been used. Zooarchaeology by Mass Spectrometry (ZooMs) was used to identify the species represented in the more poorly preserved faunal material, geochemical studies were carried out to identify potential activity areas on the dry ground, and plant macrofossil analysis was used to establish the depositional environment context of different assemblages of material within the wetlands. The programme of radiocarbon dating was also extended to include the new excavations, providing a greater degree of precision to the chronological record for the site (MILNER et al. 2018a; b).

The results of this work demonstrated the true extent of the archaeological material at the site, and the scale and intensity of Mesolithic activity. Further post-built structures were recorded on the dry ground, associated with dense concentrations of worked flint and assemblages of animal bone, whilst four large wooden structures were recorded within the lake edge deposits (Fig. 8). The first, and earliest, was the detrital wood scatter, a large spread of worked and unmodified wood associated with assemblages of animal bone, antler, worked flint and a number of artefacts made of antler and wood (Fig. 9). Running parallel to this (though slightly later in date) was the first of three substantial timber trackways or platforms. This trackway had been observed and partially excavated in 1985, but it was far more extensive than the earlier excavations had suggested (Fig. 10). The two further timber platforms were recorded to the east and west, running almost parallel with the lake shore. But perhaps the most spectacular discovery came during the excavation of a previously un-investigated area between two of Clark's trenches (Fig. 11). This baulk gave us a glimpse of the dense concentration of animal bone, worked antler, worked flint and osseous artefacts that Clark had observed, and which had formed the basis of his interpretations of the site.

4 Life at Star Carr

Drawing this data together we have been able to develop a new narrative for Star Carr. By the time Mesolithic groups first arrived at the site a dense swamp of reeds, sedges, and aquatic plants had formed in the shallow waters at the edge of the lake, whilst birch, willow and aspen were growing along the shore, and birch woodland was established across areas of the surrounding terrestrial landscape.

The first phase of occupation began around 9300 cal. BC and spanned approximately 300 years. During this period at least one (and potentially more) post-built structures were constructed on the dry ground by groups who were undertaking a range of economic and craft activities that included the hunting of a large range of animals, and the working of antler, wood, plants and hides. These activities were carried out at relatively small scales, and focused on discrete areas of the site, but were repeated on subse-



Fig. 9. The detrital wood scatter – location 6 on Fig. 8 (after MILNER et al. 2018a, fig. 3.15).



Fig. 10. Excavation of the central wooden platform - location 7 on Fig. 8.

quent visits. During these visits people also deliberately deposited animal bones, and other materials and artefacts into standing water up to 18 m away from the lake shore, creating a large, dense deposit of material (the detrital wood scatter, see MILNER et al. 2018c).

The detrital wood scatter comprised over 1300 pieces of wood, including deliberately split timbers and roundwood, wood chips, and unmodified timber that formed a linear arrangement that extended 18 m from the shore. This had been laid down on successive occasions to stabilise the soft basal sands in order to access an area of deeper water where animal bones, antler, osseous artefacts and worked flint appear to have been purposefully deposited. The main concentration of animal bone was found towards the south of the scatter, and was focused around a gap in the wood. Here, articulated limbs and parts of the torsi of at least two red deer were deposited into water at least half a metre deep, along with two skulls (elk and red deer), and two red deer frontlets

Fig. 11. A small surviving area of Clark's excavation uncovered in 2015 (cut either side by earlier trenches) – location 4 on Fig. 8.

(MILNER et al. 2018c). From the arrangement of its limbs and torso at least one of the animals may have been deposited as a complete carcass, whilst other material, including the frontlets, and some barbed points were placed in the area around it. Smaller quantities of animal bone (again dominated by red deer), and antler (red deer and elk) were also recorded across the rest of the wood scatter. However, most of this material came from the limbs of animals and had been split and broken, probably to extract marrow or fat. Worked flint, particularly utilised blades with macroscopic edge damage, was also deposited in this area, along with several pieces of worked wood (including dowels and the end of a digging stick). The reasons behind such depositions are unknown, but they occur through time across the site and suggest a of persistence cul-



tural traditions which appear to have been passed down from generation to generation (MILNER et al. 2018c, 243).

During the time that this material was being deposited, at least one structure was built on the dry ground just above the water's edge. This consisted of an arrangement of postholes that had been dug around the edge of a shallow, oval pit. The eastern side of the structure had been truncated by earlier excavations, but its total extent would have been approximately 4 m long and 3 m wide. A second structure, indicated by a partial arc of postholes, lay a few metres to the north, and a spread of postholes and small pits lay between them, possibly the remains of smaller structural features such as drying racks for skins, fish or meat. These features are undated, though their spatial relationship with the first structure suggest a degree of contemporaneity.

Relatively small quantities of flint were found within the structure, possibly suggesting a short period of use. The material that was present included a small cluster of microliths, one of which had been utilised, and could reflect the maintenance and repair of a composite tool. The area around the structures

had been used for knapping and tool use, which included cutting plant materials, scraping hides, and working bone and antler, the latter fitting well with the deposits of worked antler recorded from the wetlands. Axe sharpening flakes were also recorded from the area, again corresponding with the large quantities of worked wood that had been deposited into the lake. In addition, a discrete area of wood-working was recorded 15 m further to the east, where small quantities of wood chips, timber debris, and split roundwood were recorded from the peat immediately adjacent to the lake edge. The material had accumulated throughout the period during which the detrital wood scatter was being deposited, and probably represents a discrete area at the lake shore where people were working wood.

From around 9000 cal. BC there was an increase in the scale and intensity of activity at Star Carr, marked by the construction of a series of large timber platforms within the wetlands and more extensive activity on the adjacent dry ground. At around the same time there was a change in the character of the local wetlands caused by the ongoing formation of organic sediments. These had been accumulating throughout the preceding centuries, causing conditions to become increasingly boggy and reducing the water depth at the site. By around 9000 cal. BC, the water was significantly shallower, and the area may only have been seasonally flooded. In response, new wetland plant species became established along the shore, whilst the beds of reeds and aquatic plants expanded further into the lake.

The three platforms were laid down directly onto the peat within this shallower, boggier environment. They were constructed consecutively, each going out of use before the next was built. The first and largest of these was the central platform. This consisted of three layers of wood, including deliberately split timbers and whole trees, and ran at an angle away from the shore into the lake. The full extent of the platform could not be determined as it ran beyond the extent of the excavation, however, it was at least 14 m long, and its construction must have been a considerable undertaking, involving 26 unmodified trees and 57 large split timbers, some over 5 m long. Unlike the detrital wood scatter, the platform was built in a single episode and exhibited far greater integrity in its construction, with each layer made up of parallel arrangements of timbers. The eastern and western platforms were both smaller, each consisting of a single layer of timber, and were aligned more closely with the shore. However, as with the central platform these were constructed in single events and consisted of parallel arrangements of split timbers and trees.

The platforms were probably constructed to enable access through the wetlands, or to provide a solid working surface for tasks carried out in this area, at a time when conditions were becoming increasingly boggy. The orientation of the central platform is consistent with a landing stage, or a trackway leading out to deeper water where boats could be hauled up. In contrast, the eastern and western platforms are more closely aligned with the edge of the dry ground, and may have been associated with tasks carried out at, or close to the shore.

Activities also intensified on the dry ground areas above the lake shore where at least two more postbuilt structures were constructed. The first of these lay at the eastern end of the site and consisted of an arrangement of posts around a central hollow, forming an oval shape with an external diameter of c. 4 m. Based on the alignment and shape of the post-holes this was built using relatively narrow wooden poles (perhaps slender trees), probably bent together to form a dome or conical structure, possibly with an internal set of posts to add additional support. An analysis of the sediments within the hollow suggests it was lined with organic material, possibly ferns or reeds, and similar material may have been used for the walls and roof. The second structure lay 30 m to the west of the site and consisted of a central arrangement of postholes, supporting a larger, circular or oval structure. From the dense concentrations of burnt flint associated with it, this structure may have been destroyed in a fire.

Both structures were associated with intense episodes of activity. Large quantities of flint were recorded from within the eastern structure, reflecting tasks such as for the manufacture of tools and the maintenance and repair of tool kits, whilst use-wear analysis includes evidence for the working of plant

materials and hides. Forty-two refitting sequences were identified within the structure, suggesting that much of the material resulted from tasks carried out *in situ*, though some debris seems also to have been cleared out of the structure. Relatively dense scatters of flint were also recorded in the immediate surroundings, which have been related to the use of the structure through refitting, and these again reflect an array of craft activities, tool use, and knapping. Faunal material from this area included the heavily processed remains of large mammals, whilst the presence of several fish bones and traces of use on two pieces of flint indicate the processing of fish in this part of the site.

The western structure lay within a dense midden of flint and bone, much of which was burnt. The flint assemblage included large quantities of flakes and blades, many of which had been utilised, as well as tools. Based on microwear analysis these had been used for a range of craft activities that involved the cutting of plant material and bone, the working of hides, and the drilling of stone. The spatial patterning of the flint suggests that it had built up over time from material that had been brought there from other parts of the site.

It was around the same time that the structures were in use (and just before the last of the three platforms was built) that the large assemblage of bone and antler artefacts recorded by Clark was deposited into the wetlands. The part of this assemblage that was recorded in 2015 consisted of a very dense concentration of animal bone, antler, worked wood and worked flint, as well as a range of bone and antler artefacts. These included barbed projectile points made of red deer antler, red deer antler frontlets, and a number of bone tools. Radiocarbon dating of artefacts and animal bones has shown that the assemblage was generated over a very short period of time, perhaps in a single event.

Whilst Clark argued that this material represented waste that accumulated in an area of habitation, the new excavations have shown that it formed through the deliberate deposition of material that had been brought together and then placed into the lake edge swamp. The environment in the area where the material was deposited was at least partially submerged at that time, there was no associated wooden platform, and the assemblage sank quickly into the underlying sediments. Moreover, parts of the assemblage were clearly not generated through casual, *ad hoc* disposal. None of the barbed points or axes possessed hafts or handles, which must have been removed prior to deposition, whilst the presence of intact barbed points, along with broken mid-sections, tips, and tangs suggests these (and potentially other artefacts) had been curated.

Other forms of deposition also occurred around this time. A complete dog carcass was deposited in a different part of the wetlands, a wild boar mandible and several large flint nodules were placed around the timbers of the western platform, a cache of flint was placed at the lake edge, possibly within a small pit, and animal bone and flint was gathered together and placed in a pit next to one of the structures. These acts of deposition occurred side by side with more prosaic tasks, such as the working of flint and antler, and the butchering of animals, and appear to have been bound up in the day-to-day practices of people's lives.

Throughout this phase of activity, organic sediments continued to form, gradually burying each of the platforms and the other materials within the wetlands. By around 8700 cal. BC the wetlands started to become increasingly terrestrialised, and fen plants and trees had begun to expand over the peat. In response, the nature of activity within the wetlands began to change as tasks that had previously been restricted to the dry ground began to expand into these areas. Flint knapping in particular was undertaken on parts of the fen, along with tasks involving tool use and the working of antler. However, by around 8500 cal. BC activity in both the wetland and dryland areas had ceased, and the site was abandoned.

5 Conclusion

The results of this work have fundamentally changed our understanding of Star Carr, and through this have begun to transform our view of society in the early centuries of the Mesolithic in Britain. Not only is the site larger than previously thought, but the scale and intensity of activity is far greater than traditionally assumed for this period. We can see this most clearly in the timber platforms, the building of each of which would have required the cooperative efforts of large groups of people. The number of animals represented in the faunal assemblage recorded by Clark also reflects periods of intensive activity involving large numbers of people, as does the dense midden of material recorded on the dry ground.

This intensity of activity also reflects a significant investment in this particular location, a point that stands at odds with the idea of a highly mobile population. In the first instance, this is reflected in the construction of successive timber platforms in the wetlands, and post-built structures on the dry ground. However, it is also apparent in the acts of deposition that were taking place, such as the deposition of parts of deer carcasses (possibly including an entire adult individual) in the detrital wood scatter, and the artefacts and animal bones recorded by Clark. What is more, there are aspects of these depositional practices that span generations, particularly the emphasis on the deposition of frontlets, barbed points and animal skulls. Taken together, the deposition of these objects represents repeated associations between particular materials and this specific place in the landscape over a period of several centuries (MILNER et al. 2018c).

We also gain a clearer view of the highly complex and varied nature of Early Mesolithic life. The analysis of the worked wood, antler and bone, and the use-wear and residue analysis carried out on the flint and other materials demonstrate a huge diversity in technical practice. The working of wood, for example, involved a range of different techniques, all involving different forms of skill, knowledge, and the utilisation of particular tools. This can also be seen in the way bone and antler were being worked, and (though here the evidence is sparser) in the technical practices associated with the collection and processing of herbaceous plants. Added to this are the array of different hunting strategies that would have been required in the predation of the different species of animals and fish recorded at the site, and the suite of different tools and techniques utilised in butchering the carcasses. At the same time, people were also undertaking a variety of depositional practices, placing artefacts and materials into the lake edge wetlands, and in at least one instance into a pit on the dry ground. If we assume that many of these activities were probably being undertaken at the same time, by people of different ages and genders, then we can start to appreciate the true scale and intensity of life at Star Carr.

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