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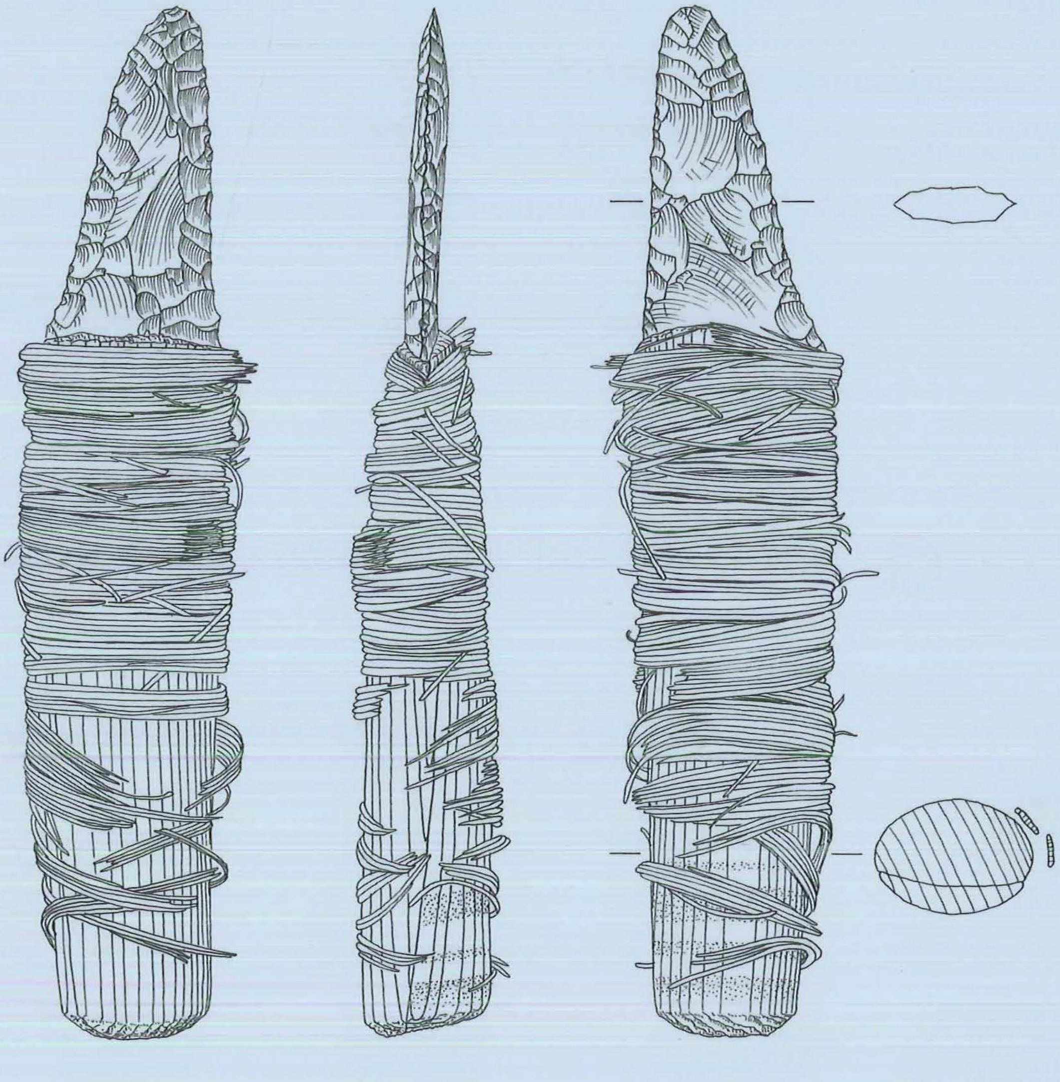
Studies of Saqqaq Material Culture in an Eastern Arctic Perspective



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MONOGRAPHS ON GREENLAND
Vol. *356*

MAN & SOCIETY
Vol. 45

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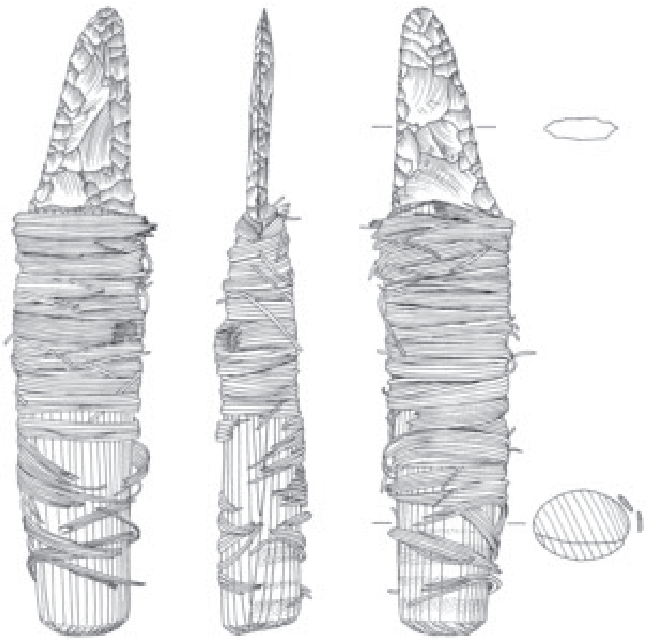

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The Frozen Saqqaq Sites of Disko Bay, West Greenland: Qeqertasussuk and Qajaa (2400 – 900 BC). Studies of Saqqaq Material Culture in an Eastern Arctic Perspective
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Composition, typesetting and Cover design: Erling Lynder
Printed in Denmark by Narayana Press, www.narayanapress.dk
ISBN 978 87 635 4561 7

Monographs on Greenland | Meddelelser om Grønland, vol. 356
ISSN 0025 6676

Man & Society, vol. 45
ISSN 0106 1062
Series editor: Lill Bjørst Rastad

www.mtp.dk/MoG

This book is published with financial support from
The Carlsberg Foundation
The Commission for Scientific Research in Greenland
The Ministry of Research
The Rock Foundation

Cover: (front) Hafted knife from Qeqertasussuk (drawing by Eva Koch);
(back) View from the north-west over the Qeqertasussuk site
(photo by Bjarne Grønnow).

Denne afhandling er af Det Humanistiske Fakultet ved Københavns Universitet
antaget til offentligt at forsvares for den filosofiske doktorgrad.

København den 7. september, 2016
Ulf Hedetoft
Dekan

Forsvaret finder sted i Nationalmuseets festsal den 31. marts, 2017, kl. 13.00.

Museum Tusculanum Press
Dantes Plads 1
1556 Copenhagen V
Denmark
www.mtp.dk

Contents

Abstract

Qeqertasussuk and Qajaa are the only known archaeological sites of the Early Arctic Small Tool tradition (Early ASTt) in the Eastern Arctic, where the entire suite of organic materials – wood, bone, baleen, skin, etc. – are preserved in permafrozen culture layers. Analyses of a comprehensive artefactual material resulting from excavations at the Saqqaq site of Qeqertasussuk in southernmost Disko Bay and substantial contextual information form the basis of this publication. An assemblage from Jørgen Meldgaard's investigations of the stratified Qajaa site in Kangia (Jakobshavn Isfjord), where up to three metres of frozen Saqqaq culture layers are present, supplements the analyses of the Qeqertasussuk material. The two sites overlap in time, and together they cover the entire Saqqaq era in Greenland (*c.* 2400–900 BC).

New detailed insight into Saqqaq technology is provided through analyses of hundreds of preserved artefacts, most of them parts of composite tools, and large amounts of different waste materials. A complex Saqqaq hunting tool kit, consisting of bows, darts, lances, harpoons with accessories and throwing boards, as well as kayak-like sea-going vessels, is described for the first time. Likewise, the finds provide insight into a wide variety of hand tools, household utensils and other material remains from daily life, including knives, scrapers, burins, sewing kits, wooden bowls and spoons, blubber lamps and drum frames. Skin fragments, including the foot of a stocking, show the advanced sewing techniques of the Saqqaq, and baleen and skin thongs document a variety of knots. Saqqaq raw material utilization and working techniques are studied through dynamic technological analyses of organic waste and preforms. It is concluded that Saqqaq material culture, even if it belongs to a highly mobile, true pioneer society, was extremely complex from the beginning, based on highly specialized tool kits targeted for special tasks, and guided by normative designs and raw material selections.

Settlement at Qeqertasussuk is divided into five chronological horizons, H5–H1, based on detailed analyses of stratigraphies and suites of radiocarbon dates. Each of the earliest horizons (the ones with organic preservation), H5–H2, probably represent a number of short-term settlement episodes within a time frame of *c.* 2350–1750 BC, whereas the latest phase at the site, H1, is an accumulation of lithic artefacts from settlements after *c.* 1500 BC. Radiocarbon dating of the layers at the huge Qajaa site shows that settlement here lasted until the very end of the Saqqaq culture, *c.* 900 BC.

Horizon 4 at Qeqertasusuk represents a short-term settlement episode, which resulted in architectural and artefactual remains in meaningful contexts. This original settlement surface was carefully investigated through preparation of an 8 m by 5.5 m excavation area. Spatial analyses of stone-built features like midpassages and hearths, in combination with turf platforms, wooden poles, artefacts and all sorts of waste, resulted in a detailed description of different activity areas inside and around a dwelling. It is concluded that this Feature A8 probably represents the floor of a single cold-season settlement at the site.

Morphological studies and aDNA analyses of human remains from Qeqertasussuk, including five limb bones and a number of hair tufts, take us close to the Saqqaq person him- or herself and to the genetic roots of the Saqqaq culture. Studies of various artefact types and styles and ornamentation on them provide some glimpses of the early palaeo-Eskimo social organization and cosmology.

Comparative studies, involving Saqqaq sites in Greenland and evidence from Independence I and Pre-Dorset sites in Canada, place the two frozen sites in a broad Eastern Arctic perspective. Comparisons of the organic components in the material culture of these three Early ASTt groups show even closer relations between them than deduced from the lithic inventories, and studies of architecture, organization of space within dwellings, as well as camp types and settlement patterns, underline the close connections between Early ASTt groups over vast distances.

Qeqertasussuk and Qajaa are viewed as belonging to the pioneer phase settlement of the Eastern Arctic. Analyses of screened and calibrated radiocarbon dates of Pre-Dorset and Independence I sites conclude that the two sites in Disko Bay are representatives of a remarkably fast and comprehensive initial settling of easternmost Arctic Canada and Greenland around 2400 BC following a 'stand-still' of the Pre-Dorset expansion (about 500 years) in western and central Canadian Arctic.

Finally, a holistic picture of Saqqaq life and settlement patterns in Disko Bay is drawn. This is achieved by combining the archaeological results with results of analyses of the comprehensive faunal material from the sites, insect remains, pollen and macrofossils published earlier by researchers of the Qeqertasussuk team.

Foreword

I clearly remember the peculiar smell of wet soil with a hint of old blubber coming from deposits hidden under an overhanging 'roof' of grass turf. The low light of the midnight sun illuminated the erosion bank on the northern beach of a small promontory at the island of Qeqertasussuk, and meltwater dripping from a black layer of twigs, fire-cracked rocks, bones and wood shavings made its way to the sandy beach below. That was the first trace of the frozen Saqqaq layers at the Qeqertasussuk site, which we located one August night in 1983. Little did I know that this discovery marked the beginning of a research project that has already lasted over thirty years and, due to the unique materials recovered in the frozen layers, will probably provide new information on the earliest inhabitants of Greenland for many years to come.

Two years before Appa Magnussen's and my discovery of the Qeqertasussuk site, my mentor in Arctic archaeology, Jørgen Meldgaard, had rediscovered the impressive frozen Saqqaq site of Qajaa in the Kangia (Jakobshavn Isfjord). His son, Morten, Tinna Møbjerg and I were conducting archaeological surveys in Disko Bay that year (1981), and when our team briefly met Jørgen and his wife, Lissen, in Ilulissat we listened with both interest and envy to their story about the visit to the enigmatic and 'inaccessible' Qajaa with its frozen Saqqaq layers more than two metres thick. Jørgen described vividly the finds of wooden Saqqaq implements and the odour of these 4000-year-old thawing middens – a detection method that I, as mentioned above, benefitted from that August night at Qeqertasussuk. Jørgen's excavation at Qajaa the following year, organized as a collaboration between the National Museum of Denmark and the local museums in Ilulissat and Qasigiannguit, produced a unique assemblage of organic artefacts from stratified culture layers – a body of material which I, via a student job for Jørgen, got to know during the following years.

In the wake of the almost contemporary discoveries of Qeqertasussuk and Qajaa in the early 1980s we were at that time all convinced that many more frozen Palaeo-Eskimo sites would follow. But we were wrong. These two sites are still the only Early Arctic Small Tool tradition sites with such excellent preservation conditions. They still form unique windows into the remotest human history of the Eastern Arctic.

I am grateful that it has been possible to publish the two assemblages together in this monograph. They complement each other nicely. The sites are situated relatively close to each other, they represent the same culture, they overlap in time, and their excellent preservation conditions are comparable. In fact it is a fascinating thought that we might have recovered material remains from the same Saqqaq families or individuals at both sites.

The material from Qeqertasussuk forms the core of the publication – several field seasons here have yielded the most comprehensive and informative assemblage in well-documented contexts. But the limited find material that Jørgen and his team recovered in 1982 from the massive and still, today, intact frozen layers at Qajaa has facilitated interpretation and contributed to a more complete picture of Saqqaq technology. I am grateful to my colleague Jens Fog Jensen, who has excellently tackled the not-so-easy task of working up Jørgen's archival material from Qajaa and re-analysing the finds. The paragraphs in this book on the history of research concerning Qajaa, and the descriptions and analyses of the finds, stratigraphy and radiocarbon dates from this site, are written by Jens Fog Jensen.

Obviously, this publication represents the efforts of many project members, fellow researchers within archaeology and other disciplines, museum staff in Greenland and Denmark, local citizens and friends of Qasigiannguit Museum, and assistants who contributed to fieldwork during the years 1983–1990, and to the conservation, registration and analyses of the assemblage. I extend my warmest thanks to all of them: Qasigiannguit: former heads of the local museum in Qasigiannguit, Torben Simonsen, Troels Romby Larsen, Jens Fog Jensen, and present head of the museum, Anne Mette Olsvig; Egon Geisler, Steen Jeppson, Axel Jerimiassen. The Greenland National Museum and Archive: former heads of the museum, Claus Andreasen and Emil Rosing; Jan Brøndsted, Flora Heilmann, Erik Holm. Ilisimatusarfik (The Greenland University): Elisa Evaldsen, Malene Fleischer, Pauline Knudsen, Aappaa Magnussen, Hans Lange, Elisa Petersen, Maria Steenholt. Zoological Museum, University of Copenhagen: Thomas Berg, Jens Böcher, Anne Birgitte Gotfredsen, Morten Meldgaard, Jeppe Møhl, Kim Aaris Sørensen. The Botanical Museum, University of Copenhagen: Bent Fredskild. Institute of Prehistoric Archaeology, University of Copenhagen: Keld Møller Hansen, Lars Wilfred Hansen, Gitte Jensen, Mette Palm Pedersen, Erik Brinch Petersen, Per Ole Rindel. The National Museum of Denmark: Mai Stief Aistrup, Charlie Christensen, Morten Djørup, Nancy Eskildsen, Jørgen Meldgaard, Gerda Møller, Anne Lisbeth Schmidt, Bodil Tårnskov. External experts: Bruno Frøhlich, Tom Gilbert, Pieter van de Griend, Jens Peter Hart Hansen, Eileen Jensen, Anders Koch, Niels Lynnerup, Anne Marie Rørdam, Manaassa Raghavan, Morten Rasmussen, Mikkel Sinding, Eske Willerslev. Art work, drawings: Pia Breinholt, Lars Holten, Alice Lundgreen, Eva Koch Nielsen. Photographers: Geert Brovad, Roberto Fortuna, John Lee, Jesper Weng. Editing and layout of illustrations: Marie Lenander Petersen. Linguistic revision: Simon Coury, Aoife Daly. Production of monograph: Jordy Findanis, Museum Tusculanum Press.

I worked with the Qeqertasussuk material during my assistant and associate professorships at the Institute of Prehistoric Archaeology, University of Copenhagen, and I thank my colleagues and students from those years for support and fruitful discussions.

I am most grateful to my colleagues from SILA – Arctic Research Centre at the Ethnographic Collections, Modern History and World Cultures, National Museum of Denmark, as well as friends and colleagues in the circles around the centre. They have all been inspiring and contributed directly and indirectly to the interpretation of the Saqqaq assemblages: Hans Christian Gulløv, Jens Fog Jensen, Peter Andreas Toft, Martin Appelt, Ulla Odgaard, Mikkel Sørensen, Tinna Møbjerg, Jens Rosing. In particular, I thank Martin for digitization of plan drawings and sharing ideas and data from experiments with Saqqaq technology, and Ulla for her initial analysis and interpretation of midpassage A8 at Qeqertasussuk. I also thank the head of my department, Christian Sune Pedersen, for his support.

My special thanks go to former museum director Torben Simonsen. Together with Egon Geisler, Torben was one of the enthusiastic founding fathers of the local museum in Qasigiannguit in the early 1980s. He was an excellent fundraiser, organiser and driving force in the realization of the Qeqertasussuk Project. Without Torben's vision, hospitality, persistence and firm hand there would have been no local museum and no Qeqertasussuk Project.

I am grateful to my friend Morten Meldgaard. We met for the first time in 1977 and started working as young graduates across disciplines, enthusiastically sharing a deep interest in Greenland's natural and cultural history. The collaboration with Morten has been, and still is, a unique source of inspiration.

Substantial funding, which made the analysis and documentation of the assemblages and the writing of this monograph possible, came from: the Carlsberg Foundation, the Commission for Scientific Research in Greenland, and the Ministry of Research. Since 2009, when the publication of Qeqertasussuk and Jørgen Meldgaard's Qajaa assemblage became integral parts of the Carpenter-Meldgaard Endowment Project, the Rock Foundation has generously supported the project.

This monograph is dedicated to my wife, Gitte, and our two children, Liv and Asger.

Gershøj, May 2016.

1. Introduction: Two Frozen Saqqaq Sites in Disko Bay

1.1 Framework, research topics and perspectives

This book is about two unique Saqqaq sites. The permanently frozen culture layers at Qajaa and Qeqertasussuk provide a gateway to an understanding of the 'life world' of the first people in West Greenland. An incredible amount of new information derives from these sites and the results challenge our traditional perception of the earliest Arctic pioneering societies.

Since the excavation campaigns during the 1980s, articles and monographs on the archaeological finds, faunal materials, palaeo-environment, etc. from Qajaa (Qa) and Qeqertasussuk (Qt) have been published in international journals (see e.g. Møhl 1986; Böcher and Fredskild 1993; Grønnow 1994, 1996a, 1996b, 1997, 2012a, 2012b; Meldgaard 2004) and results of the investigations have been incorporated in textbooks, popular literature and schoolbooks dealing with the cultural history of Greenland (e.g. Grønnow and Meldgaard 1991; Gulløv 2004; Godtfredsen 2009). At present, Qa and Qt are renowned sites of 'national importance' in Greenland and objects from the two sites form important parts of permanent museum displays in Nuuk and Qasigiannguit in West Greenland.

However, whereas the archaeo-zoological, palynological and entomological materials have been extensively analysed and presented in monographs (Böcher and Fredskild 1993; Meldgaard 2004), the same is not true for the archaeo logical finds, the features, and the human remains and their contexts. These remarkable discoveries more than deserve a fully fleshed-out monograph, which can serve as a solid stepping stone for further research into Greenland's early prehistory and beyond.

The excavated materials are so diverse and comprehensive, and from such information-rich contexts, that it is appropriate to structure the presentation as a kind of 'classical ethnography' rather than a traditional archaeological thesis. Accordingly, the descriptions and analyses of the Saqqaq material culture are not based on divisions into, for example, raw materials or morphological types, but structured according to the concept of 'tool kits' identified by analogies with historical/ethnographical observations and ethnographic collections. As seen below, analysis based on this division into complex functional entities like hunting tool kits, hand tools, household utensils, etc. puts the prehistoric Saqqaq objects into entirely new perspectives. This approach provides insight into the material culture of the genuine pioneer societies, which spread eastwards into completely unknown Arctic landscapes from the Bering Strait to East Greenland during the fifth to third millennia BC.

The find materials from Qt and Qa provide a solid basis for studies of technology. They include a variety of lithic and organic artefacts at all stages of manufacture, from raw materials via blanks to finished, reworked and discarded tools. The analysis of these materials provides new insight into the technological concepts behind the complex and yet remarkably distinct and normative Saqqaq material culture.

The two frozen sites are among the very few known Saqqaq sites with stratified layers covering considerable time spans. Thus it is possible, via careful studies of sections through the culture layers, to define chronologically significant 'horizons', in particular at the Qt site, which, taken together with radiocarbon dates and typological and metrical studies of the artefacts, provide new information on the chronology of the Saqqaq culture.

The investigations at Qt allow detailed studies of activity areas and stone-built features on a spatially and temporally well-defined settlement surface. The excellent preservation conditions mean that wooden tent poles and organic refuse, including wooden artefact fragments and shavings, can be mapped both inside and outside a midpassage dwelling. Moreover, through detailed studies of the internal stratigraphy of the features, it is possible to describe a number of episodes that reveal the complex history of the different architectural structures. Thus important new knowledge is added to our understanding of the architecture of the Saqqaq dwellings, the multiple functions of the midpassages and the spatial structuring of activities on the dwelling floors.

It is the ambition of this book to draw a holistic picture of the living conditions and life of the earliest inhabitants at the two sites. This is done by synthesizing the many results presented in the two earlier monographs on Qt mentioned above, in the many articles on Qt and Qa, and in specialist reports. Subsequently, the sites are

Fig. 1.1 a
The geographical position of Disko Bay in the Eastern Arctic.

viewed in increasingly broader perspectives: first in the context of the Saqqaq culture in Disko Bay, second in relation to the Saqqaq in Greenland, and third through comparative studies of the other archaeological cultures of the Early Arctic Small Tool tradition (ASTt), the pioneering palaeo-Eskimo societies of the Independence I, the Pre-Dorset and the Denbigh Flint Complex, which widens the geographical scope of the studies to the Central and Western Arctic.

Even though the discovery and excavation history of the two frozen sites in Disko Bay are very different, the materials from them are published together in this monograph, and accordingly information from both sites is integrated where appropriate. As seen below, Qa is a huge and extremely complex site. Only a small fraction of it has been excavated, and the investigations at the site in 1981 and 1982 by Jørgen Meldgaard (1927–2007), the father of Morten Meldgaard, were conducted as extended trial excavations, which focused on stratigraphy, dates and the extraction of organic artefacts and faunal material. The excavation strategy at the much smaller Qt site was different: excavations were carried out during a considerably longer

Fig. 1.1 b

The position of Qajaa (Qa) and Qeqertasussuk (Qt) in Disko Bay (large red dots).

period (1983–90) by a large interdisciplinary team, and consequently these investigations produced a much more comprehensive and contextually well documented material than at Qa. However, the find materials from the two sites supplement each other nicely, in particular concerning information on Saqqaq tool kits and technology, and together they demonstrate the wide range of Saqqaq manifestations in Disko Bay (Fig. 1.1).

1.2 Discovery of the sites and the investigations at Qajaa and Qeqertasussuk

1.2.1 Qajaa – discovered and re-discovered

Qa was an important site for the early archaeological exploration of Disko Bay. As early as 1870 excavations were carried out by members of A. E. Nordenskiöld's expedition to Greenland (Fig. 1.2). Nordenskiöld (1832–1901) had been informed that, according to local stories, the ice fjord formerly contained less ice and was navigable, and upon analysis of the excavated fauna from the midden layers he concluded that there were indeed bones left from several species that were no longer living in the ice fjord (Nordenskiöld 1872). From a historiographical point of view it is noteworthy that it comes naturally to Nordenskiöld to use the term 'Stone Age' when designating the oldest cultural deposits. Later, from 1929 and during the 1930s when Therkel Mathiassen (1892–1967) carried out his systematic archaeological campaigns in Greenland, the association of the term Stone Age with pre-Inuit cultures became disputed, since Mathiassen believed that the Thule culture represented the first people in Greenland (see Mathiassen 1958). Being a pioneer in natural history, Nordenskiöld had his focus on glaciology and geology and his explorations at Qa form an early example of the use of archaeological data as proxy data for reconstructions of palaeo-climate. Unfortunately, Nordenskiöld did not present detailed descriptions or discussions of the stratigraphy at Qa, whereby he missed an opportunity to forestall the lengthy discussion between Mathiassen and Birket-Smith on the chronology of early human settlement in Greenland (Gulløv, in press).

Nordenskiöld had the local transport from Disko Bay to Qa organized by the trade manager Carl Fleischer in Ilimanaq, and in the following year, 1871, Fleischer received a number of questions concerning the character of middens in Greenland from professor Japetus Steenstrup (1813–97) at the Zoological Museum in Copenhagen (Meldgaard 1996; Jensen 2006: 32 ff.). Fleischer then made a new excursion to Qa in order to collect samples, and quite remarkably, in his report which accompanied the samples, Fleischer presented the earliest description of stratified cultural deposits in Greenland. Fleischer characterized the deepest layers at Qa as 'Kitchen midden no. 1', consisting of layers with bones and stone tools. These deposits were covered by peat layers without finds, and on top of these there was 'Kitchen midden no. 2', which lacked stone tools. Carl Fleischer actually discovered the Stone Age of Greenland. Regrettably, Fleischer's report was forgotten and only rediscovered in 1986 (Meldgaard 1996), and his early discovery thus never became known among scholars.

More than a century elapsed before renewed archaeological interest was directed towards the Qa site. This time the thread was picked up by curator Jørgen Meldgaard from the National Museum of Denmark, when he headed reconnaissances in Uummannaq Fjord and in Disko Bay to the north of Ilulissat in 1981. He made excavations at Sermermiut and Qa in Jakobshavn Isfjord (Kangia). The students Bjarne Grønnow, Tinna Møbjerg and Morten Meldgaard conducted much of the survey in Disko Bay that year.

Jørgen Meldgaard's investigation at Qa in 1981 consisted of a short visit lasting from August 6th to 10th. Meldgaard, his wife Lissen, the Greenlander Mikkel Paulsen and his son, Gerth, from Qasigiannguit made up the team (Fig. 1.3). Meldgaard sketch-mapped the site and managed to clean several sections of the eroded midden facing the shore; the site's cultural deposits were more than two and a half metres deep and often

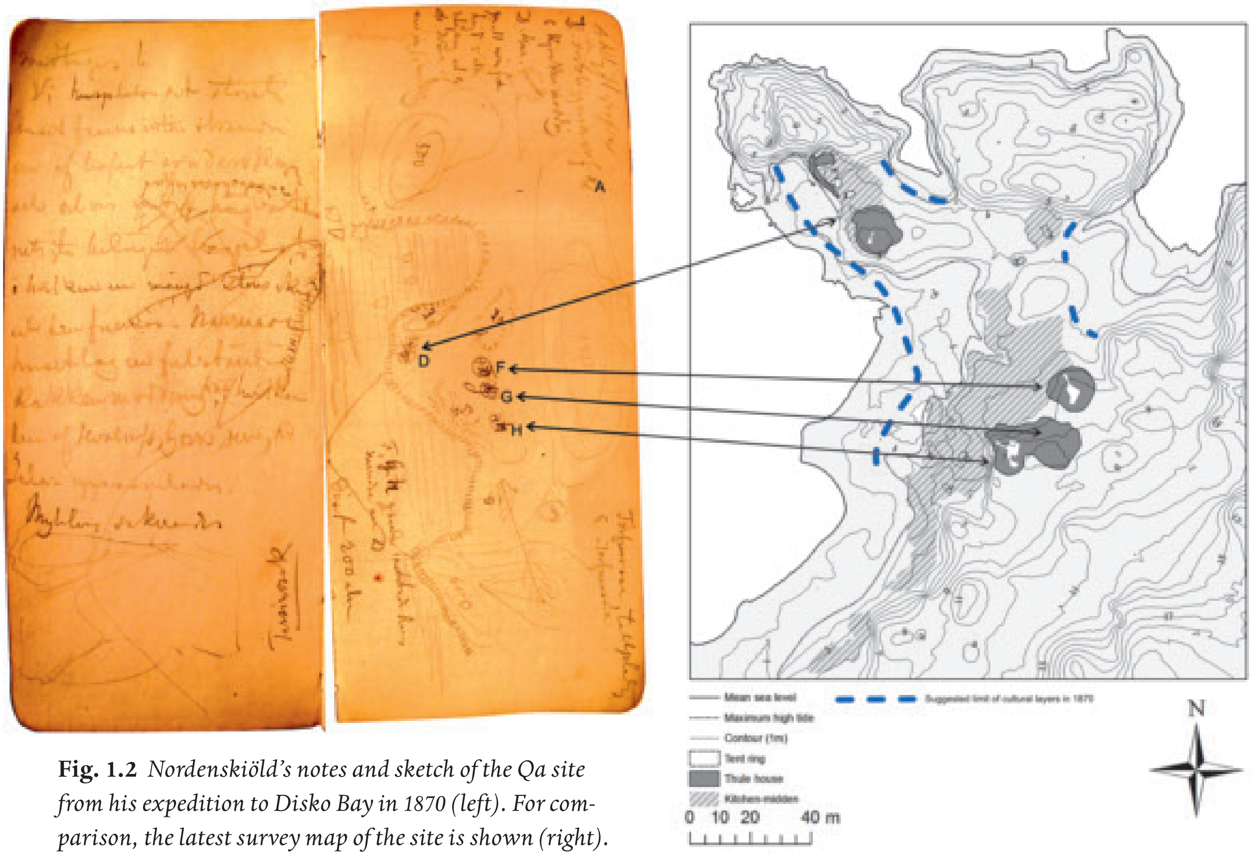


Fig. 1.2 *Nordenskiöld's notes and sketch of the Qa site from his expedition to Disko Bay in 1870 (left). For comparison, the latest survey map of the site is shown (right). See also Fig. 2.2.*

stratified. Meldgaard was surprised to find large quantities of well-preserved organic artefacts as well as faunal remains, in particular in the deepest, permanently frozen midden layers.

Meldgaard immediately recognized the potential of the excellently preserved deposits, and he planned for an interdisciplinary investigation, in which palaeo-ecological reconstructions would enable the archaeologists to relate the cultural changes to fluctuations in fauna and climate. Meldgaard believed this would be a rewarding strategy because the Qa site is situated next to the Jakobshavn Isbræ (Sermeq Kujalleq), which was well known to be sensitive to climatic fluctuations and which he had previously studied using historical sources (Larsen and Meldgaard 1958).

The Qa site could be the first to yield a representative sample of bones of the game hunted by the Saqqaq, and the stratified deposits would enable research into the transition from Saqqaq to Dorset and hopefully date it by radiocarbon dating. His experiences from the excavations 28

Fig. 1.3 *Jørgen Meldgaard's first visit to Qa, 1981. Meldgaard in front of the exposed Saqqaq midden layers for the first time. (Photo: Lissen Meldgaard).*

years earlier at the nearby site of Sermermiut clearly shine through. Meldgaard knew all the trouble he would face when digging in perma-frozen midden layers, but he also knew that rich and unique finds could be retrieved from the frozen soil. The site map and preliminary documentation of sections A, B, C, D and E furnished Meldgaard with information for applications for further funding and a starting point for more thorough investigations the following year. Supported by Grønlands Landsmuseum (now the Greenland National Museum and Archive) and the Danish Research Council of Humanities, archaeological fieldwork at Qa continued in 1982.

As in 1981, the 1982 field season also had several parallel activities: (a) ethnological investigations in Uummannaq municipality; (b) archaeological excavations at Qa, (c) surveys in the vicinity of Qa as well as in selected areas in Qasigiannguit (Christianshåb) municipality; (d) archaeological investigations in Paamiut (Frederikshåb) municipality; and (e) archaeological investigations in Ammassalik in East Greenland. Jørgen Meldgaard was in charge of the excavations at Qa, whereas the other operations were managed and conducted by crews from the museum in Nuuk, by local people, and also by researchers from Danish institutions. In Disko Bay, the reconnaissance of the Tasiussaq inlet was conducted by Jeppe Møhl and Hans Lange, who made an excursion from the Qa excavation towards end of July. The reconnaissance of the northern part of Qasigiannguit municipality was also conducted by Jeppe Møhl and Hans Lange, from the 4th to the 14th of August (Møhl 1982). This survey was funded by the Qasigiannguit municipality. Torben Simonsen and master carpenter Egon Geisler, both leading characters in the founding of the local museum in Qasigiannguit, arranged the logistics and local transportation with the vessel *Asta*. The survey was the first in a long series of systematic reconnaissances to be conducted by the newly established museum in Qasigiannguit.

Meldgaard's 1982 field season at Qa lasted from July 1st to July 30th (Fig. 1.4). Members of his crew included curator emeritus Helge Larsen (1905–84), Jeppe Møhl (conservator and zoologist from the Zoological Museum

Fig. 1.4
From the excavations at Qa, 1982. Jørgen Meldgaard (right) and Helge Larsen excavating and discussing the finds from Area F. (Photo: Jeppe Møhl).

in Copenhagen), Hans Lange (the Greenland National Museum and Archive), Torben Simonsen, Egon Geisler, student Regine Jørgensen, and Mogens Andersen, head of the local museum in Ilulissat.

1.2.2 Trial excavations at Qajaa and later investigations

1.2.2.1 Jørgen Meldgaard's excavation, 1982

During his 1982 investigations Meldgaard completed his survey of the site, excavated selected areas and documented the stratigraphy at several places where the frozen midden layers were exposed and stood as bank facing the shore (Meldgaard 1983). The excavation areas were cleared of recent vegetation and turf, and in places with thick peat layers the more recent, naturally deposited layers were removed. When excavation started, the deposits were excavated in 10 cm artificial layers, with the rare exception that very distinct floor layers were documented. Occasionally individual artefacts were plotted or drawn in relation to stone-built structures such as the flagstone platforms in Area E, where several vertical standing stakes were plotted; hafted stone tools were also found in association with the midpassage structure in Area F. However, generally the artefacts were collected layer by layer, sometimes in square-metre units. Since most excavations were rather small, just covering a few square metres, this meant that the excavation areas were divided into two or four units, and the finds subsequently collected within these. The different, often quite small, excavation areas and related sections were named A to H. They will be described in chapter 4.2 in their geographical order, from north to south, with an emphasis on stratigraphy and absolute dates.

1.2.2.2 Monitoring of permanently frozen layers at Qajaa

Since 2009 the National Museum of Denmark and the Greenland National Museum and Archive have collaborated on monitoring the thaw and freeze processes at Qa in order to document the decay processes during changing climatic conditions and to predict their future impact on the preservation of organic artefacts in the Qa midden (Elberling *et al.* 2011; Matthiesen *et al.* 2014; Hollesen *et al.* 2015). During these renewed investigations, a broad spectrum of monitoring equipment has been installed, and sediment samples have been retrieved from sections of the eroding cliff and from drill cores. The holes left by the drilled cores allowed the lowering of sensors for measuring temperature and water content into the permafrozen midden layers, and in 2010 a climate station measuring air temperature, wind speed, precipitation and snow cover was installed. Equipment for monitoring the sea level was installed to evaluate the risk of coastal erosion, and an automatic camera was installed to monitor variations in snow cover at the site (Matthiesen *et al.* 2012). The preliminary results of the monitoring indicate that the frozen midden covered by more than a metre of sphagnum peat and Thule culture layers is relatively stable and well protected against the expected warming for the next 70 years (Elberling *et al.* 2011, Hollesen *et al.* 2012). However, future thawing of the layers is sensitive to drainage, meaning that if the midden layers remain water-saturated the current anoxic conditions will persist, whereas if the midden layers are drained conditions are likely to become oxic, which will speed up a wide range of decay processes (Matthiesen *et al.* 2014). Monitoring the water run-off from the frozen portions of the midden thus becomes paramount for the ability to predict radical future changes in preservation. Attention should also be paid to the stratigraphic observations made by Meldgaard in 1982, which indicate that optimal preservation conditions can only be expected to be present in the sphagnum-covered part of the midden, probably extending only 200–400 square metres between areas A and B.

1.2.3 Analyses, storage of materials and data

Following excavation the finds were sent to the National Museum in Copenhagen, where they were preserved and registered. The assemblage was later sent to the Greenland National Museum and Archive (NKA), where the objects are permanently stored and curated. At present the finds from Qa form the basis of the Saqqaq component in the permanent exhibition at the museum in Nuuk.

The Qa assemblage and Jørgen Meldgaard's archival materials and photos from Qa were documented and digitized by Jens Fog Jensen in connection with the analyses leading to the presentation of the material in this monograph (sponsored by the Carpenter-Meldgaard Project). The entire material, including the digitized archives and photos, will be gathered and made available for further study at the NKA.

1.2.4 The discovery of Qeqertasussuk

The Qt site was discovered in August 1983 by Bjarne Grønnow and Appaa Magnussen during a routine archaeological survey for the local museum in Qasigiannguit. Late at night they passed the northern shore of the small island of Qeqertasussuk. A tombolo – a series of raised gravel beaches connecting a rocky knoll with the main island – at the easternmost side of the island attracted their attention, as they had learned from other regions that palaeo-Eskimo sites were often associated with these topographical features. On the sandy and windswept upper part of the tombolo they identified a few stone-built fireplaces and midpassages containing fire-cracked rocks. Finds of characteristic lithic artefacts and refuse on the ground close to these structures revealed that they had located a Saqqaq site. Importantly, no later constructions, except for a single recent tent ring, were found in the vicinity, and thus the site seemed to be undisturbed by later activities. Such a palaeo-Eskimo site is in fact quite rare in the Disko Bay region, which was intensively settled throughout four millennia. However, the most important discovery was made at the erosion bank at the northern beach of the tombolo. A dense, 40 cm thick 'mat' of recent vegetation and turf was covering some partly frozen black layers, which consisted of a smelly mixture of bones, twigs, burnt blubber, wood shavings and fire-cracked rocks. The findings of killiaq flakes and a burin spall, which had fallen down from these thawing organic culture layers, pointed to a date during the Saqqaq culture. On one of the following days Bjarne Grønnow and the then head of the newly established Qasigiannguit Museum, Torben Simonsen, visited the site. A 0.5 m broad 'column' at the northern erosion bank was cleared, producing a section through the covering turf layer, the culture layers and the light beach gravel below. Samples for radiocarbon dates were extracted and some bones and worked driftwood pieces recovered.

The radiocarbon dates confirmed the archaeological assessment: Qt represented a Saqqaq site undisturbed by later activities. It contained a vegetated and turf-covered area with intact, permanently frozen culture layers showing excellent preservation conditions for organic matter. At that time (and it is still the case now, more than thirty years later) Qt had only one counterpart in this respect, namely Qa. The potential to expand our knowledge of the Saqqaq considerably through a closer investigation of Qt was clear, and accordingly Qasigiannguit Museum decided to arrange a trial excavation at the site during the summer of 1984.

1.2.5 The investigations at Qeqertasussuk, 1984–87 and 1990

In Grønnow and Meldgaard (1991) and in Meldgaard (2004: 70–86) an overview of the multi-disciplinary investigations that were carried out at Qt during the four important field seasons 1984–87 is presented. Organized by the newly established local museum in Qasigiannguit in collaboration with, primarily, the Greenland National Museum in Nuuk and the University of Copenhagen, these field seasons involved large excavation teams, complex logistics, high ambitions, enthusiasm, and collaboration across languages, ages and disciplines. Details can be found in the files at the local museum in Qasigiannguit, where all primary contextual data (diaries, notebooks, plan drawings, data sheets, photos, etc.) and original finds are stored and curated. A copy of the archival material is kept at the Ethnographical Collections at the National Museum of Denmark.

Details of the technical aspects of the excavations at Qt are presented fully by Meldgaard (2004), as noted above, and thus the following is only a brief presentation of the most important information, which facilitates an understanding of how the primary material of the Qt investigations was secured.

1.2.5.1 Surveys, excavation areas and methods

A topographical survey was made in 1984 using a manual theodolite. This survey forms the basis of the detailed maps of the site. In the same process the main axes of the metric excavation grid were established with a west–east oriented X-axis and a south–north oriented Y-axis. The starting point (X = 100 and Y = 200) was situated on the uppermost, central beach ridge of the tombolo forming the site area (Fig. 1.5). All excavation units (1 × 1 metre, 0.5 × 0.5 metre, or 0.25 × 0.25 metre) were designated by the coordinates of their south-western corner.

Based on results from surface registration and information from a grid of 1 × 1 metre and 0.25 × 0.25 metre test pits, the site was divided into three main areas, where thorough excavations were made: A, B and C.

Area A (4.5 m × 5.0 m) covered a couple of fireplaces partly visible on an eroded gravel surface on the highest beach ridge. No organic materials except some charcoal were preserved here. Area B (5 m × 2 m) in the north-westernmost part of the site was designed to cover the thickest permafrozen culture layers.

In order to follow the erosion bank and to optimize stratigraphic control, Area B was assigned a local metric sub-grid with a starting point at X = 10 and Y = 20, the X-axis pointing south-east and the Y-axis pointing north-east. Area B was baptized 'the midden area' due to the thick heaps of organic refuse and exhausted fire-cracked rocks that the excavations revealed in this 'remote corner'. A few test pits were assigned to Area B as well.

Area C, nicknamed 'the dwelling area', consisted partly of a 8.0 m × 5.5 m excavation unit which was aimed at uncovering a relatively intact, permafrozen settlement surface showing different stone-built features belonging to one of the early phases at the site. In connection with Area C, the 15-metre-long trench, Profil C (Section C), was excavated in order to explore the complex structure of the culture layers (overlapping refuse heaps and dwelling floors) on the northern, permafrozen part of the site and to correlate the layers identified in Areas C and B, respectively.

Much weight was put on recording the contexts of the find materials in the field. Careful stratigraphic/chronological control was secured by excavating, recording and analysing several sections in Areas B and C (Fig. 1.6). The exact positions of *in situ* artefacts and important faunal remains were recorded in three dimensions or, alternatively, gathered by the layer number assigned to a given square-metre or quarter-square-metre unit. Each artefact was assigned a unique number consisting of the coordinates of the excavation unit (typically a quarter-square-metre unit) where it was found and a serial number within the unit. Exact coordinates, layer and other contextual information were noted on data sheets for each find or defined assemblage. Stone-built features were surveyed and photographed and documented in detail by layers. Microstratigraphic data were frequently recorded. Other *in situ* components of structures, e.g. wooden tent poles, were drawn on plans.

Excavation methods were applied as follows: generally the upper layer, above permafrost, was removed by shovel in 1 × 1 metre units. The layers below were excavated carefully by trowel as they thawed in 0.5 × 0.5 metre units. Unit by unit and layer by layer, all back-dirt was laid out on a table next to the excavation area and carefully examined once more for small artefacts and bone fragments that had not been found during the excavation by trowel. Careful sieving of the turf and culture layers in the field was tested but proved too time-consuming and difficult. Consequently, a lot of soil samples for

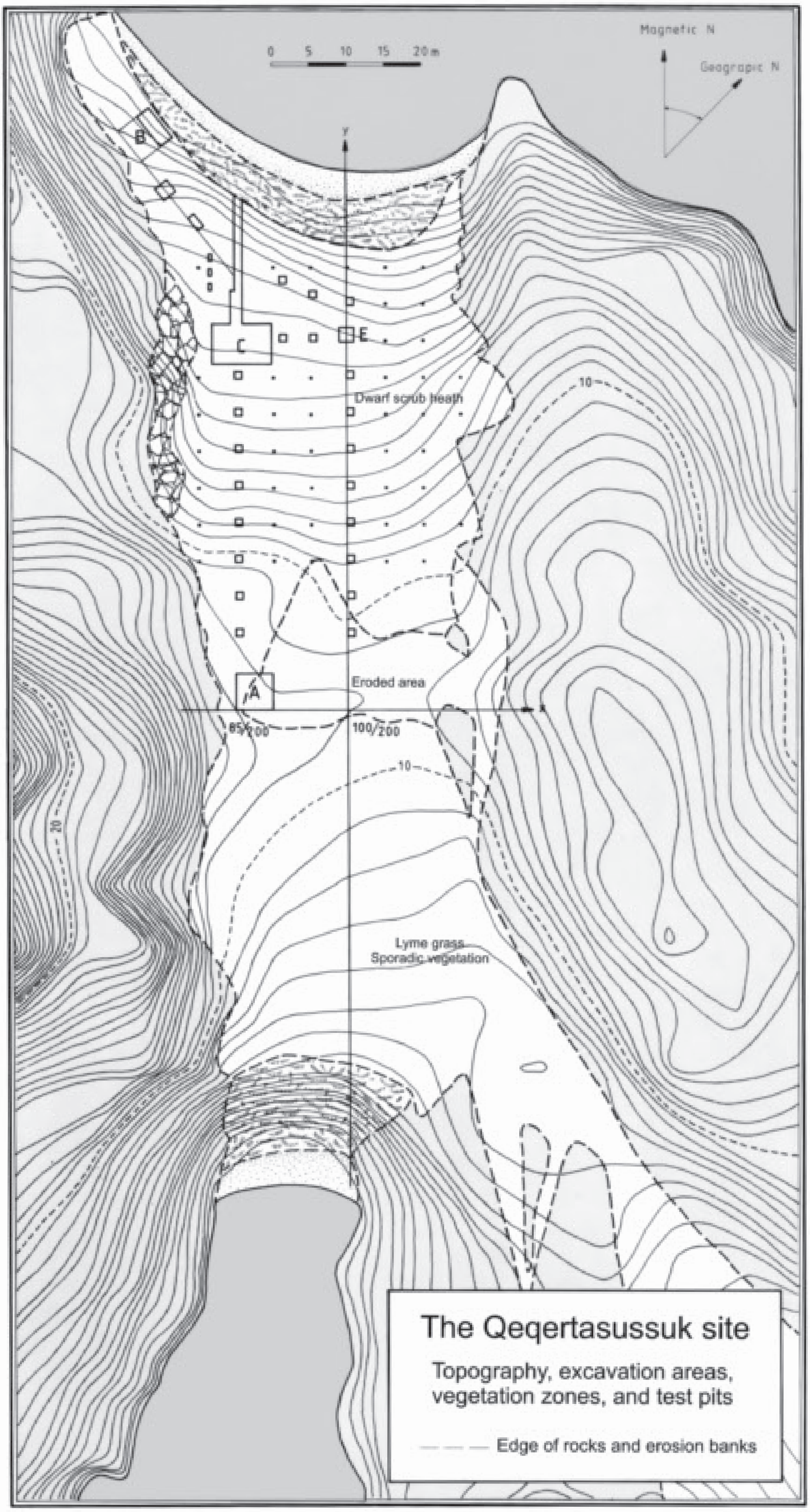


Fig. 1.5
Topographical map of Qt with excavation areas. (Survey by B. Grønnow and G. Jensen, 1984).

sieving from selected contexts were bagged and taken home to the lab for further treatment and analysis.

The five main field seasons at Qt (1984–87, 1990) were from the outset arranged as multidisciplinary enterprises. Archaeologists collaborated with scientists from quaternary zoology, geology, palaeo-botany, entomology and conservation science. This was extremely beneficial for decision-making and interpretation in the field, and it was very useful that the different specialists had the opportunity to extract samples themselves, in close collaboration with the excavators, during fieldwork. In this way the specialists gained detailed knowledge of the archaeological contexts of their samples. While Bjarne Grønnow headed the team of archaeologists and conservators, Morten Meldgaard coordinated the archaeo-zoological investigations, along with the suite of natural scientific fieldwork carried out by Charlie Christensen (quaternary geology), Bent Fredskild (pollen and plant macro-fossils) and Jens Böcher (entomology). The 1990 field season included experiments with the thawing of permafrozen layers by means of a microwave scanner and the conservation in the field of objects of organic matter by means of a portable freeze-drying device (Grønnow and Meldgaard 1991: 46–47; Grønnow *et al.* 1991).

1.2.5.2 Treatment of finds in the field, registration, storage

The excavations at Qt were organized with a special focus on documenting and preserving the unique materials of organic matter in the frozen layers. This meant that all important artefacts of bone, ivory, antler, wood and skin were kept moist and cool as far as possible. Right after *in situ* documentation in the excavation unit the finds were taken to the tent of the conservator, where they were photographed and packed for transportation to the museum. Organic refuse, like bone fragments and wood shavings, were as far as possible carefully dried in the field and bagged.

Fig. 1.6
Excavations at Qt. Morten Meldgaard describing the section in the midden area, Area B, 1986.

The finds of organic matters were shipped, via Qasigiannguit Museum, to the conservation departments of the Greenland National Museum in Nuuk, the National Museum of Denmark and the Zoological Museum (University of Copenhagen). Subsequently, all artefacts were recorded and analysed prior to conservation. In many cases careful drying and treatment against fungus were sufficient, but finds suited for future exhibitions were preserved using different techniques, for instance wooden artefacts were freeze-dried and stabilized with PEG.

The primary documentation of the organic artefacts prior to conservation consisted in photographic documentation, detailed full-size drawing and measuring, including registration of traces from production processes, lashings, use, repair, reuse and breaking. All organic refuse, as well as lithic artefacts and refuse, was counted, classified and measured, recorded in databases, and selected items were drawn in full scale and photographed. The most important original drawings of plans and sections were digitized for analytical purposes and for publication.

Following this process of documentation carried out in Denmark, the finds were returned to Qasigiannguit, where they are now on exhibit, curated and stored (Jensen 1997). After the excavations the main part of the soil samples, wooden refuse and a number of other samples were stored at the University of Copenhagen and the National Museum for further analysis, but all samples were returned to Qasigiannguit in 2013. Like all other faunal material and human remains owned by Greenland, the material from Qt is stored at the Natural History Museum of Denmark and the Department of Forensic Medicine, University of Copenhagen, respectively.

1.2.5.3 Specialist analyses

The potential for scientific analysis of well preserved finds, samples and sediments from frozen sites like Qt and Qa is almost infinite, and the potential for future discoveries is great.

Since the years of excavation several specialist analyses have been made on samples and finds, and the results of these will be integrated in the analyses and interpretations in the present monograph. As seen below, much has already been done, but as many of the original samples are kept intact in the storage of Qasigiannguit Museum, much more can be done in the future, motivated by new questions and the application of new scientific methods.

Hitherto, the main post-excavation specialist analyses of samples from Qt include:

Use wear analysis of end scrapers of killiaq and agate from Qeqertasussuk (Claus Skriver (2002)).

Baleen strings, knots (Pieter van de Griend, Institute of Mathematics, University of Aarhus (1994)).

Wood and skin, conservation experiments (Gerda Møller, Dept. of Conservation, the National Museum of Denmark; Jeppe Møhl, Zoological Museum (Grønnow *et al.* 1991)).

Sediments, stratigraphy and formation processes of layers (Charlie Christensen, National Museum of Denmark (1990)).

Pollen, palaeo-climatology, plant macro-fossils (Bent Fredskild, Botanical Museum, University of Copenhagen (1993)).

Insect remains, in particular arthropod remains (Jens Böcher, Zoological Museum, University of Copenhagen (1993)).

Insect remains, in general (Eva Panagiotakopulu, Institute of Geography, University of Edinburgh (in prep.)).

Hair morphology (Anne Marie Rørdam and Eileen Jensen, Institute of Pharmacology, Copenhagen (Rørdam and Jensen 1991a, 1991b), and Silvana Tridico, Australian Federal Police (in prep.)).

Human bones, morphology, dating (Bruno Frølich, Niels Lynnerup, Anders Koch, Jens Peder Hart Hansen, University of Copenhagen (Koch *et al.* 1996)).

Human hair, ancient DNA, dating (Tom Gilbert; Eske Willerslev; Manassa Raghavan; Morten Rasmussen and others, Centre for Geogenetics, University of Copenhagen (Gilbert *et al.* 2008; Rasmussen *et al.* 2010; Raghavan *et al.* 2014)).

Baleen, ancient DNA, dating (Mikkel-Holger Sinding, Centre for Geogenitics, University of Copenhagen (Sinding *et al.* 2012)).

2. Geographical Setting, Site Topography and Resource Bases

2.1 Geography and climate of Disko Bay

The following introduction to the geographical and biological aspects of Disko Bay draws on the descriptions in the monographs of Meldgaard (2004: 17–40) and Jensen (2006: 14–31). It is brief, and puts weight on those environmental factors which are of direct importance for the understanding of the human living conditions during the Saqqaq era. Subsequently, the geographical positions of the two frozen sites and their local topographies, which are remarkably different, are described.

Situated in northern West Greenland, north of 68 degrees and south of 70 degrees latitude north, and delimited to the west by Disko Island, Disko Bay forms a topographical and climatic zone of its own (Fig. 1.1b). The climate, including the wind regime, in the Bay is conditioned by its proximity to the giant Inland Ice (The Greenland Ice Sheet) to the east, the high mountain ridges of the Nuussuaq Peninsula to the north, the ice-capped plateau of Disko Island to the west, and by the ocean of Baffin Bay, which delivers the branch of the relatively warm West Greenland current feeding into Disko Bay from the south. The 150 km long (north–south) and 100 km wide (east–west) bay shows an Arctic maritime climate in its western parts facing Baffin Bay, whereas the climate in the inner, eastern areas, where Qajaa and Qeqertasussuk are situated, can be described as *low-Arctic continental,* i.e. cold, dry winters with average monthly temperatures of –10 to –15 °C and fairly dry (monthly average precipitation 20–30 mm) and warm summers with an average temperature of 8 °C.

Analyses of climate indicators directly on the site of Qt (Böcher and Fredskild 1993) in the shape of pollen, plant macro-fossils and insect remains reveal that during the Saqqaq era the average summer temperatures were a few degrees higher than today and that summers were more moist than today. This is directly supported by Meldgaard's studies of the faunal materials at Qeqertasussuk and Qajaa (2004: 38), where 'southern species' like cod (*Gadus morhua*), great auk (*Pinguinnus impennis*) and great shearwater (*Puffinus gravis*) have been identified. Moreover, glaciological investigations have shown that the margin of the Inland Ice was situated about 15–20 kilometres east of its present position, leaving space for a broad inland zone. Taken together with results from marine micro- and macro-fauna analyses (Jensen 2006: 22 ff.; Meldgaard 2004), this evidence indicates that the climate of Disko Bay during the Holocene thermal maximum (*c.* 5000–3000 BP) is comparable with conditions which are at present found in West Greenland, about 500–1000 kilometres south of the bay. It must be mentioned that the many different climate indicators show a weak cooling trend from the beginning of the Saqqaq period to the end, even though conditions never reached the present-day level.

2.2 Ice-scapes and resource dynamics

Human living conditions in Disko Bay are, and were during the Saqqaq era, to a large degree defined by great variations in the living resources. These dynamics have been thoroughly studied by Meldgaard (2004: 24–36). The seasonal variations in quantity, quality, distribution and accessibility to human exploitation are huge, primarily determined by sea ice conditions. Recurring polynyas, secondary polynyas, and ice ledges and edges concentrate the living resources during the resource boom in spring (April–June), when important species like beluga, ringed seals, harp seals, capelin and sea birds are found in the openings, highly concentrated and relatively easy to access. This diversity of game continues during summer (July–September), when the Bay is open, resulting in abundant, but dispersed resources. The autumn resources (October–December) consist mostly of migratory species like beluga, harp seals and waterfowl, which are quite dispersed. This picture changes again in winter (December–March), when sea ice covers most of the Bay, leaving space for very few game species, primarily a dispersed population of ringed seal below the fast ice.

Importantly, the seasonal variations in the living resources in Disko Bay are, as in every Arctic environment, superimposed by short-term (inter-annual) population fluctuations and changing spatial configurations of the game. These year-to-year fluctuations have direct impact on human existence in a given area. A society's subsistence strategies are flexible on a short-term scale – but only to a certain extent. Meldgaard's analysis of historical sources documents a remarkably high variation in the inter-annual occurrence of, for example, small whales and seals like the harp seal and ringed seal in Disko Bay – commonly the population sizes fluctuate 25–50%. These fluctuations are hard to predict and it takes great flexibility regarding strategies and technologies, as well as social agreements (e.g. about collaborative hunting, division of hunting grounds and food sharing) to cope with these short-term resource dynamics. It is argued below that in many respects Saqqaq culture was characterized by high flexibility in these matters, which made this pioneering culture in Greenland remarkably sustainable through almost two millennia (Meldgaard 2004: 31–32).

Finally, long-term animal population fluctuations superimpose on the seasonal and inter-annual variations. Determined by the east–west movements of the polar front, West Greenland is exposed to shifts between an 'Atlantic climate' (warm and moist) and an 'Arctic climate' (cool and dry) on the decadal or centennial scale (Meldgaard 2004: 32–36). Interferences between the seasonal, the short-term and the long-term variations have caused drastic changes in human living conditions in Disko Bay, and this should be kept in mind when evaluating the archaeological evidence from two millennia of Saqqaq settlement at the frozen sites of Qt and Qa.

2.3 Qajaa in the Kangia (Jakobshavn Icefjord)

2.3.1 Qajaa at the polynya and its resources

Situated at 69.13° N, 50.70° W (WGS84), 18 kilometres south-east of the town of Ilulissat, Qa is protected to the north and east by a rounded rocky promontory. The site is situated right at the 'confluence' of two deep fjords – the north–south oriented Tasiusaq and the east–west oriented Kangia (Jakobshavn Icefjord) – with the huge floating glacier, Sermeq Kujalleq, to the east. Here, at the central southern shore of the huge ice fjord, the strong tidal and meltwater currents, in combination with the forces from calving glaciers and giant icebergs, maintain a patch of open water, a recurring polynya, right in front of the site (Fig. 2.1). Today, however, few marine mammals, and probably not migrating herds of harp seals, reach this patch of open water deep in the ice fjord. Ringed seals are seen during all seasons, but due to extremely strong currents and milling icebergs in the polynya, the game is difficult to access from the site. A few bird cliffs south of the site do not alter the overall picture of Qajaa today as a poor site, seen from a resource point of view.

Things were different in the past. Qa contains remains of intensive winter occupation by the Thule culture, culture layers from the Dorset culture and, last but not least, massive culture layers from the Saqqaq culture over two metres thick, showing that the site was particularly attractive during this era. In those times the foot of the glacier, now calving into the ice fjord, was inland. Huge quantities of fresh meltwater from the glacier, combined with powerful tidal currents at the confluence of the two fjords, resulted in a very nutritious and easily accessible open water area – a veritable larder right at the 'doorstep' of

Fig. 2.1 *Overview from a southern direction of the Qa site showing its position at a 'corner', where the fjord, Tasiussaq (to the left), meets the Kangia (Jakobshavn Icefjord) (in the background). The area with open water next to the site is the recurring polynya at Qa. (August 2009).*

the Saqqaq settlers at Qa (Møhl 1986). The larder was, typically for Disko Bay, booming during spring with quantities of seals – primarily herds of migrating harp seal but also ringed seals – and birds – mainly large gulls, eider and thick-billed murre – thriving in the polynya. Bones of caribou and ptarmigan in the Saqqaq midden layers at the site are indicators of hunting trips to the land area along the Inland Ice to the east and to the south of the site, where char runs could be exploited as well.

2.3.2 Site topography and the effects of erosion

The initial topographical/archaeological survey sketches and descriptions of the site were made by Jørgen Meldgaard in 1981 and 1982. Recently, in 2009, Bjarne Grønnow and Claus Andreasen surveyed the site with precision GPS (post-processing of data by Jørgen Hollesen, University of Copenhagen) in connection with the interdisciplinary 'Project Permafrost' carried out by the national museums in Denmark and Greenland and the University of Copenhagen (Elberling *et al.* 2011; Matthiesen *et al.* 2012). The present topography of the site is obviously a result of a complex interplay of natural and human formation processes and natural erosion since the Saqqaq era (Fig. 2.2).

The large site, *c.* 160 m (north–south) by 40 m (east–west), covers a crescent-shaped area delimited to the east and north by steeply sloping terrain and a couple of 10–15 m rocky knolls respectively. The site, lying in a cove in the Tasiusaq

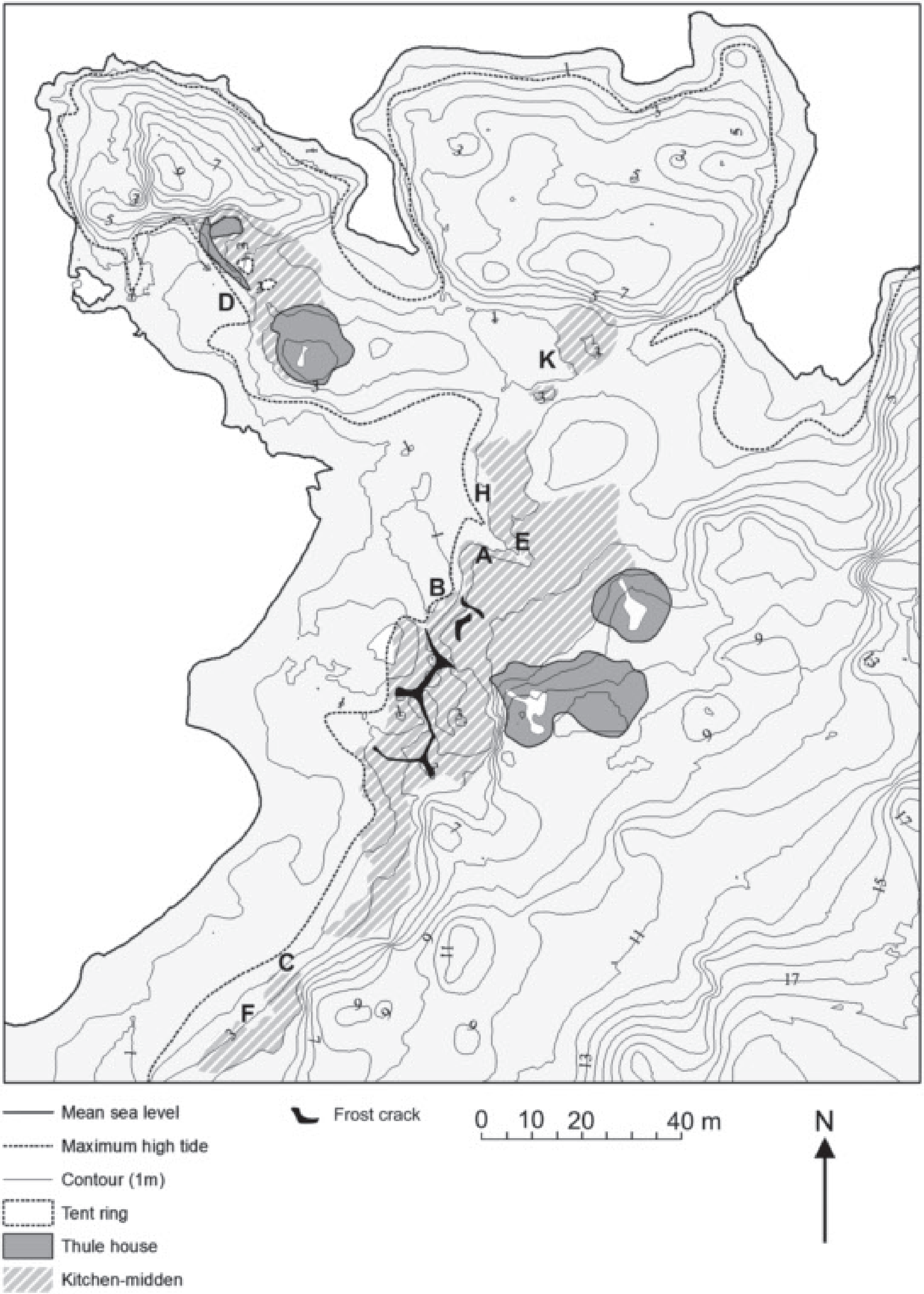


Fig. 2.2 *Topographical map of Qa including the position of Meldgaard's excavation areas from 1982. Survey by Bjarne Grønnow and Claus Andreasen, 2009. (Drawing by Jørgen Hollesen).*

Fjord, is thus exposed to the west, and both from the site area and from the northern knolls there is a perfect view towards the polynya.

The most prominent features at the site surface today are a few 'islands' of cultural layers covered with lyme grass, grass and dwarf bushes, divided by areas where ice floes and seawater waves have 'swept' the ground, resulting in the exposure of bare gneiss rock surfaces or cobble and gravel beaches. Surges from calving icebergs right next to the site – probably in combination with high tides – have even washed out a 'channel' through the northern part of the site. The most resistant parts of the old Saqqaq layers are those in the central/western part of the site, which are covered by a 30–50 cm thick sphagnum turf layer, and those protected by overlying 'house mounds' of Thule culture winter houses, i.e. the central eastern part of the site and the 'island' to the north-west. Two other 'islands' of Saqqaq layers are situated at the southernmost part of the site and to the north-east. They have survived probably because of their resistant texture of bones and fire-cracked rocks cemented by coagulated blubber (Fig. 2.3; Fig. 2.4). Peri-

Fig. 2.3 *Jørgen Meldgaard's Section A from 1984 was reinvestigated in 2009. The thick layer of well-preserved sphagnum peat (light brown) covering and isolating the massive Saqqaq cultural layer is seen above the excavator.*

Fig. 2.4 *Close-up of the erosion bank of one of the 'islands' of kitchen midden. Here the layers consist of twigs, burnt bones and fire-cracked rocks. Parts of the deposits are 'cemented' by coagulated blubber. (August 2009).*

glacial frost cracks, which are deepened by meltwater from melting snow patches on and above the site, are dividing the central area with its culture layers into sections, making them vulnerable to drainage and wave erosion from the bay to the west. The erosion bank is distinct. It is up to a metre high and has exposed the Saqqaq layers all along the shore (Fig. 2.5). Along most of the beach the layers have been washed away, but the erosion processes are more complicated at the central, permafrozen and sphagnum turf-covered area. Here contact with salty seawater thaws the Saqqaq layers and wave activity undermines the bank. However, the erosion processes are apparently delayed by the tough sphagnum layer, which sinks when undermined, bends over the bank, and to some extent protects the Saqqaq layers at the site.

It is possible to gain an impression of the rate of erosion at Qa during the last couple of centuries. This in turn gives an idea of the original volume of the Saqqaq layers at the site. When, as mentioned above, members of Nordenskjöld's team visited the site in 1870 (Nordenskjöld 1872), they excavated the front of an entrance passage of a Thule communal house (17th–18th century) and a section of the bone-rich midden structure belonging to it right next to the erosion bank (Fig. 1.2). This must have been the front of the northernmost Thule house ruin, of which only the back part of the back turf wall of the large dwelling room has survived till today (Fig. 2.6). Assuming that the entrance passage of the house was originally about four metres long, and that the original dwelling room was about four metres across – typical dimensions for these houses (Gulløv 1997) – the erosion caused by wave action has removed no less than eight metres of sediment on the northern site area over a period of about 130 years, an average erosion rate of about 6 cm per year. This fast rate of erosion during the last century or so cannot be typical of the entire time span following the end of the Saqqaq settlement at Qa *c.* 2,800 years ago (in that case almost 170 metres of the site area to the west would have been washed away), but we can conclude that important parts of the original site area have disappeared since Saqqaq times due to a combination of wave action (most probably single events like catastrophic surges from

Fig. 2.5
View over the erosion bank in Area D towards the south-east. (August 2009).

Fig. 2.6
The eroded back wall of the Thule common house north of Area D at Qa. (August 2009).

icebergs) and pressure from packing ice floes in winter and spring time. Probably the present separate 'islands' of culture layers at Qa were originally joined together, and several metres of culture layers in front of the present erosion bank existed before the erosion began, showing that the Saqqaq remains consisting of dwelling remnants and refuse heaps were originally extremely voluminous. Qa today is a veritable ruin of a once huge site.

2.4 Qeqertasussuk in the Sydostbugten

2.4.1 The island and the tombolo

Qeqertasussuk is the name of a small island (*c.* 2 km north–south and 3 km east–west) situated *c.* 35 km south of the town of Qasigiannguit in Sydostbugten at 68.592° N and 51.071° W in the south-east corner of the large Disko Bay. The island is separated from the mainland to the south and east by a 1–2 km wide strait (Qoornua) and protected from winds and swells from the open Disko Bay to the north by a number of small islands up to 200 metres high – mainly Tusaaq, Saallat and Akulliit (Fig. 2.7). Qeqertasussuk island itself is, typically for this region, a rounded knoll reaching a height of 220 metres at its highest, quite barren south-western part. The eastern part of the island shows a number of 'shelves' at different levels divided by steep cliffs facing east, resulting from the erosion of vertical layers of gneiss bedrock. Small ponds surrounded by moss heath, and – on drier ground – heaths dominated by *Empetrum* and dwarf bushes like *Betula nana* and *Salix galuca* add some life to this part of the island (Böcher and Fredskild 1993: 4–5). The coast of the island is not welcoming and in fact only one place offers favourable landing: a small tombolo forming the easternmost point of the island. This is where the Saqqaq site of Qt is situated (Fig. 2.8). The tombolo consists of an elongate rocky knoll (maximum height: 16 m.a.s.l.) – a former skerry – which is connected to the island by a 'saddle' of fossil raised sand and gravel beach ridges with a maximum height of 11 m.a.s.l. The inner, western part of the tombolo is delimited by 20–30 metre high vertical gneiss cliffs with scree consisting of large angular gneiss rocks at its foot. The view from the site area over the Qoornua strait and the protected part of the Sydostbugten to the north is excellent – not least from the top of the knoll.

2.4.2 The topography of the site

Traces of Saqqaq activities indicated by lithic flakes are found all over the tombolo, including the outer rocky knoll. The 'saddle' of raised beaches, however, forms the main settlement area and here traces of characteristic Saqqaq stone-built constructions like midpassages and hearths and refuse abound on and below the site surface.

The 30–40 m wide (E–W) and 50 m long (N–S) northern part of the tombolo is protected from the strong 'Sydosten' (föhn winds coming from the Inland Ice south of Qeqertasussuk) and, fed by nutrients from the soil and meltwater from a quite thick snow cover, the present vegetation – a mossy heath of *Empetrum*, *Salix* and *Poa* – thrives on this part of the site. In the shade of the vertical cliff on the north-westernmost area the environment is so moist that mosses dominate completely, forming an insulating 'mat'. The permanently frozen culture layers of Qt are limited to this northern vegetation-covered part of the site. To the north the site is delimited by a crescent-shaped 3–4 m high erosion cliff partly covered with patches of fallen turf and culture layers from above. The northern beach at the foot of this slope is sandy and protected by a skerry (Fig. 2.9).

Conditions at the top of the 'tombolo-saddle' and the south-facing part of the site are remarkably different from the northern part. The prevailing winds including the föhns have dried up and eroded the surface of the southern part, which is characterized by sedge, lyme grass and lichen-covered patches separated by barren 'blow-outs'. A polar fox den on top of the tombolo has shaped the surface as well. This 20–30 m wide (E–W) and 50 m long (N–S) part of the site is delimited to the south by a 15 m wide and 7–8 m high steep erosion slope ending in a rough boulder beach. Steep rock cliffs form the side edges of this southern beach.

Fig. 2.7 *View towards north-northeast from the mainland to the eastern part of the Qeqertasussuk island. The site is situated on the low, light grey promontory in front of the iceberg. (1985).*

Fig. 2.8 *View from the north-west over the tombolo, where the Qt site is situated on vegetated, raised gravel beach ridges. The mainland is seen in the background. (August 2009).*

Fig. 2.9 *View towards the west over the turf- and vegetation-covered northern area of the Qt site. (1987).*

2.4.3 The living resources in the vicinity of Qeqertasussuk

A detailed description and mapping of the biology of the present-day living resources in Sydostbugten can be found in Meldgaard 2004 (summarized in his Figs. 1.13 and 1.15 A–D). The following summary of that information aims at understanding the topographical position of Qt as regards resource utilization.

The south-east corner of Disko Bay is not particularly rich in living resources. In general, the area follows the seasonal pattern described above for the Disko Bay, but the resource-rich ice edge reaches this innermost part quite late. Thus Qt will, under present climatic conditions, first experience a resource boom when the fast ice has disappeared from the strait of Qoornoq, as late as in late June/early July. Then the vicinity of Qt becomes rich. Herds of harp seals, schools of capelin, and whales migrate through the strait and the bird cliffs teem with nesting gulls and other wildfowl. From Qt there is also access to cod in the sea and char runs in the rivers on the mainland close by. Finally the mainland across the strait offers game like caribou, fox and ptarmigan. Soon, however, the harp seals disperse and almost disappear from the area, and with them an important resource. The vicinity of Qt becomes productive again during autumn with the return of migrating harp seals, beluga and important sea birds like guillemot, little auk and eider. When fast ice is formed around Qt in January the accessible living resources are limited first and foremost to ringed seals. It is obviously no coincidence that only a single tent ring and no Thule winter houses were situated at the site, and that the ancient Thule settlements are typically situated, not at the island of Qeqertasussuk, but further north in Sydostbugten, closer to the present ice edges and ledges. It follows that the topographical position of Qt under present climatic conditions does not favour whole-year settlement at the site. At least the seasonal resource lows must be buffered by a strategy that brings in game from larders at a certain distance from the site, e.g. polynyas and the ice edges, in combination with the storage of resources like meat and blubber.

As at Qa, the environment of Qt was quite different during Saqqaq times. Meldgaard's thorough faunal analyses (2004: 97–158) based on thousands of bones from the stratified Saqqaq layers reflect an environment extremely rich in resources, which formed the basis of intensive, whole-year settlement at Qt, in particular during the earlier phases at the site, *c.* 2400–2000 BC.

2.5 Conclusions

As seen in the introduction above, the two sites differ considerably in many respects: Qt is situated on a tombolo on a small island in the inner part of a wide, quite protected bay, whereas Qa is situated on the mainland in Disko Bay in the centre of a deep fjord complex, where two large fjords meet. The areas and in particular the volumes of the culture layers at the two sites are different as well: the total settlement area of Qt (the gravel ridges of the tombolo) is c. 3,500 m^2 but only the north-western part of the site shows frozen culture layers, which do not exceed a thickness of 70 cm. In contrast, even if erosion has washed away the major part of the Qa site, today it still covers about 2,900 m^2 and includes an area of 200–400 m^2 with culture layers of an impressive volume: well over 2.5 metres thick in the central part and packed with cultural remains. Concerning resources: while the huge site of Qa seems to rest almost solely on the exploitation of harp and ringed seals, the smaller site of Qt shows a considerably broader resource base. This is apparent in numbers of game species identified in the faunal materials: at Qa *c.* 20 different species are represented, while *c.* 30 species were utilized at Qt. It must be kept in mind that, according to Meldgaard's analysis, Qt shows variation in resource exploitation through time, and that Qa would probably do the same if excavations had been made there with equally high stratigraphic resolution.

In spite of these basic differences in volume, topographical position and subsistence, the archaeological inventories of Qt and Qa are similar. The selection of raw materials, design of the artefacts and technologies are alike, as are the types of stone-built features. This will be elaborated below, where the archaeological evidence on the material culture and the stone-built features at the two sites will be presented *in extenso* and thoroughly analysed.

The tables listing the complete artefact and faunal material from the two frozen sites, Table 1.5.1, Table 5.4.1-1, 5.4.1-2, 5.4.1-3 and Appendix B Table 1, supplemented with Table 9.2 in Meldgaard 2004, provide an overview of the finds recovered. By their sheer volume, excellent preservation and variation, these materials stand out as quite unique in the Eastern Arctic.

3. Saqqaq Material Culture

3.1 Sources, theoretical approaches, methodologies and terminology

3.1.1 Overview: geographical and temporal range of the Saqqaq culture

Overviews of the historiography of palaeo-Eskimo research in Greenland are found in Meldgaard 1996, Grønnow 2005 and – concerning Disko Bay in particular – in Jensen 2006. From these publications it can be seen that both the empirical material and our insight into Saqqaq material culture have multiplied during the last two to three decades.

Apart from the excavations at Qt and Qa, a number of campaigns published from the 1990s onwards have yielded substantial knowledge of the Saqqaq: archaeological surveys and excavations on Ellesmere Island (Schledermann 1990), in Disko Bay (Olsen 1998; Jensen 2006) and the Sisimiut (Kramer 1996a; Gotfredsen and Møbjerg 2004) and Nuuk regions (Hinnerson-Berglund 2004). A number of surveys and trial excavations have produced information on Saqqaq sites in other regions: Inglefield Land and Avernarssuaq (Thule) (Diklev and Madsen 1992; Appelt *et al.* 1998; LeMoine and Darwent 2010), the Ammassalik and Skjoldungen area (Møbjerg 1986; Jensen 1996), the Scoresby Sound area (Sandell and Sandell 1996) and the Clavering Ø area in north-east Greenland (Sørensen 2012b). Furthermore, Saqqaq lithic tools and waste have been located in wall turfs from Thule winter houses in areas where the sites themselves have been destroyed by erosion (Mathiassen and Holtved 1936). Finally, early collections donated to the National Museum by a wide range of non-professionals during the last 150 years add information as well (Meldgaard 1996). Thus, we are able to define the maximum geographical range of the Saqqaq culture to an area stretching from 'The Gateway to Greenland' (Ellesmere Island/Inglefield Land) to west, south, east and north-east Greenland (Grønnow and Sørensen 2006), i.e. the entire island except for the northernmost and north-easternmost High Arctic Greenland (Fig. 3.1). A series of screened radiocarbon dates, mainly from West Greenland (Jensen 2006: 172–76), define the overall time frame of the culture's presence in Greenland: *c.* 2400 cal BC – 900/800 cal BC.

Fig. 3.1 *The geographical range of the Saqqaq Culture. Saqqaq sites have been identified within the shaded, green areas on the map, but the entire island except northernmost and north-easternmost Greenland was probably settled by the Saqqaq at some point in time. The gaps in West Greenland at least are due to fragmentary archaeological surveys in these regions and/or transgressions which have destroyed the early sites.*

3.1.2 The character of the sources

Even taking the substantial results from the last decades into consideration, it must be kept in mind that the evidence on the Saqqaq is quite heterogeneous. The number and density of Saqqaq sites within the culture's geographical range to a large extent reflect the intensity and aims of archaeological surveys in the different regions, but they are also a function of topographical and geological factors. Briefly stated, the contrast between the remarkable site densities in West Greenland (Disko Bay to Nuuk) and the often sporadic Saqqaq traces beyond this region is probably disproportionately high due to the fact that intensive surveys and professional excavations have been carried out in West Greenland since the beginning of archaeology in Greenland. That is certainly not the case outside this area. New surveys aimed at locating palaeo-Eskimo sites in so-called 'marginal areas' are changing the picture of the Saqqaq settlement range (e.g. Sørensen 2012b). However, in some areas erosion and submergence of Saqqaq sites have removed most of them from the archaeological record forever, in particular in southernmost Greenland (e.g. Raahauge *et al.* 2005).

Almost all Saqqaq sites share the sad fact that only lithic tools, debitage and some fragmented stone-built structures have survived. It is important to take this lack of organic materials into account when evaluating the potential of comparative studies in relation to the unique sites of Qt and Qa. However, whereas no other Saqqaq sites show preservation of wood, skin, feather, etc., a couple of excavated sites have produced artefacts of antler, ivory and bone, which adds greatly to the value of the technological and chronological comparative studies. These rare organic artefacts belong to the following sites: Nipisat in Sisimiut municipality (Kramer 1996b; Godtfredsen and Møbjerg 2004) and Itinnera in Nuuk municipality (Meldgaard 1961; Møhl 1972).

Stone-built features form an informative dataset on Saqqaq sites from practically all regions of the geographical range. In particular, well-documented dwelling and hearth features are found in the Sydostbugten area (Olsen 1998; Jensen 2006) and the Sisimiut (Kramer 1996b) and Nuuk municipalities (Appelt and Pind 1996; Hinnerson-Berglund 2004; Appelt 2006), but also East Greenland, from the Skjoldungen area in the south (Jensen 1996: 145–46), via Ittoqqortoormiit (Sandell and Sandell 1996) to Hvalros Ø (Sørensen 2012b) in the north, has yielded important evidence on dwelling remains.

3.1.3 Theoretical approaches and analytical methods

Considering the interdisciplinary character of the investigations of the frozen sites, as well as the main goal of the present monograph – the creation of a holistic picture of the Saqqaq culture – it was clear from the beginning that various theoretical approaches to the study of material culture had to be applied in concert. Likewise, an entire suite of analytical methods would need to be applied for this work (see also Dobres and Hoffmann 1994).

The starting point of the monograph is the presentation and analysis of comprehensive original archaeological data and contextual information derived from the excavations at the two frozen sites. The emphasis on deep descriptions of the finds is justified by the unique character of the objects. Important parts of the finds have never been presented before, and one way to make these objects accessible to the professional as well as the lay world is – in a positivistic spirit – to present descriptions of artefacts, stone-built structures, culture layers, etc. that are as objective and complete as possible.

However, other approaches to material culture than plain descriptions are obviously applied in the present work: as indicated above, the idea of gaining insight into the material culture by arranging the artefacts in classes according to their (inferred) related functional properties has determined the organization of the following descriptive chapters. This approach is based on the concept of 'tool kits' – an approach that flourished quite early in our Arctic field of anthropological and archaeological research in the shape of a series of now 'classic' ethnographies, in which material culture studies were essential (e.g. Birket-Smith 1929; Nelson 1899; Nansen 1891; Boas 1888, 1901, 1907; Jenness 1922; Mathiassen 1928; Porsild 1914; Turner 1894). The application of the tool kit concept in an archaeological context must obviously be based on formal and – where possible – relational analogies between ethnographic and archaeological sources (Ravn 1993, 2011; Grønnow 1987a, 1993; Wylie 1985; Hodder 1982, Hodder and Hutson 2003). Relational analogies are feasible as strong interpretive tools when ethnographic present and archaeological past are connected by cultural/historical continuity (e.g. Gulløv and Kapel 1980; Gould 1977; Sturtevant 1966), but in our case such a 'direct historical approach' to the analysis of Early ASTt Saqqaq material culture is clearly impossible. Thus, by necessity the division of the prehistoric artefactual material into 'tool kits' and considerations of tool functions draws heavily on formal analogies between, on the one side, ethnographically described Inuit, Iñupiat and Yupik technology and, on the other side, the artefacts from the frozen sites. As will be seen, the interpretive potential of some formal analogies can be reinforced through contextual archaeological evidence.

In the present work the 'functionalistic' approaches to material culture are qualified and expanded through a prism which possesses explanatory power: the *chaîne opératoire* or 'dynamic technological approach' (Leroi-Gourhan 1993; Sørensen and Desrosiers 2008; Sørensen 2012a). Analysis of the 'life cycle' of artefacts (as well as architectural constructions (Ryan 2009)) at archaeological sites through careful analysis of raw materials, preforms, finished items and subsequent stages of the material outcome of tool manufacture and use, and the final deposition of the items on the site, provides insight into the motor skills, preferences, technical solutions and the mental templates which guided the manufacturing processes. The influence of the *chaîne opératoire* approach, which prioritizes processes rather than morphology, is evident in the present book. The methods of experimental archaeology, which are closely related to *chaîne opératoire*, are applied as well. Results from the author's and his colleagues' practical experiments are incorporated (e.g. Appelt *et al.* 2012), but it is evident that we have only 'scratched the surface' and comprehensive, systematic experimental work with lithic and organic reduction processes – as well as with the functionalities of the different, often composite, Saqqaq tools – lies ahead. Due to the excellently preserved artefacts and debitage at Qa and Qt, these sites provide a perfect starting point for future controlled experiments with Saqqaq technology.

Analyses of architecture – in our case, mainly dwelling floors with stone-built structures – play an important role in the monograph due to the fact that a single chronological horizon on the Qt site contained preserved structures representing only a brief time period. This provides the basis for a comprehensive analysis of the architectural remains at Qt – analysis which is guided by a perception of architecture as simultaneously resulting from and shaping the life and world views of the occupants. Thus insight into the well-preserved architectural remains is important for the holistic picture of the Saqqaq culture that we are aiming for. A series of anthropological, ethno-archaeological and archaeological works on architecture and other sorts of 'constructed space' among small-scale societies provides the guidelines for interpretation of the structural remains at the frozen sites. Among the literature directly related to the present study is: Lawrence and Low 1990; McGuire and Schiffer 1983; Parkington and Mills 1991; Binford 1991. Karen Ryan (2009) has provided us with an important and very comprehensive update of analyses of the architecture of small-scale societies in general and the prehistoric Arctic societies in particular.

Examination of intra-site spatial distributions of artefact and refuse in context with architectural remains is a classical archaeological discipline. In relation to the Arctic, spatial analyses at different levels of detail have been conducted since the 1970s in relation to the identification of habitation floors and activities inside and immediately outside dwellings (e.g. Olsen 1998; Schledermann 1990; Meyer 1977; McGhee 1979; Stapert and Johansen 1996b; Jensen 1998; Renouf and Murray 1999). In particular, Bryan Hood's discussion (2008: 23–52) of theoretical as well as methodological aspects of intra-site spatial analysis is important. The present author's work takes its starting point in this strong tradition of conducting intra-site analyses, and this is reflected both in the excavation strategies chosen at the Qt site and in the presentation of the data. The analyses draw on methodologies originally developed by Cziesla (1990; see also Stapert and Street 1997), and in accordance with this, artefact distributions and densities are shown either as plots on the excavation maps marking the positions of the individual artefacts or by circles per excavation unit, where the diameter of the circle signature is related to the absolute number of objects in the unit. With this presentation of data we are provided with a tool that facilitates identification of spatial patterns of artefacts and refuse through 'simple visual inspection', and this is, in the experience of the present author, more productive for the interpretation process than the various numerical/statistical methods that were explored some years ago in order to identify densities of and relations between artefacts, refuse and architecture on site surfaces (e.g. Blankholm 1991).

The results of the technological, architectural and spatial analyses invite attempts to interpret the archaeological evidence from the Qt site with a view to gender relations. This subject, in particular concerning gendered space within dwellings of the late Dorset, has been treated in a most inspiring way by Geneviewe LeMoine (2003) (see also Boismier 1991; Yates 1989; Whitelaw 1994), and her studies form a guideline. Parallel to this, an attempt is made to trace the presence of children at the frozen sites, drawing upon ethnographical (e.g. Guemple 1988) as well as archaeological literature (Lally and Moore 2011).

Substantial evidence points to the remarkable normative role of 'things' and architecture, which framed and influenced everyday life for the members of Saqqaq society. As will be seen, we observe a quite homogeneous material culture over vast areas that, moreover, is stable throughout millennia. This is a material conservatism that finds no immediate analogies in later Arctic societies, which are known for being very dynamic and open to incorporation of new raw materials, designs and technological solutions. This calls for interpretation. Here Pfaffenberger's view on 'sociotechnical systems' (1992), which produce power and meaning as well as goods, is important to the analytical parts of the present monograph.

How do we understand raw materials, tools, architecture and symbolic representations as agents interplaying with the individuals who created these material manifestations? We must turn to theoretical literature, which deals with the multifaceted agencies of material culture and the role of 'things' and other living beings in relation to individuals and society. Works such as Lemonnier (1992), Dobres and Robb (2000), Hill (2011) and Olsen (2003, 2010) inspired the author in this respect, as will be apparent from the interpretive chapters.

Finally, in accordance with the ambition of placing the frozen sites and Saqqaq culture in a broad temporal and geographical Eastern Arctic perspective, basic comparative analyses across the archaeologically defined cultures of the Early ASTt are conducted. Here critical evaluations of radiocarbon dates, comparisons of raw material processing, technologies, architecture and artefacts are presented, and this widens the understanding of the Saqqaq phenomenon considerably.

3.1.4 Terminology and the starting point for descriptions and analyses of the assemblages

In accordance with the ethnographically based arrangement of artefacts into *tool kits*, the terminology assigned to Saqqaq technology in this book is derived from Arctic 'classics' like Porsild (1914), Mason (1902), Nelson (1899) supplemented with Fitzhugh and Kaplan (1982). As mentioned in the introduction, the almost complete preservation of the entire range of materials on the frozen sites allows this 'ethnographic approach' to the overall interpretation and classification of the Saqqaq material culture.

There are variations in the nomenclature used in the literature, due to differences in the different authors' sources, research traditions and study objects, be they Inuit, Iñupiat or Yupik technologies. In cases of doubt the present work prioritizes the taxonomy from Fitzhugh and Kaplan (1982). In some cases, in particular concerning archaeological typological details, the dictionary by Linda Owen (1991) is applied.

In the present work the Saqqaq tool kits (based on ethnographic interpretation and nomenclature) consist of *artefact classes*. For example, the 'hunting tool kit' consists of the following, likewise ethnographically defined, artefact classes: bow and arrow, darts, lances, harpoons, throwing boards, etc.

The next level of detail is based on a 'classic' archaeological typology: each artefact class consists of *types*, which are defined by common metric properties and/or shared morphology of the artefact types. For example, analysis of metric properties of bifacial, symmetrical projectile points allows a division into five types, a–e. These types are defined by measurements of the maximum blade width and stem width of each intact point and depicted as clusters of points in a simple plot. When compared with the results of the analysis of wooden foreshafts in the assemblage, these metrically defined types of lithic bifaces translate into points or heads for specific artefact classes like arrows, darts and lances of different 'calibres'.

Finally, a type can be further divided into *groups*, which is again based on analysis of raw material, morphology or metric properties. For example, end scrapers of Type B, the 'standard' fan-shaped Saqqaq end scraper, form two clusters in a l/w plot, revealing the existence of two groups, B1 and B2, ultimately determined by different angles between their side edges.

It goes without saying that the properties selected for measurement must be chosen with care and based on a profound understanding of the *chaîne opératoire*, in particular the fracture and resharpening patterns of the different artefacts. Thus, it makes sense to base analysis of burins on measurements of the proximal end, which typically – due to the hafting – was unchanged throughout the burin's 'life cycle', whereas the distal (active) end was exposed to several resharpening episodes before the exhausted burin was finally pulled out of the blade bed and ended up among the waste on the site.

The present work does not use a historic or modern Greenlandic/Inuit taxonomy of material culture components. This is due to the fact that the publication is aimed at an English-speaking professional audience. Moreover, the source material is of archaeological origin, and work remains to be done in order to tabulate archaeological components and details in Greenlandic. However, Mariane Petersen's recent translation of Gulløv (ed.) 2004 from Danish into Greenlandic (Gulløv 2006) forms an excellent starting point for a future professional Greenlandic archaeological taxonomy.

The structure of the following chapters is guided by the description of the finds from Qt, which compared to Qa is the more comprehensive and better documented assemblage. However, the finds from Qa supplement the Qt material nicely and fill in knowledge gaps. Taken together, the two assemblages provide the most detailed insight into the Early ASTt material culture yet acquired.

It is important to note that the following typological analyses, which are based on morphology and metric properties of artefacts, treat variations primarily as functionally determined (in a broad sense), not as temporal. This is done even if the two assemblages in concert cover the entire time span of the Saqqaq culture, about 1,500 years. The justification for this analytical approach consists of the fact that thorough analysis of the stratigraphy of culture layers at Qt, combined with radiocarbon dates (Chapter 4), clearly documents that chronology is only a minor source of typological variation among the artefact types and classes. Saqqaq material culture was remarkably steady through time.

The following integrated descriptions and analyses begin with the Saqqaq hunting tool kit. This is followed by chapters on hand tools, household utensils, parts of constructions, and raw material utilization and processing. Table 1.5.1 provides an overview of the artefact materials from Qt and Qa and each main chapter is provided with a summary.

3.2 The Saqqaq hunting tool kit

3.2.1 Bows

Nineteen wooden objects and two pieces of whalebone from Qt are designated bow components or bow component fragments.

3.2.1.1 Bow limbs (Fig. 3.2)

A complete specimen (Fig. 3.2a), which still lacks finish, is a 'standard' bow limb: it is 452 mm long and 32 mm wide, and its thickness at the central part of the limb is 16 mm. The cross section shows an almost flat broad side (probably the back of the bow) and an opposite rounded side. The flattest part of the limb is the central part between a proximal, bevelled end and a distal end showing a rounded rectangular or almost square cross section. In this specimen the growth rings run perpendicular to the broad sides of the bow, but this is not common.

Another six pieces are large bow limb fragments which fit this standard in size and cross section variation through the different sections of the limb (max. width [w]: 29–33 mm; thickness, central part of leg: 12–19 mm). Two of these show bevelled proximal ends with roughened surfaces for securing the scarf links and the lashings (Fig. 3.2b). The remainder are distal limb fragments which were snapped with great force (Fig. 3.2c and Fig. 3.2d). The limb ends are only intact in one of these large fragments (Fig. 3.2e). There are no notches for strings on this piece. However, two small distal fragments show two different string notch designs: The one shown on Fig. 3.2f has an end with tapering sides and marked shoulders, and the other is a bow limb end showing very narrow and low side notches for the loop of the string (Fig. 3.2g).

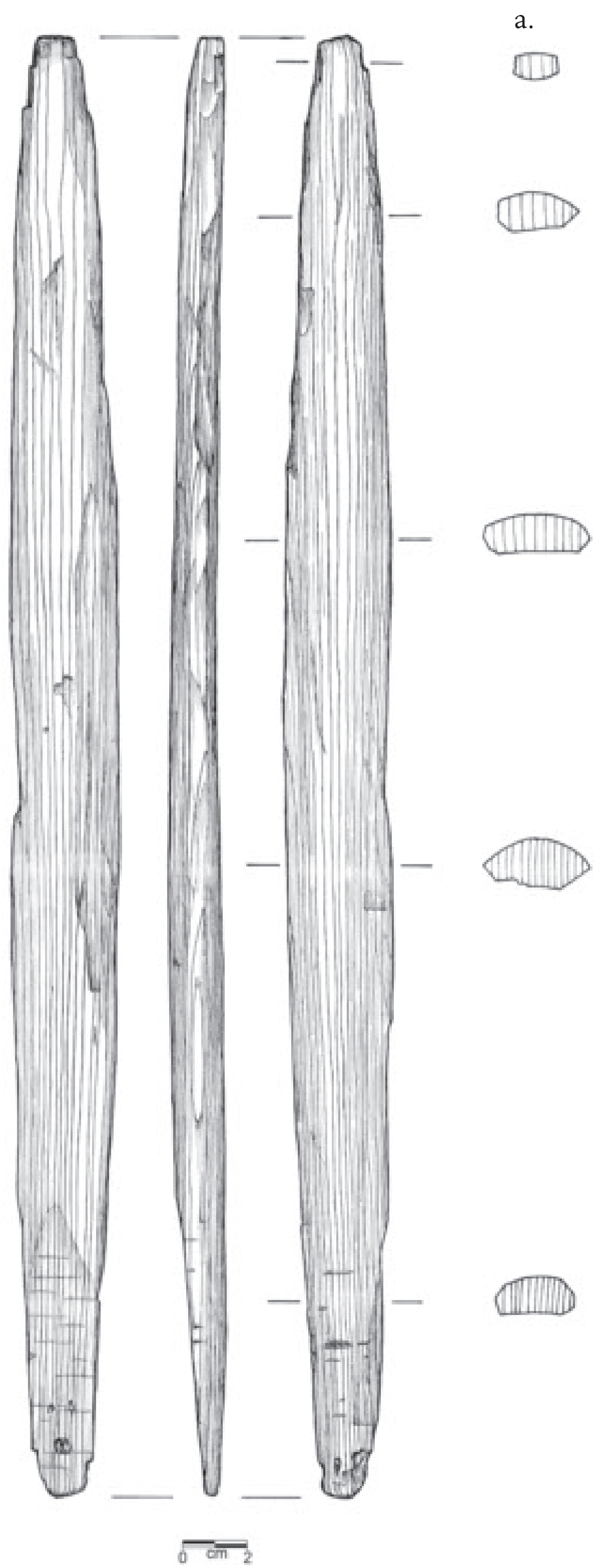
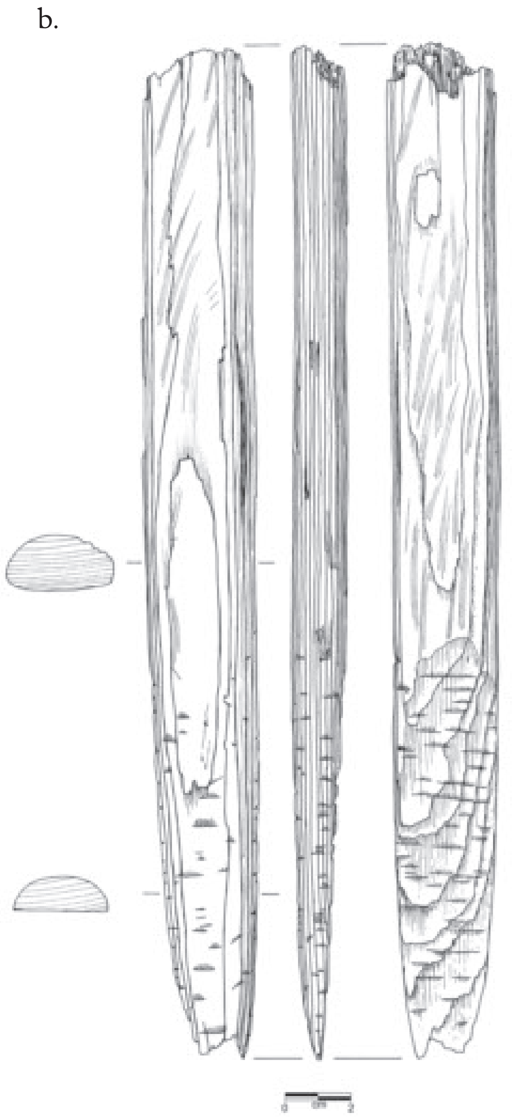


Fig. 3.2
Bow limbs from Qt.
a: *85/259: 2*



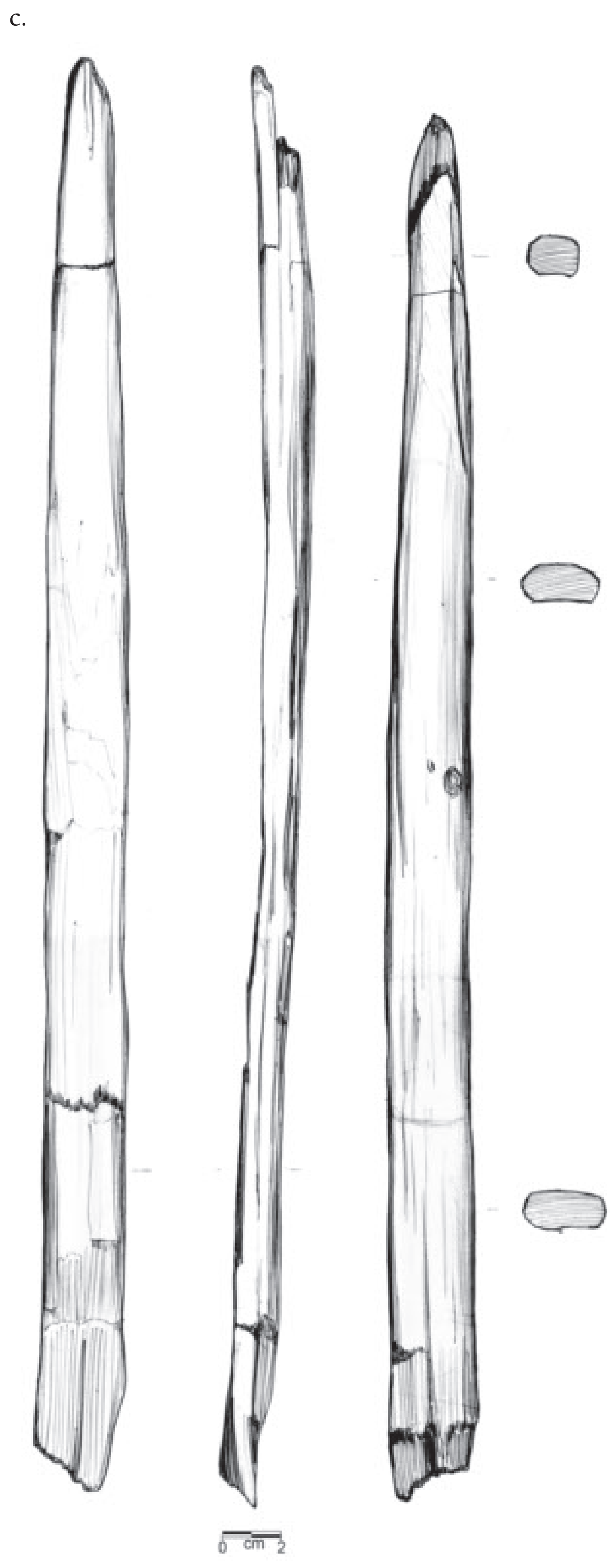
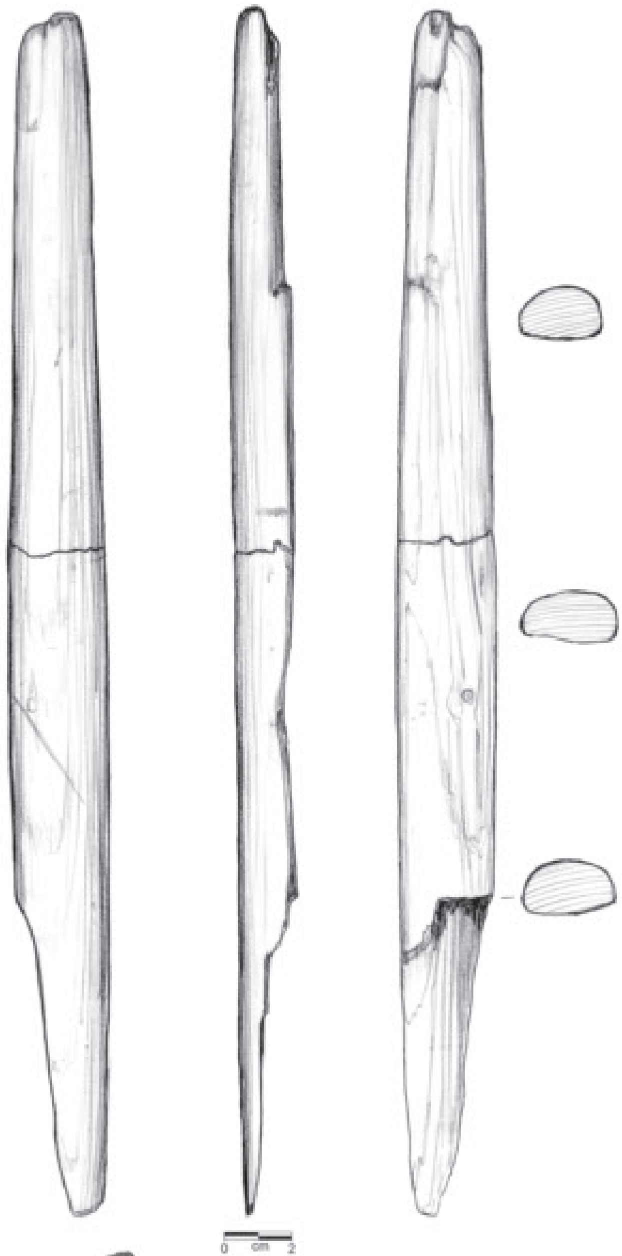
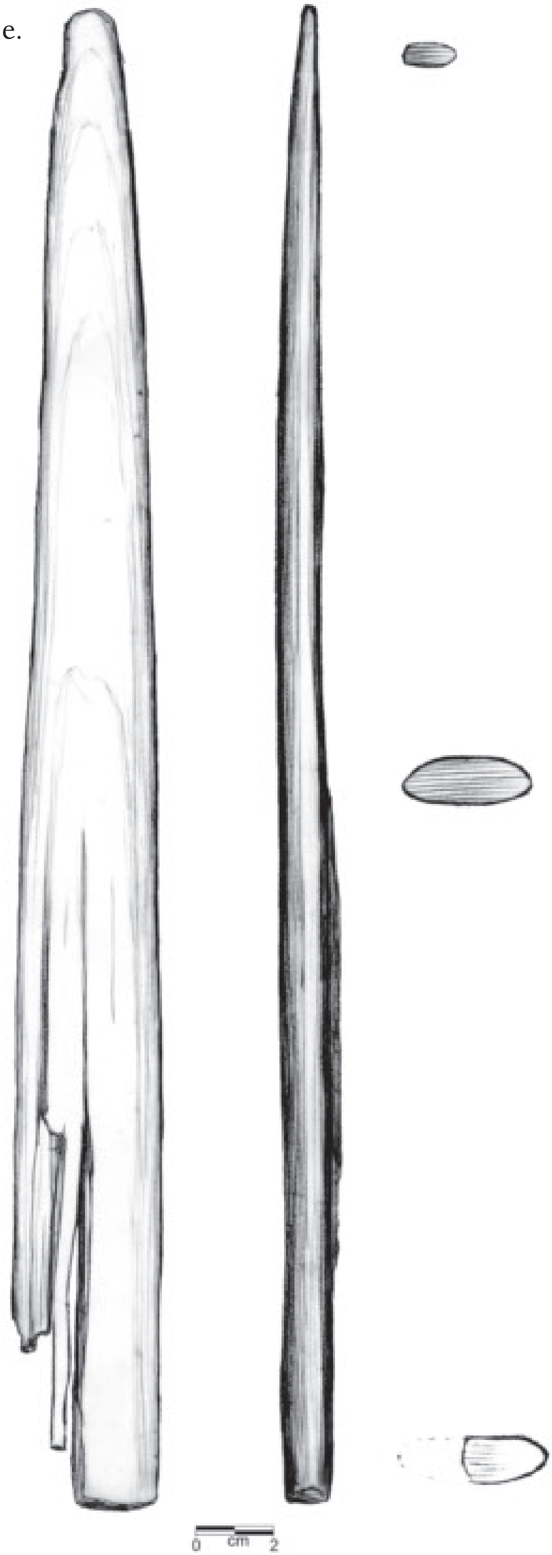


Fig. 3.2
Bow limbs from Qt.
b: *14/24: 14*
c: *84,5/254,5: 16*
d: *20/19: 85*
e: *14/23: 29*
f: *11/24: 63*
g: *12/24: 3*

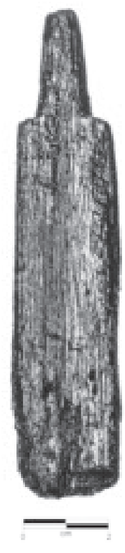
d.



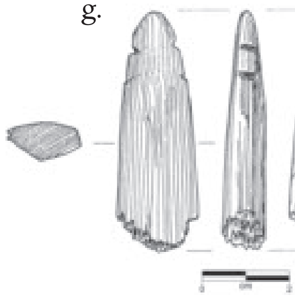
e.



f.



g.



The bow limbs were part of composite bows, but there are no obvious candidates for mid sections of bows.

3.2.1.2 Cable backing (?)

The composite Saqqaq bows were probably – like most historic Arctic bows (Birket-Smith 1914) – reinforced by means of a sinew backing. The flat front side of the bow formed a suitable base for a sinew cable and the shallow groove on the front of the supposed mid-section points in the same direction.

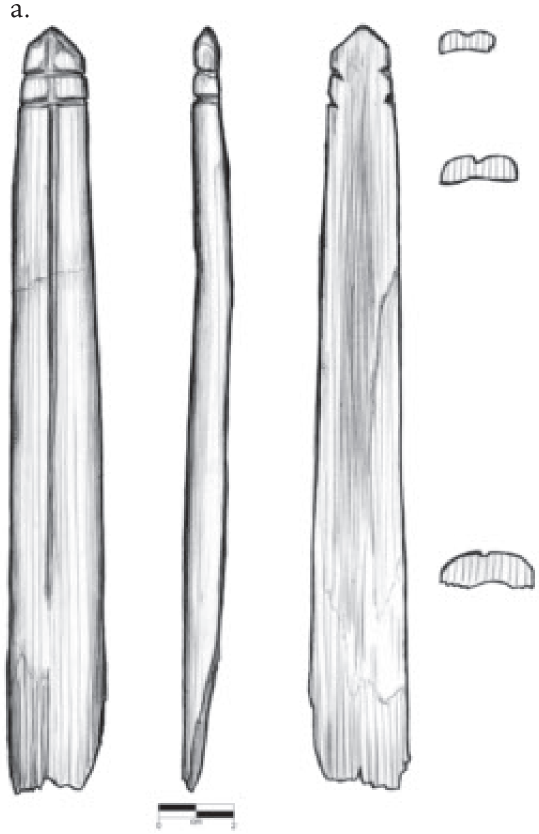
This leads to the mentioning of two distal fragments of possible limbs of bows which, to judge by the grooves along the mid-line of their back sides, indicate the presence of an original sinew backing:

88,0/249,5: 20 shows a shallow, broad groove along its flat back and a narrow groove on its belly side running from the distal end and 140 mm along the mid-line of this side. There are two parallel, narrow notches cut into the sides and belly side of the very distal end. Max. w: 23 mm; thickness: 10 mm (Fig. 3.3a).

'12-13/25: in profile' shows a narrow groove along its flat back and a tapering end with slightly marked shoulders for anchoring the backing and the loop of the bow string. Max. w: 21 mm; thickness: 17 mm (Fig. 3.3b).

If these fragments do in fact represent hunting bows, they add a smaller and more 'gracile' reinforced bow type to the Saqqaq hunter's tool kit.

a.



b.

Fig. 3.3
'Gracile' bow type.
a: *88,0/249,5: 20*
b: *Found in section 12–13/25 (4 cm above sand).*

3.2.1.3 Toy bows (?) (Fig. 3.4)

One specimen could be a toy bow. It is a tiny bow model – only 258 mm long and 5 mm thick – with tapering ends with marked shoulders for the bow string. It has a flat back and a rounded belly like the functional bows (Fig. 3.4–1).

A larger, probably functional complete bow with a flat cross section – l: 537 mm; w: 30 mm; thickness: 11 mm – could have been a functional child's bow (Fig. 3.4–2).

3.2.1.4 Steps of the *chaîne opératoire* (Fig. 3.5)

The raw materials of twelve specimens have been identified: seven are of *Larix* sp.; four are of *Picea* sp. and one is of *Pinus* sp. Thus there is a preference of *Larix* sp. for bow limbs.

85/263:14 is a blank of a bow limb (Fig. 3.5). It shows the beginning of the working process: a split piece of wood was shaped by means of precise chopping with an adze. The rough outline of a bow leg cross section with flat back and rounded belly side is seen. The growth rings run almost parallel to the back of the leg, which is the much-preferred direction of the rings in bow limbs. The next step is represented by 85/259: 2 (Fig. 3.2a), which is closer to the final shape. The belly side was smoothed but adze chopping marks are still visible. Finished, and later forcefully broken and discarded bow limbs, are shown in Fig. 3.2b–g. Finally, discarded bow components were used as raw materials for other tools or reused as poles.

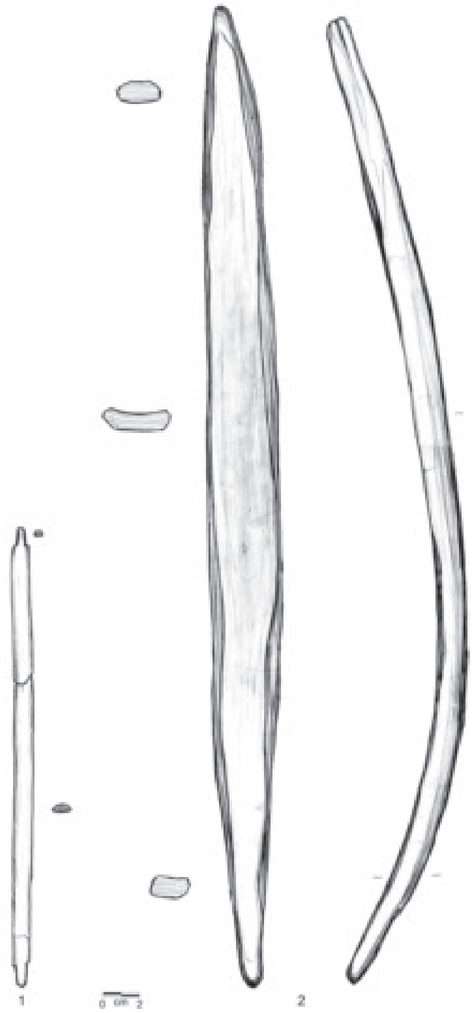


Fig. 3.4
Toy bows? 1: 25/21: 14; 2: 'Qt 90, Gerdas felt'.

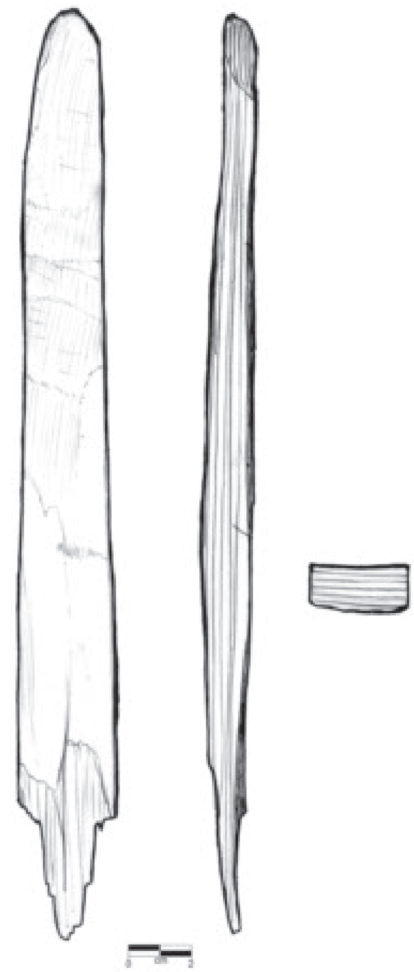


Fig. 3.5
Bow limb blank (85/263: 14).

Finds from Qajaa (Fig. 3.6):
Four bow limbs or possible bow limb fragments have been recovered from Qajaa. One of these (F238) was already recognized during excavation due to the presence of two laterally placed notches in the edges *c.* 2.5 cm from the distal end of the bow limb. The cross section of the 37.5 cm long bow limb is rectangular, 2.8 cm wide and 1.4 cm thick. There are many marks from the working of the surface, yet the specimen appears somewhat expedient or unfinished. Three pieces of bow limb have the characteristic ovate, flattened cross sections that characterize the specimens from Qt. One (F267) is broken distally, but with a scarf in the proximal end, 2.4 cm wide and 1.2 cm thick; the other (C88) is broken towards the proximal end, 2.4 cm wide, 1.8 cm thick and with an exquisitely finished pointed distal end without notches. A distal fragment (E,b, 90–100) has a tapering end and marked shoulders for fastening the bow string (and a sinew backing (?)), like the single fragment from Qt shown in Fig. 3.2f. The last specimen (E194) is a minor possible bow fragment, 2 cm wide and 1.3 cm thick. Interestingly, the bow limbs from Qajaa do not have the growth rings parallel to the back or broad sides of the limbs.

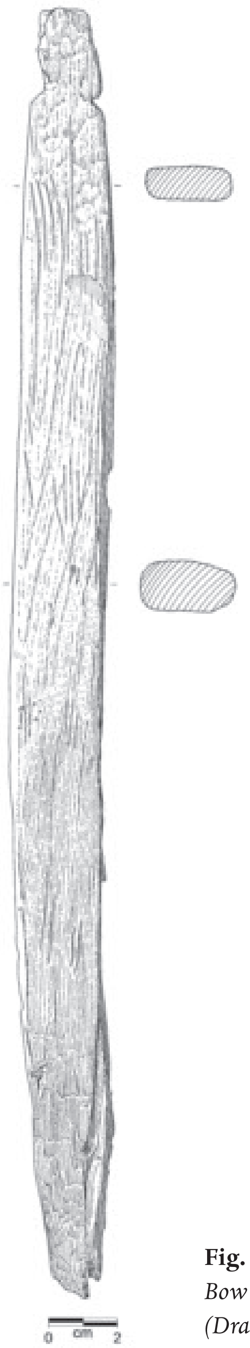


Fig. 3.6
Bow limb fragment from Qa (F238). (Drawing: Pia Breinholt (PB)).

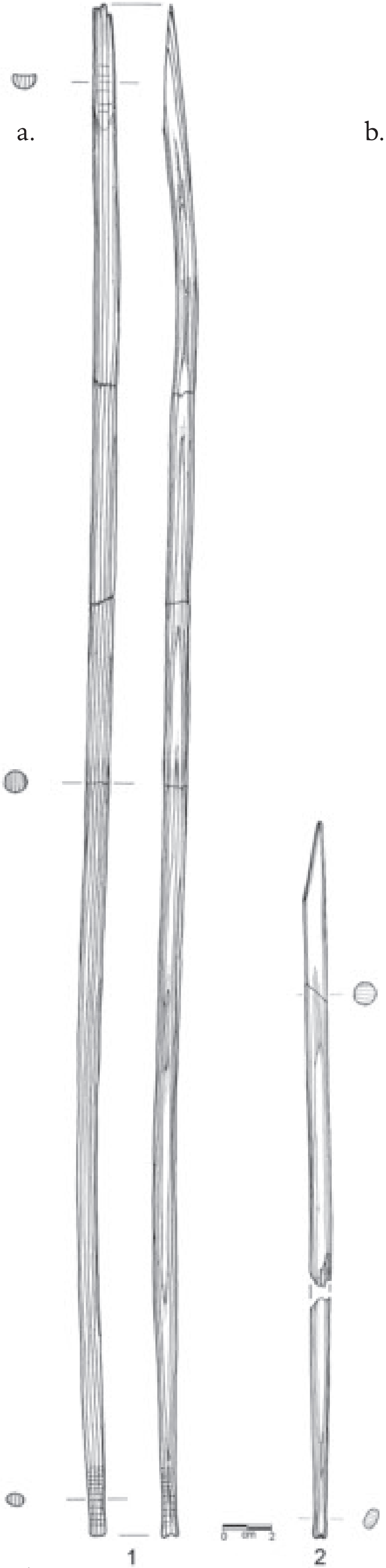
3.2.2 Arrows

No fewer than 78 wooden specimens are classified as arrows and fragments thereof. Main shafts with notch (6), foreshafts with blade bed (9), fragments with tapering scarf end (27), shaft fragments (36), and 56 arrowheads make up this informative material.

The Saqqaq arrow consists of at least three components: a main shaft with notch in the proximal end and, originally, feathers. The distal end of this shaft component tapers, and a foreshaft, likewise with tapering end, was lashed to it, forming a scarf link. The distal end of the foreshaft shows a shallow blade bed into which the tapering stem of an arrowhead, usually of killiaq, was originally lashed. As demonstrated below, the total length of a 'typical' complete Saqqaq arrow from notch to point is calculated at about 70 cm.

3.2.2.1 Main shafts (Fig. 3.7)

Of the six main shafts with preserved nock ends Fig. 3.7a – 1 is the most complete piece. It is 625 mm long and carefully crafted so that the cross section smoothly varies from a circle of 10 mm at the distal bevelled end, via 9 mm at the middle part to a narrow oval cross section of 5 × 7 mm at the basal end 10–15 mm above the notch. The cross section of the very nock end expands to



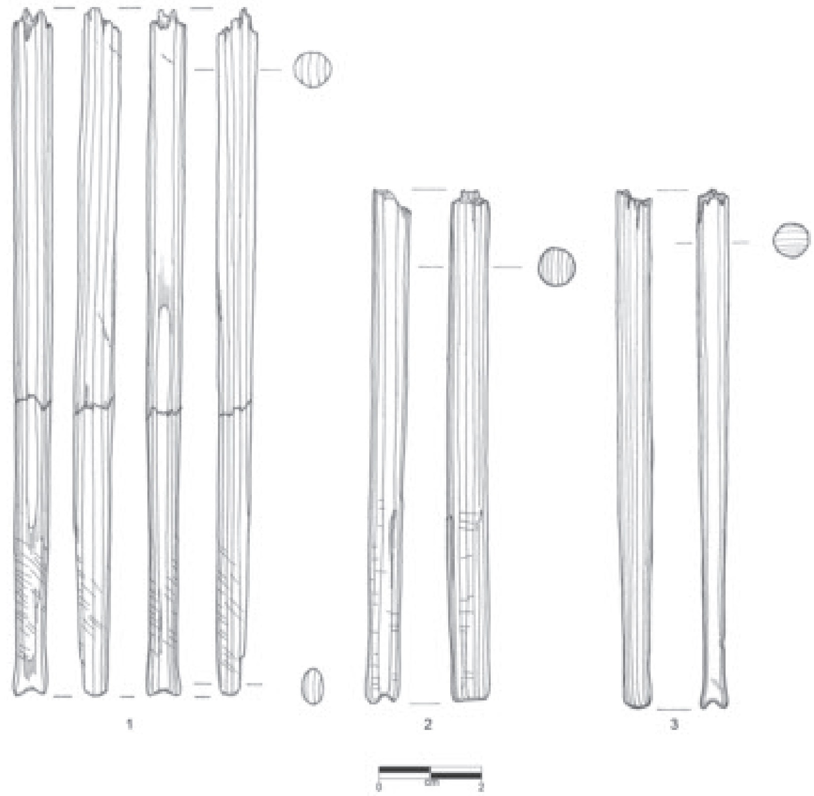


Fig. 3.7
Arrow shafts.
a: *1: 85/264: 6; 2: 85/262: 11*
b: *1: 89,0/248,0: 6; 2: 14/23: 6; 3: 10,0/23,0: 95*

a circle of approximately 7 mm in diameter, and thus the proximal end of an arrow was shaped in order to provide a firm grip of the arrow. The notch is oriented parallel to the plane of the scarf link at the distal end. Thus the notch is parallel to the edges of the arrowhead (see below). Traces of lashing for feathers and for reinforcement of the nock end are preserved as alternating dark and light oblique bands in a 20–30 mm broad zone about 5 mm above the notch. The traces do not reveal the number of feathers or the length of these. The surface of the scarf is provided with oblique scratching in order to stabilize the joint linking the main shaft to the foreshaft.

The other main shafts supplement this information in different ways:

Fig. 3.7a – 2 shows a complete main shaft which is only 295 mm long. This indicates that arrow shafts could have consisted of three or more components joined by scarf links as a result either of repair or lack of long pieces of high quality wood. Two fragments show a 25–30 mm broad zone of scratching and lashing traces above the nock end (Fig. 3.7b – 1–2), just like the long, complete main shaft. Lashing traces on a fragment (19/20: 97) cover an 80 mm zone above the nock end, indicating that the feathers of a Saqqaq arrow were at least that long.

The diameters of the distal ends of the most complete main shafts with notch for the bow string vary from 8–10 mm, which provides a clue for the identification of arrow shaft fragments based on a simple metric parameter.

3.2.2.2 Foreshafts (Fig. 3.8)

Nine specimens are complete or nearly complete arrow foreshafts. Six of these are 'typical'. They show a bevelled proximal end and a shallow distal blade bed (40–55 mm long and 8–11 mm wide) for the tapering end of the arrowhead (Fig. 3.8 – 3). A single piece (Fig. 3.8 – 1) shows a lowered zone or bed for the lashing behind the pointed distal shaft end, making the distal part of the arrow completely 'streamlined'. Fine oblique scratching is seen where a roughened, stabilizing surface was useful: in the blade beds, on the bevelled proximal ends (the scarf joints) and in the lashing zones (around the blade beds and around the scarf joints).

The mean length of the 'typical' foreshaft is 135 mm (var.: 130–145 mm). When the mean length of the scarf joints is subtracted, these foreshafts add on average 78 mm to the length of a 'typical' main shaft. Diameters vary from 8–11 mm, with a mean of 9.8 mm. Fig. 3.18 shows how the cross section diameter of the arrow foreshafts distinguishes them from the other heavier categories of missiles belonging to the Saqqaq hunter's tool kit. It must be mentioned that the cross section diameters of foreshafts for heavy arrows and foreshafts for light darts (propelled by a throwing board) probably overlap around 11 mm, and that there are no certain morphological characteristics to distinguish the two types

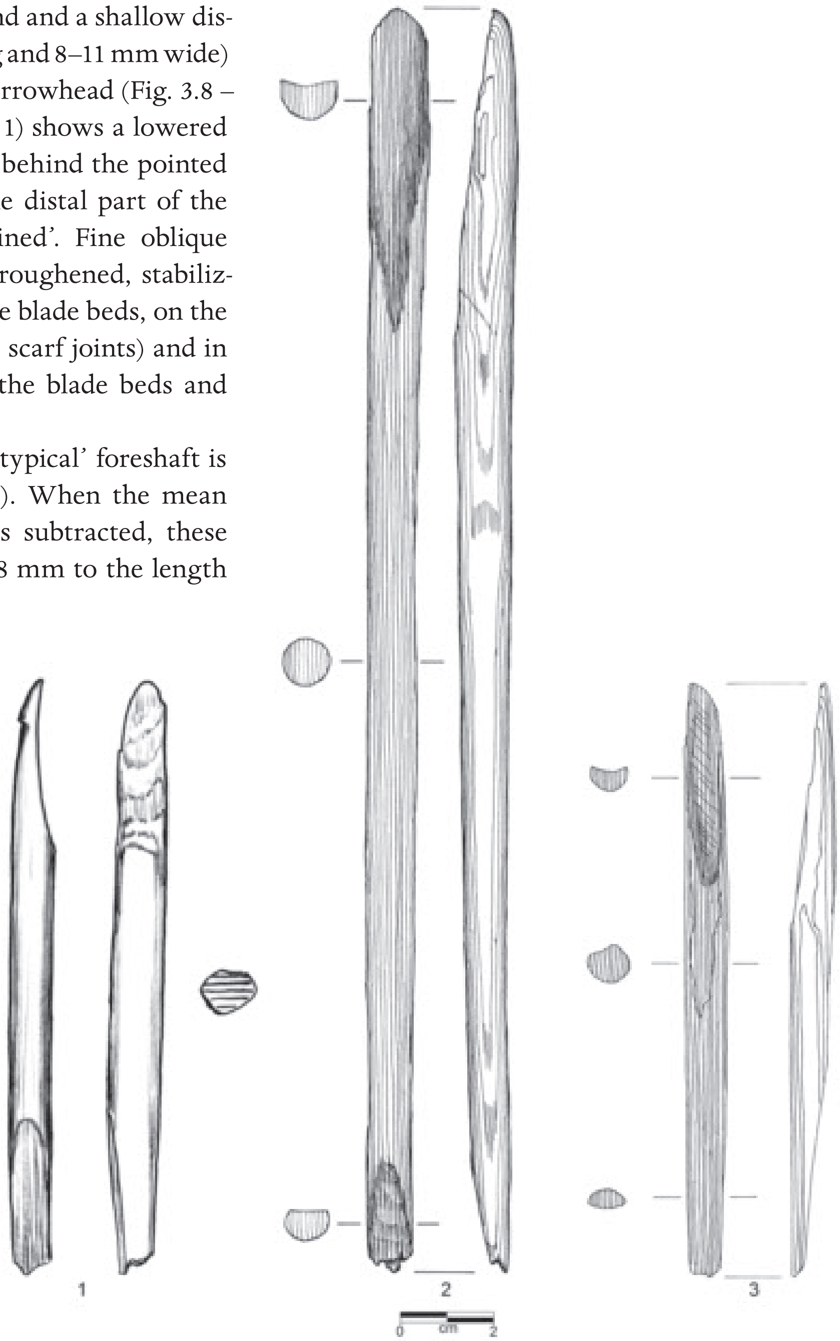


Fig. 3.8
Arrow foreshafts.
1: 86,5/248,0: 3
2: 12/23: 124
3: 14/23: 5

of foreshaft from each other. In contrast, it is much safer on morphological grounds to distinguish between arrow foreshafts and foreshafts for bird spears and light lances, as seen from the descriptions below.

A single foreshaft (Fig. 3.8 – 2) is extraordinarily long: about 280 mm. Moreover its diameter is from 10–12 mm (largest in the distal end with the blade bed). This indicates that the arrows vary considerably, probably including types suited for certain prey and/or shooting ranges.

3.2.2.3 Arrow shaft fragments (Fig. 3.9)

Twenty-seven pieces are classified as fragmented arrow (main) shafts with bevelled end (Fig. 3.9a). Some show oblique scratching of the bevelled surface and most of them are finely scratched all around the scarf joint end in order to form a firm base for the lashing. The mean length of the bevelled end is 61 mm. The average diameter of the circular cross section of the shafts is 9.6 mm (range: 7–12 mm). This means that the average scarf joint ratio is 6.4 : 1. Experiments carried out by the author show that such a scarf joint on a 10 mm arrow shaft with sinew lashing withstands a longitudinal *push* of about 80 kg – when stressed further the shaft tends to break beside the joint. However, a plain scarf joint with no interlocking devices is easily *pulled* apart: a longitudinal pulling force of just about 8 kg dismembers the joint.

The diameters of all undetermined shaft fragments were measured and among these the arrow shaft fragments are clearly seen as a peak in the histogram around the 10 mm bin (Fig. 3.9b and 3.43). In total about 50 out of the 116 measured shaft fragments are from arrows. There is probably an overlap in the 11–12 mm zone, where fragments of the heaviest arrows cannot be distinguished with certainty from fragments of the lightest bird darts, light darts, harpoons and lances based on measurement of their diameters.

3.2.2.4 Steps of the *chaîne opératoire*

Most often wood with dense, narrow rings and no knots was selected for arrow shaft production. Determination of species was made on 27 shaft fragments. *Larix* sp.: 14; *Picea* sp.: 9; *Pinus* sp.: 4. Thus the preference among driftwood for arrow shafts was fine-grained *Larix* sp.

Working traces on a foreshaft preform (88,5/249,5: 24) show how the split wood was first roughly cut with a sharp-edged tool, then shaped by means of scraping (with the edge of a side scraper?). Finally, as the finished shafts show, the surface was polished to perfection, probably by means of pumice grinding stones

a.

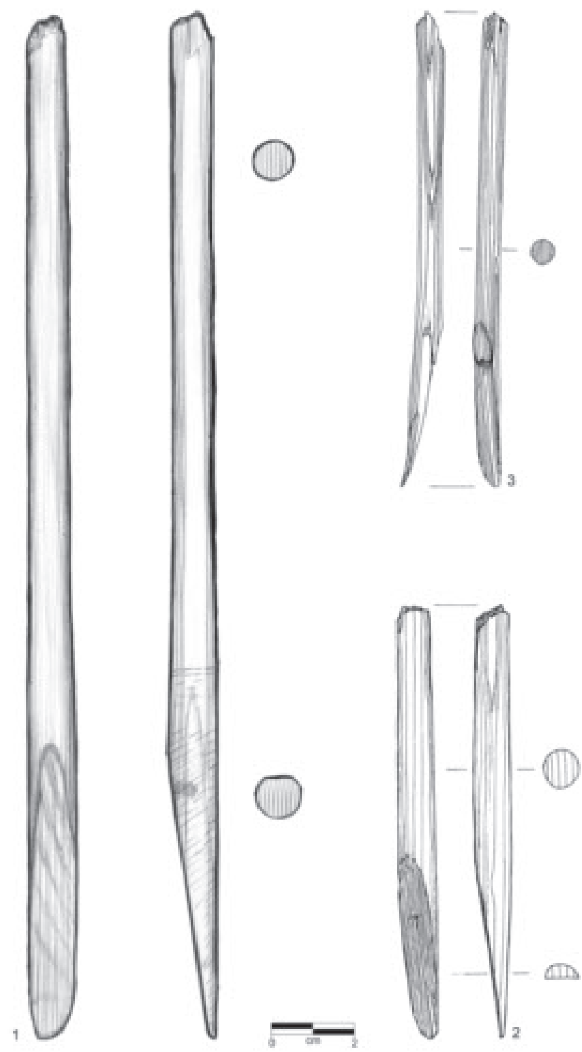


Fig. 3.9 a
Arrow shaft fragments.
1: 85,5/252: 18; 2: 11/23: 134; 3: 11/23,5: 23

with grooves of the right width (see 3.3.13 below). As would be expected, almost all arrow shaft fragments are small. Many would break during use and trampling added to the destruction of the thin shaft fragments before they were embedded in the culture layers.

3.2.2.5 Arrowheads (Fig. 3.10)

Fifty-six lithic, leaf-shaped, bifacial endblades are arrowheads, which fit the blade beds of the wooden arrow foreshafts. Thus the maximum stem width of these projectile points is about 11 mm. The great majority, 47, have tapering

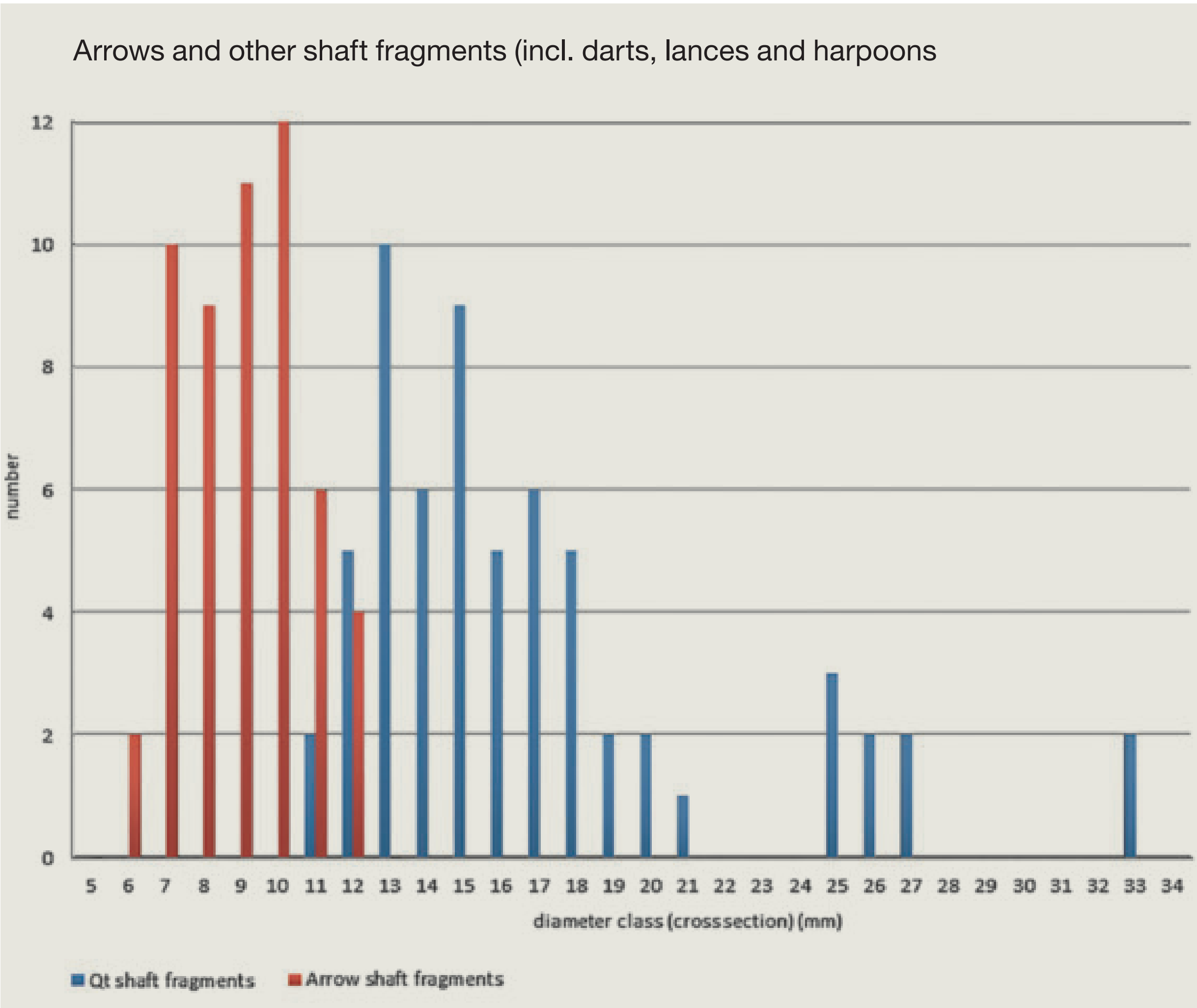


Fig. 3.9 b
Diameters of cross sections of all shaft fragments from Qt. Arrow shaft fragments form the peak around 9–10 mm. Due to overlap in diameters in the 11–12 mm range, fragments of arrows and light darts of these size classes cannot be distinguished unless they show a notch for a bow string.

tangs, most often with a soft transition between tang and blade (36 specimens), though some show a clearly marked transition between tang and blade (11), whereas 9 are without tang. Killiaq was by far the preferred raw material. Only 2 heads are of microcrystalline quartz (mcq) and 3 of quartzite. No arrowheads are made of bone, antler or ivory.

Edge serration is quite common. It is present on 18 out of the 56 specimens (32%) and includes equal numbers of finely and coarsely serrated arrowheads.

The lithic arrowheads can be categorized according to their maximum stem widths, which of course must fit the wooden arrow foreshafts. Taking this into consideration, the maximum stem width of arrowheads is 11.5 mm. Metric analysis of this segment of symmetrical end-blades is presented in 3.2.3.6 below. Based primarily on measurements of blade widths, three types of arrowheads emerge: *small arrowheads* showing blade widths between 8 and 11 mm and very narrow tangs (less than 8.5 mm stem width), and two types of *ordinary arrowheads* with blade widths between 9.5 and 15.5 mm. These normal-sized arrowheads show a tendency to divide into a group of *slender heads* and a group of *broad heads* (Fig. 3.23).

The length of the arrowheads is a somewhat problematic measurement as the majority of the blades snapped during action and/or have been resharpened. As expected, several of the small heads (four specimens or 44%) and only eight (17%) of the ordinary heads are in a state where a measure of the total length is meaningful. The average length of the twelve intact heads is 40 mm (min.: 29 mm; max.: 65 mm). A plot of the l/w relationship of these few heads shows a division between short and long heads: eight are less than 40 mm long and four are more than 40 mm long. But it must be kept in mind that meaningful data on lengths is sparse.

A quite unique specimen of wood, 84,5/253,5:20, is obviously not a functional arrowhead. It is only one growth ring thick (2 mm). Metrically (w: 14 mm; l: 69 mm; stem w: 10 mm) it is an 'ordinary arrowhead' in the group of *broad*

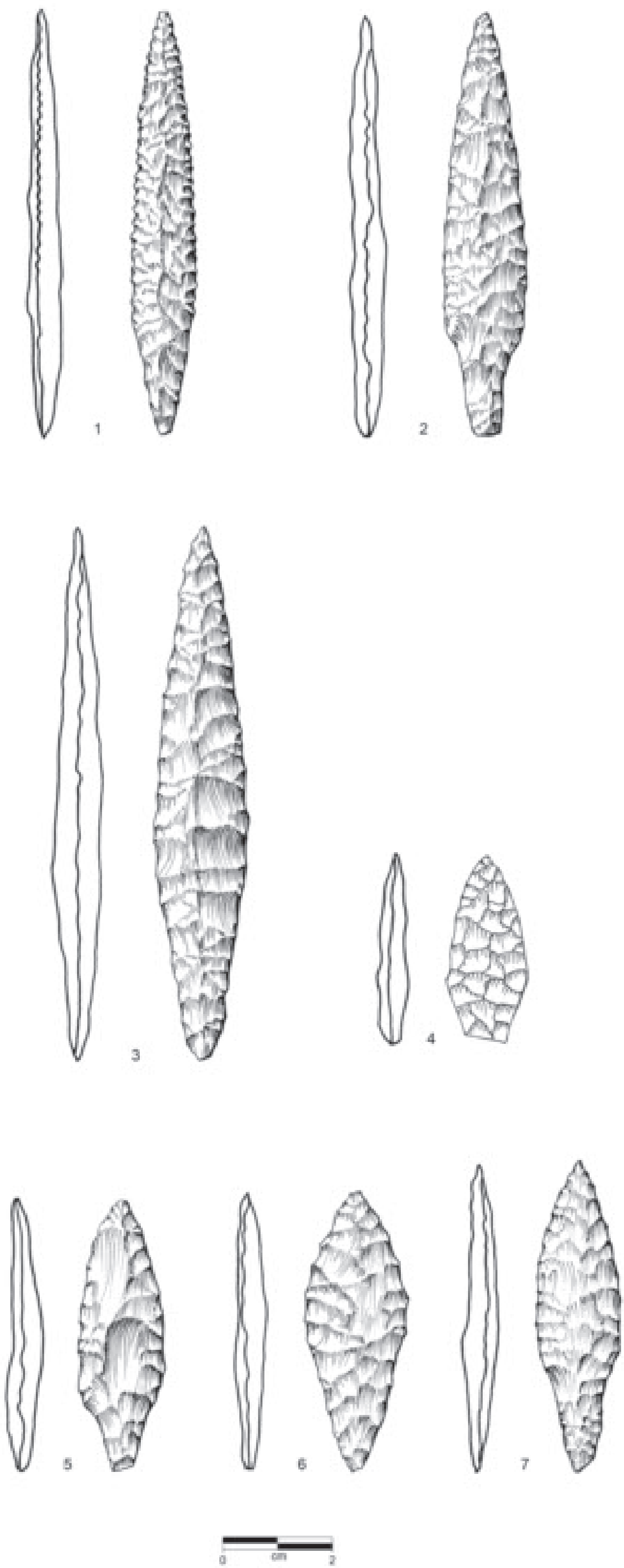


Fig. 3.10
Arrow heads. Divided into slender (1–3), small (4) and broad heads (5–7).

arrowheads, and it is among the long specimens. It could be a toy head or a kind of template (Fig. 3.11).

Finally, it must be mentioned that among the 177 indeterminate fragmented bifacial endblades, in particular among the small ones (37), a number of arrowheads are probably included. Likewise, a number of the 67 preforms for small bifacial endblades must have been for arrowheads.

Finds from Qajaa:

Thirty specimens from Qa are arrow shaft fragments. Among these are a foreshaft with blade bed (Fig. 3.12a) and a proximal fragment with notch (Fig. 3.12b). The metric dimensions and the selection of the qualities of the wood nicely fit the Qt material. Most arrow shaft fragments (28) are broken at both ends. Four specimens have a scarf at one end and are broken at the other; three specimens are secondarily worked or pointed at one end; five specimens are scorched at one or both ends. Furthermore, and not included in the total count of 30 arrow shaft fragments, the assemblage includes a little knife shaft (F 295), which appears to have been produced from a reused arrow shaft. Finally, a tiny foreshaft of antler or bone must be mentioned. It has a blade bed in the distal end and a narrow, longitudinal groove on one side. The ovate cross section is only 6 mm wide. It was probably part of a toy arrow (Fig. 3.12c).

Nineteen bifacial endblades are catalogued as arrowheads. Seventeen are of killiaq, one of quartzite and one of mcq. The overall length of the eleven complete specimens varies between 25 mm and 46 mm, and their l/w and stem width proportions are generally similar to the arrow-

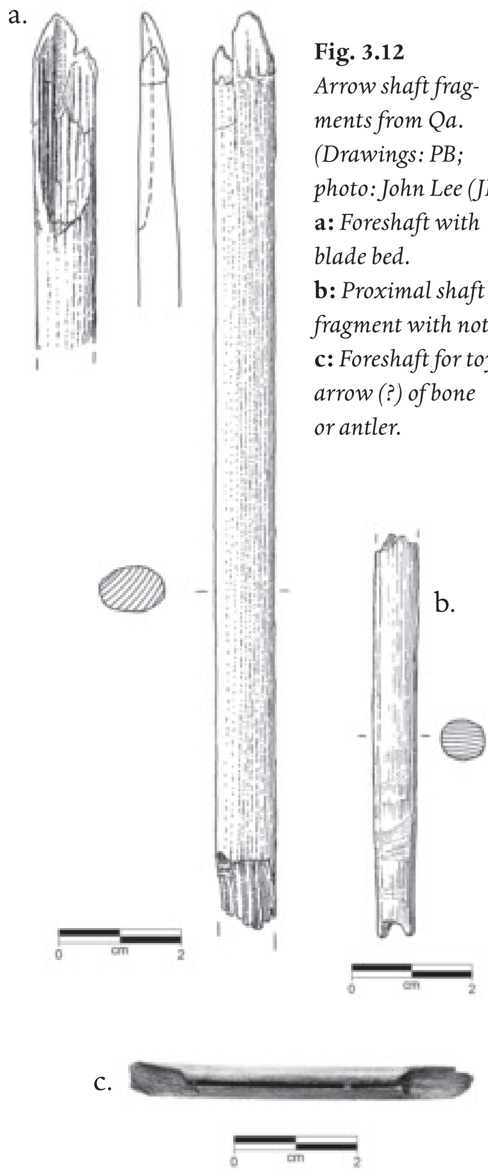


Fig. 3.12
Arrow shaft fragments from Qa. (Drawings: PB; photo: John Lee (JL))
a: *Foreshaft with blade bed.*
b: *Proximal shaft fragment with notch.*
c: *Foreshaft for toy arrow (?) of bone or antler.*

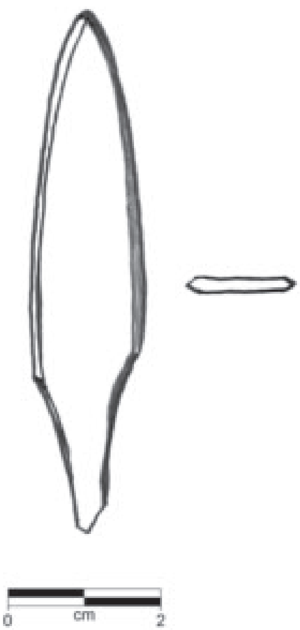


Fig. 3.11
Arrow head template (?) of wood (84,5/253,5: 20).

heads from Qt (Fig. 3.23a and Fig. 3.23b). The stem widths vary between 6 and 11.5 mm, but with a dominance of stem widths of 8 mm (n. 4) and 9 mm (n. 4). (Specimens wider than 11.5 mm are metrically defined as bifaces for darts or light lances).

3.2.3 Darts, leisters and lances

A large number of shaft fragments and projectile heads of various sizes, materials and forms show that an important part of the Saqqaq hunter's gear consisted of darts and lances. Here, darts are defined as light missiles to be *thrown*. They were provided with end prongs of bone or antler or a lithic projectile point. Darts were launched with a throwing board (see 3.2.6 below). Lances and leisters are defined as spears, mainly for *thrusting*, and were armed with a lance head or leister end prong(s). Identification of the different classes and types is based on analysis of wooden foreshafts showing preserved distal and/or proximal ends and – in a few cases – with the original projectile point found *in situ*. Metric analyses of lithic projectile points and wooden shaft fragments also aid in the identification and characterization of hunting weapon types. The analyses demonstrate that the Saqqaq hunter possessed at least three kinds of dart, probably a fishing leister and at least two types of lance: light and heavy.

3.2.3.1 Bird darts

Shafts (Fig. 3.13):

Seventeen fragmented foreshafts belong to the class designated 'three-winged foreshafts', characterized by three deeply cut beds/grooves for end prongs in the distal end.

The specimen shown in Fig. 3.13a is the largest of these fragments. The length is 358 mm and the maximum diameter of the round shaft is 14 mm. The length of the three beds for end prongs is 60 mm, but probably 10 mm of the distal end is broken off. A zone of fine, oblique scratches is seen around the base of the beds, indicating where the lashing for the end prongs began. A 40 mm broad band of fine scratches 220 mm from the distal end of the shaft shows

a.

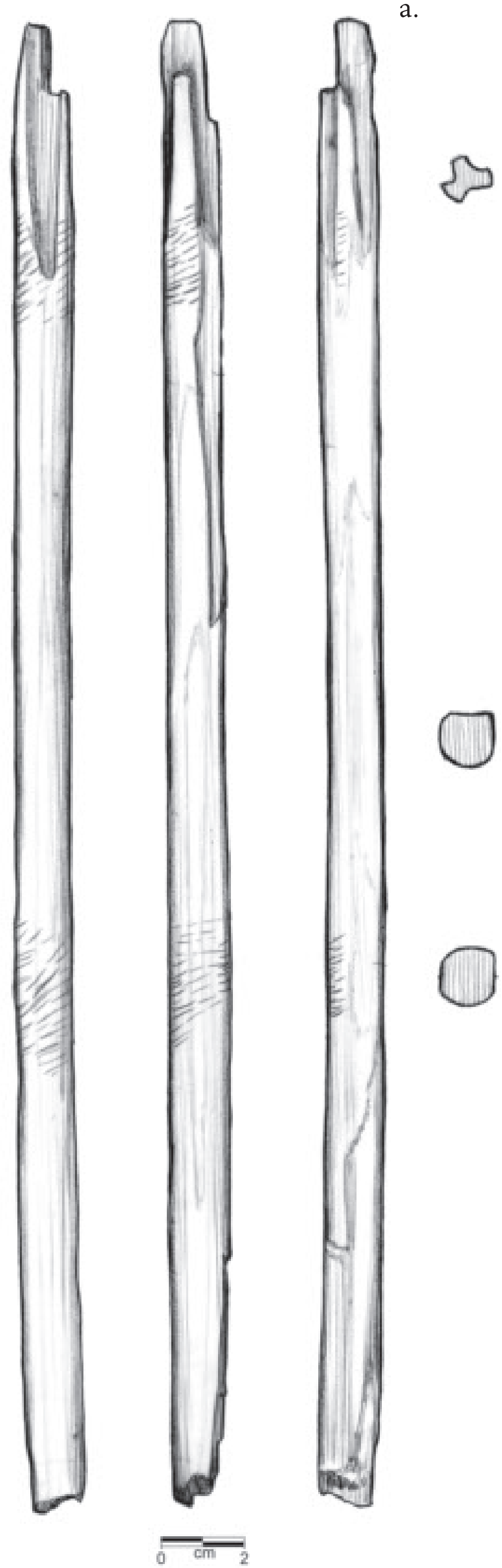


Fig. 3.13 a
Three-winged foreshaft for bird dart.
87,5/250,0: 11

b.

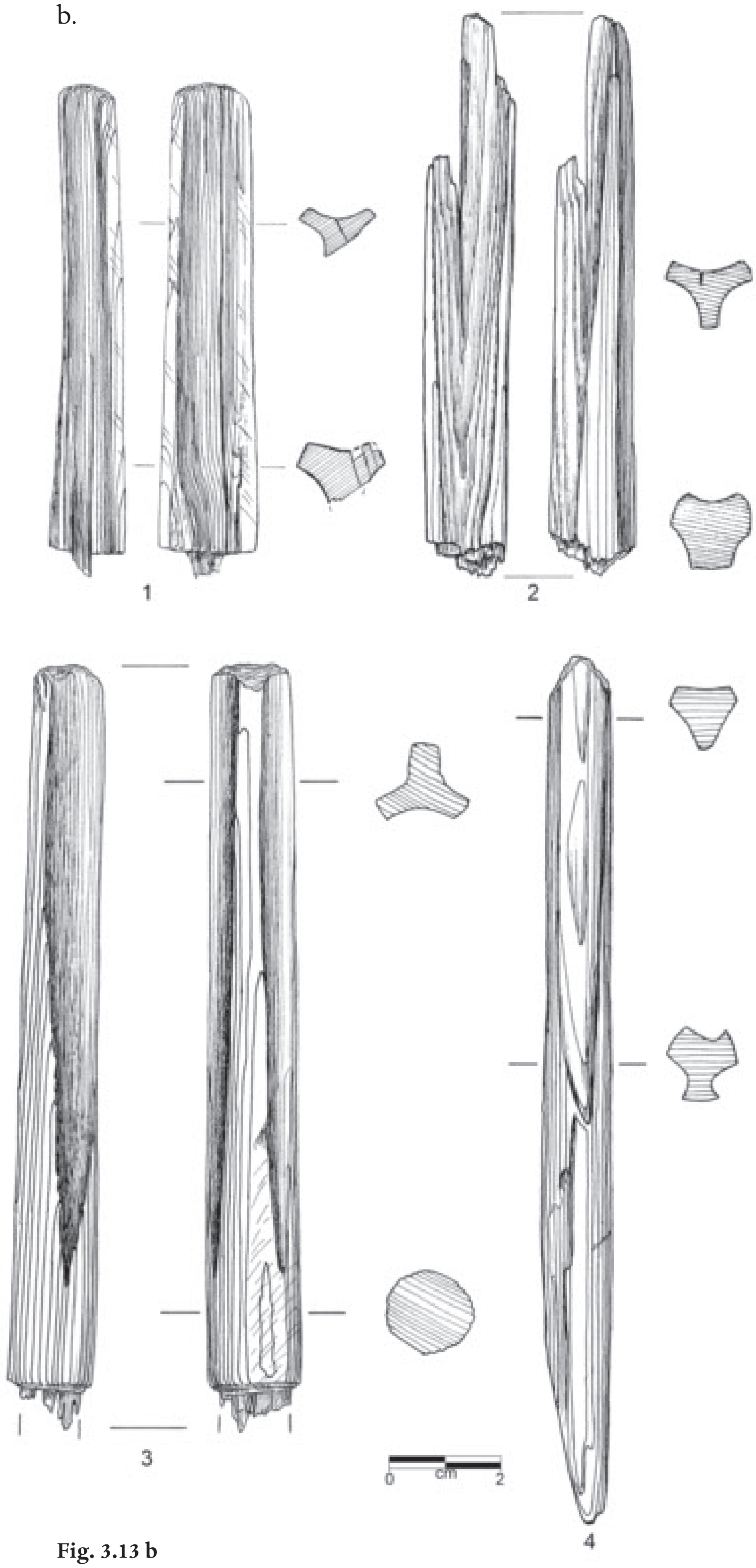


Fig. 3.13 b
Three-winged foreshafts for bird darts.
1: 11/23: 84; 2: 12,0/23,5: 48; 3: 14/24: 64; 4: 85/261: 7

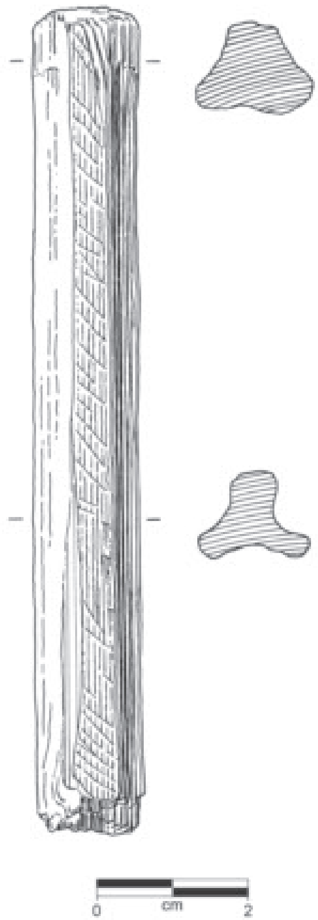


Fig. 3.14
Three-winged foreshaft for bird dart from Qa (F271). (Drawing: PB).

the position of a 'girdle' of lashing, probably made for reinforcement of this light and flexible shaft.

Several fragments show how the three grooves for end prongs broaden and deepen towards the distal end (Fig. 3.13b), and that there is no knob or point on the shaft for anchoring the lashing that held the three end prongs at a suitable angle. Fine oblique scratching on the three 'wings' of some of the foreshafts made a firm basis for the lashing that held the proximal ends of the prongs in the longitudinal grooves. In a couple of cases the 'three-winged foreshafts' are very short, approximately 160–180 mm, and show a proximal bevelled end for a scarf joint. This could be evidence of interchangeable distal dart ends or repair to the bird dart.

The bird darts were very light weapons and, as mentioned above, the shafts must have been quite flexible. The diameters of the 'three-winged foreshafts' vary between 13 and 17 mm, with an average of 14.5 mm.

The wood selected for these darts was quite dense *Larix* sp. (nine specimens) or *Picea* sp. (four specimens).

Finds from Qajaa:

Three fragments of 'three-winged foreshafts' have been recovered at Qa (C 96,1; C 96,2 and F 271). With diameters of 12, 14 and 13 mm respectively, they represent light weapons. C 96,1 is broken towards its proximal end, whereas the distal end is nicely rounded, giving the shaft a blunt end. C 96,2 is badly preserved, whereas F 271 (Fig. 3.14) is a well-preserved regular fragment with clear marks of the lashing which held the side prongs in place. Proximally the shaft is broken, and distally the shaft is cut off, giving it a blunt end. This might, however, be a secondary feature that occurred during the dismantling of the side prongs.

End prongs (Fig. 3.15):

End or side prongs for bird darts are often difficult to distinguish from fishing leister prongs. However, 20 specimens of whalebone, classified as 'end prongs', fit into the grooves of the 'three-winged foreshafts'. Thus they are considered end prongs for bird darts. Furthermore, seven specimens are either mid- or distal end fragments of this kind of prong.

Five pieces are more or less complete. Fig. 3.15a – 1 shows a 269 mm long specimen (estimated original length: 320 mm) which has eight unilateral barbs on the ventral side. The barbs are short and have almost straight bases, and they are situated 20 mm apart at the proximal end, gradually becoming a little closer together towards the distal end (16 mm). The cross section of the long, tapering proximal end (estimated at 115 mm) is egg-shaped (9 × 10 mm), with the broad part on the dorsal side. The prong is bent slightly inwards and must have been quite flexible. Fig. 3.15a – 2 shows a comparable specimen, which has been resharpened so that only three barbs remain. The complete proximal end of this prong is 125 mm.

On the almost complete prong 'Sydprofil #6' a notch has been carved on the ventral side right below the proximal barb (Fig. 3.15a – 3). This is also seen on a small, complete specimen and on some of the more fragmented prongs (Fig. 3.15b – 1–3). It might be a notch for fixing the position of a lashing, which would have stabilized the end prongs and held them at a suitable angle. A number of distal fragments show that some end prongs had barbs that were placed a little closer and cut deeper than the ones mentioned above (Fig. 3.15b – 4–6).

Fifteen fragments show that the basal end of the prongs is 7–9 mm thick and up to 10 mm wide in cross section and so they fit nicely into the shaft grooves. During use the end prongs typically broke 60–120 mm from the proximal end, i.e. above the lashing (Fig. 3.15c – 1–3) .

All end prongs for bird darts are made of solid whalebone and are very precisely and carefully worked.

Finds from Qajaa:

Only one bone end or side prong for a bird dart was found at Qa (E169). E 169 is a whale or walrus bone fragment from the proximal end of the side prong (l: 71 mm; w 10–11 mm). The cross section

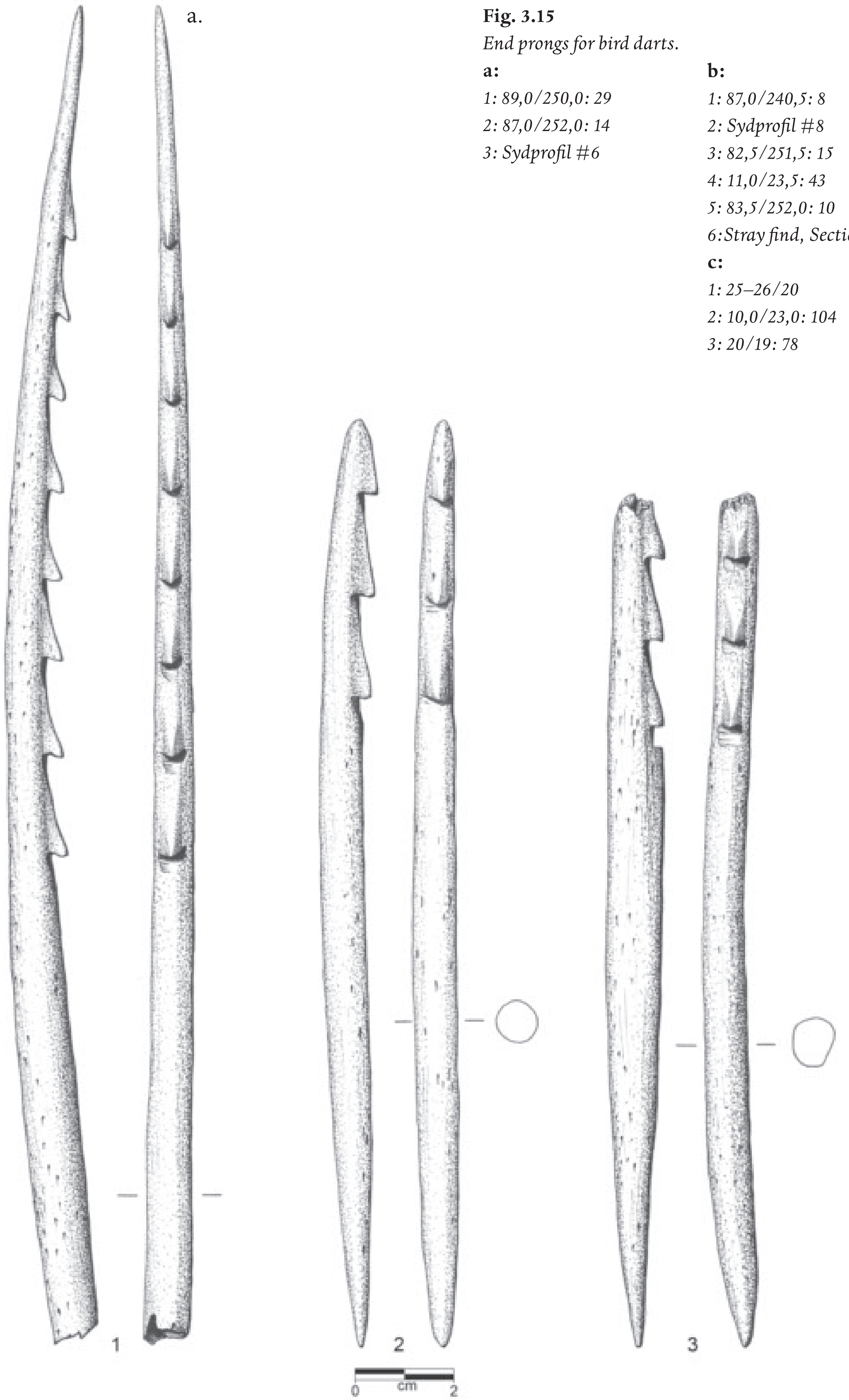


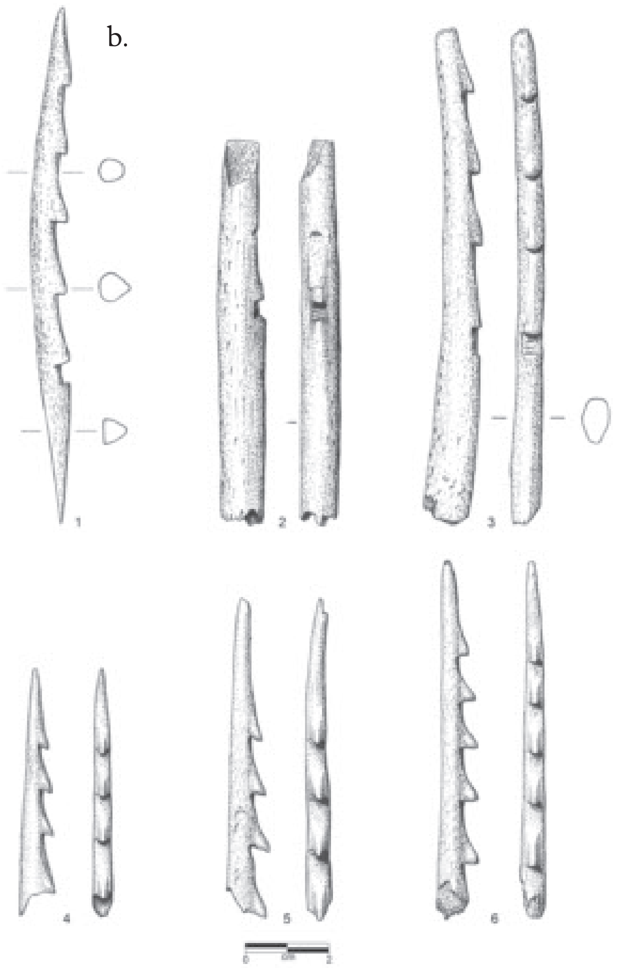
Fig. 3.15
End prongs for bird darts.

a:
1: 89,0/250,0: 29
2: 87,0/252,0: 14
3: Sydprofil #6

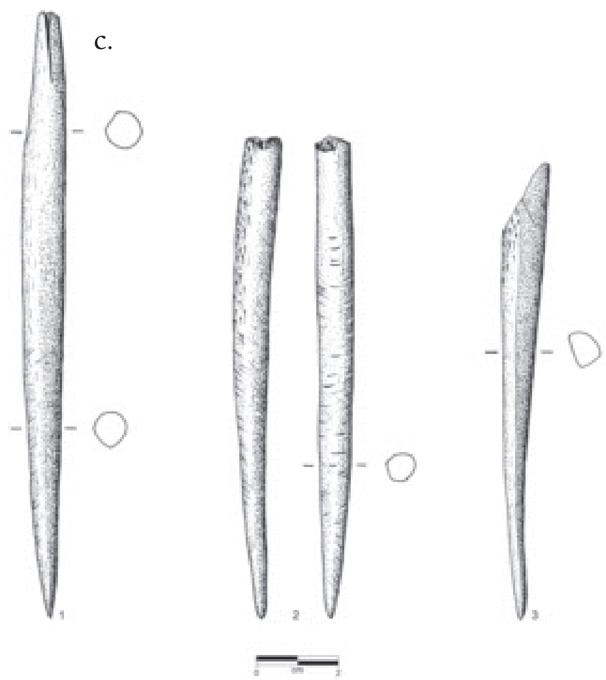
b:
1: 87,0/240,5: 8
2: Sydprofil #8
3: 82,5/251,5: 15
4: 11,0/23,5: 43
5: 83,5/252,0: 10
6:Stray find, Section C.

c:
1: 25–26/20
2: 10,0/23,0: 104
3: 20/19: 78

b.



c.



is oval to egg-shaped, as is typical in the prongs for bird darts.

3.2.3.2 Fishing leisters (?) (Fig. 3.16)

A single complete specimen of antler is classified as an end prong for a fishing leister. It is 120 mm long. This prong is different from the end prongs described above: it has a wedge-shaped base which does not fit into the 'three-winged foreshafts'; it shows two 'hook-shaped' lateral barbs, and it is made of antler. It is thus considered a possible candidate for a fishing leister end prong.

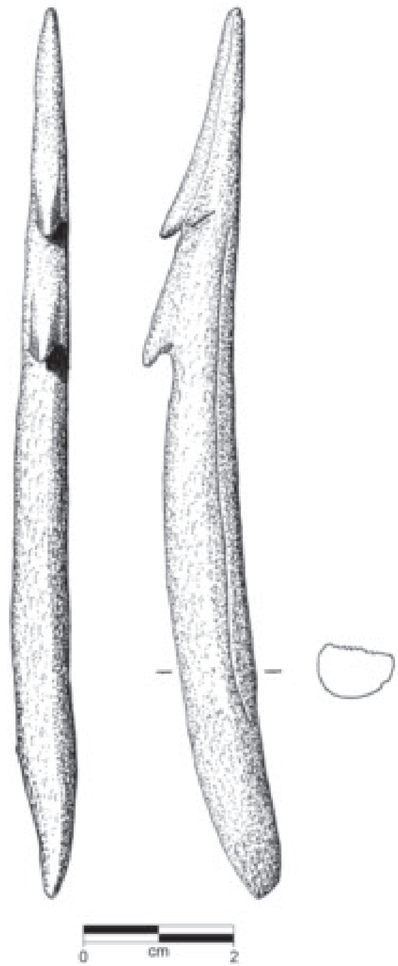


Fig. 3.16
A possible end prong for fishing leister (25/21,5: 37).

3.2.3.3 Darts (Fig. 3.17)

Type 1 foreshafts, interpreted as foreshafts for darts, are provided with a distal blade bed for a lithic projectile point. They show a proximal bevelled end for a scarf joint and a circular cross section. The 18 specimens with diameters varying from 12 to 19 mm (average: 15 mm) represent a category of light hunting weapons thrown by means of a throwing board (see 3.2.6 below). Fig. 3.18 shows the width categories of the blade beds of these dart foreshafts in comparison with the other missile foreshafts.

One of these foreshafts (diameter: 15 mm) was found with its projectile point *in situ* in the blade bed (Fig. 3.17a). Both the shaft and the leaf-shaped bifacial endblade of killiaq (l: 53 mm;

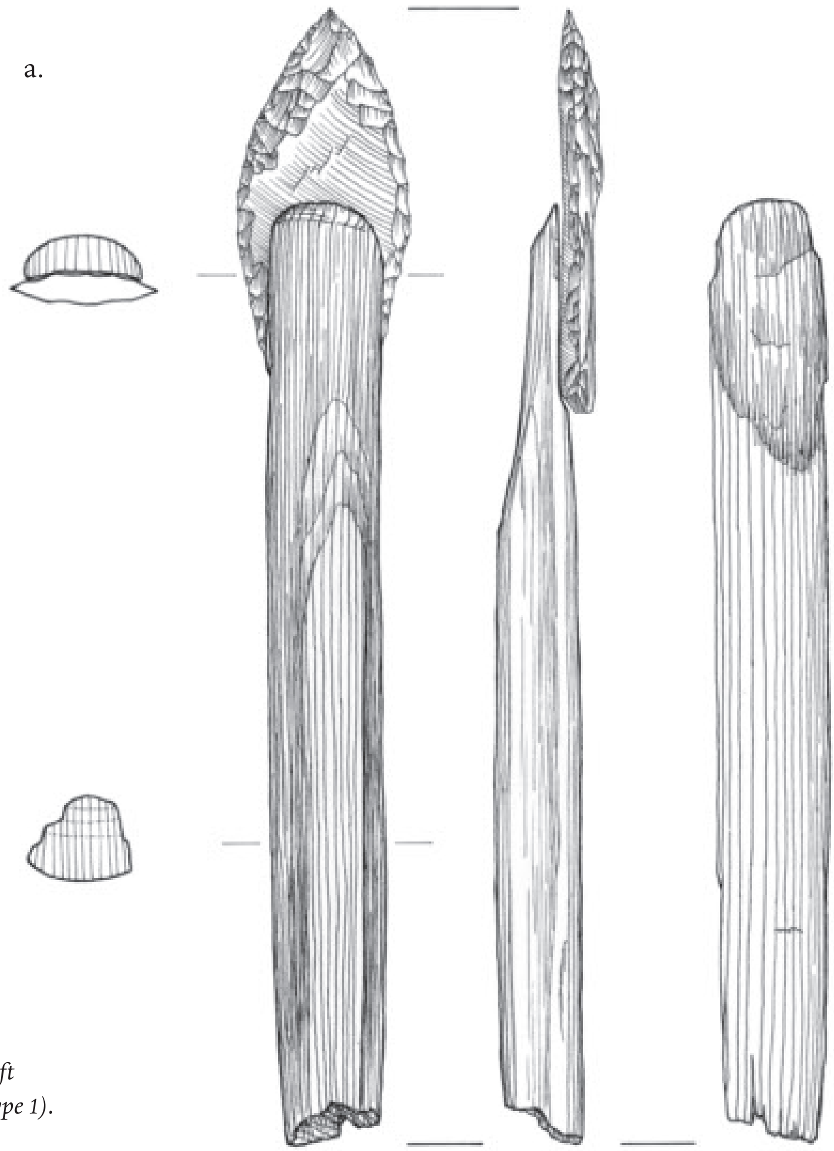


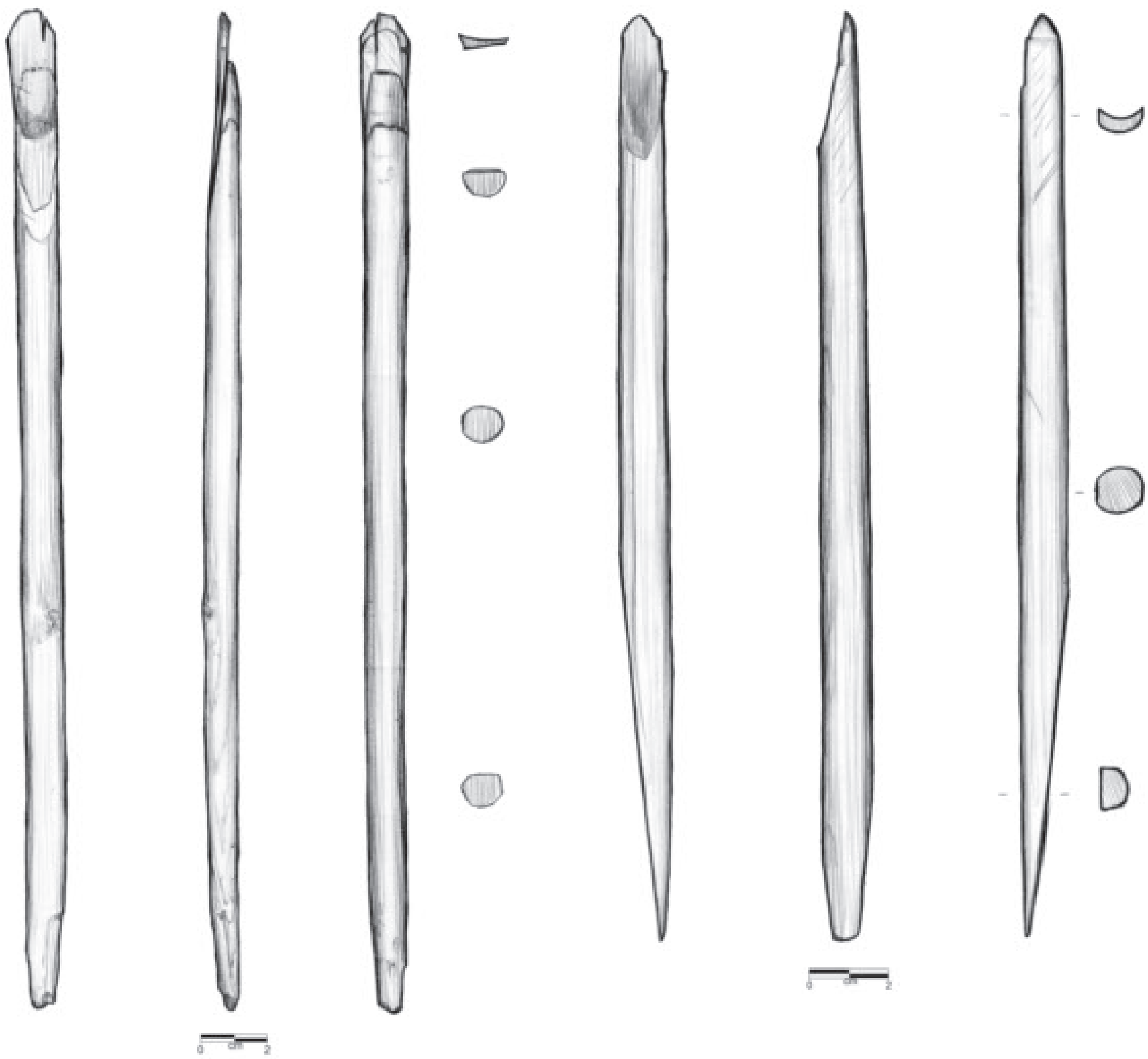
Fig. 3.17
Dart foreshafts and dart shaft components (foreshafts of Type 1).
a: *85/250: nn*
b: *88,5/249,5: 27*
c: *88,5/250,0: 13*

w: 23 mm) are quite coarsely made. So we see that in this case a 15 mm wide shaft held a 23 mm wide projectile point.

Six of the foreshafts are complete or almost complete and well preserved. They have deeply cut and slender distal blade beds, and were probably armed with tanged, symmetrical endblades (projectile points), the widths of which must have exceeded the shaft diameters (see analyses in 3.2.3.6 below).

Some foreshafts are quite long, for example Fig. 3.17b, which is 298 mm long and carefully repaired: the weak and broken distal end of the blade bed was reinforced by means of a separate thin piece of wood, which was originally wedged in between the tang of the projectile point and the damaged blade bed. Marks from the surface of the tang of the point are preserved in the 'wedge'. The specimen in Fig. 3.17c is 234 mm long from the distal end to the proximal bevelled end. The diameter of the shaft is only 12 mm and thus close to the category of arrows. A few shafts are so short that they probably just served as a link between the back shaft and the point – they may represent repairs (Fig. 3.17d – 1–2).

b. c.

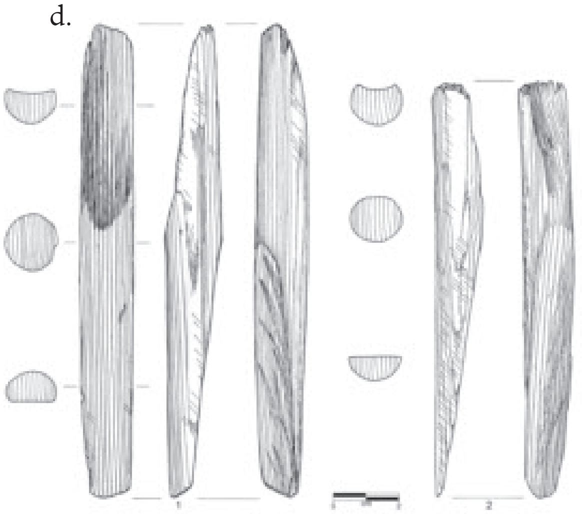


All well preserved foreshaft fragments are finely scratched for stabilizing the lashing in the area around and a little below the blade bed and around the scarf joint end (see also Fig. 3.17e – 1–2). One specimen has a lowered zone or bed for the lashing behind the pointed distal shaft end (Fig. 3.17f).

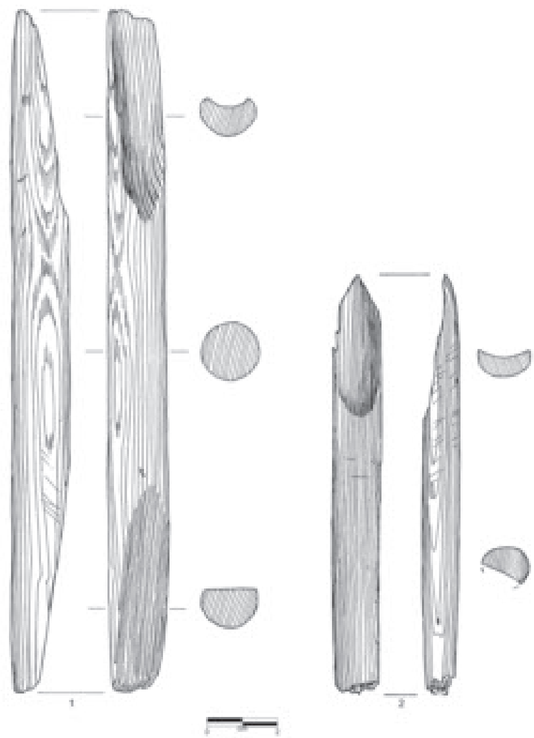
The tree species of the wood in thirteen of these foreshafts were identified: eleven are *Larix* sp. and two are *Picea* sp. Perfect pieces of wood with straight grain, no knots and dense growth rings were selected for these foreshafts.

Finds from Qajaa:
The Qa material contains six dart foreshaft fragments of Type 1. Among these are two very short foreshafts (114 and 154 mm long), which were probably made for repairing broken distal ends of the darts. Both have a scarf, and the oblique cuts for the blade bed overlap with the oblique scarf cuts, which are therefore turned 90 to 180 degrees. The four remaining pieces are fragments with blade beds; two are broken, and one cut and broken off the shaft. The diameter of four specimens is 14 mm, and that of one of the broken-off ends with blade bed is 16 mm.

d.



e.



f.

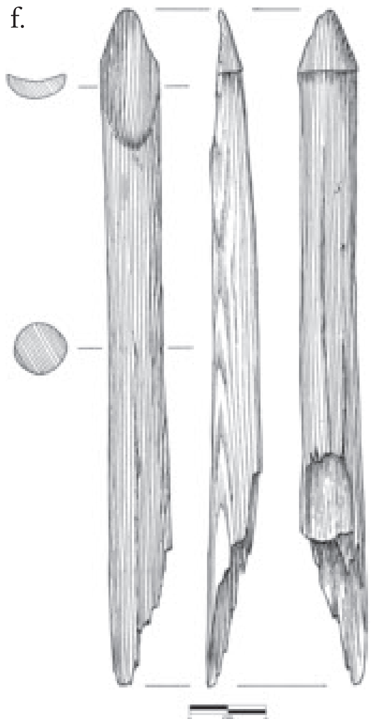


Fig. 3.17
d: *1: 10/23,5: 48; 2: 13/24: 71*
e: *1: 83/250,5: 3; 2: 12/23: 139*
f: *Nordprofil #3*

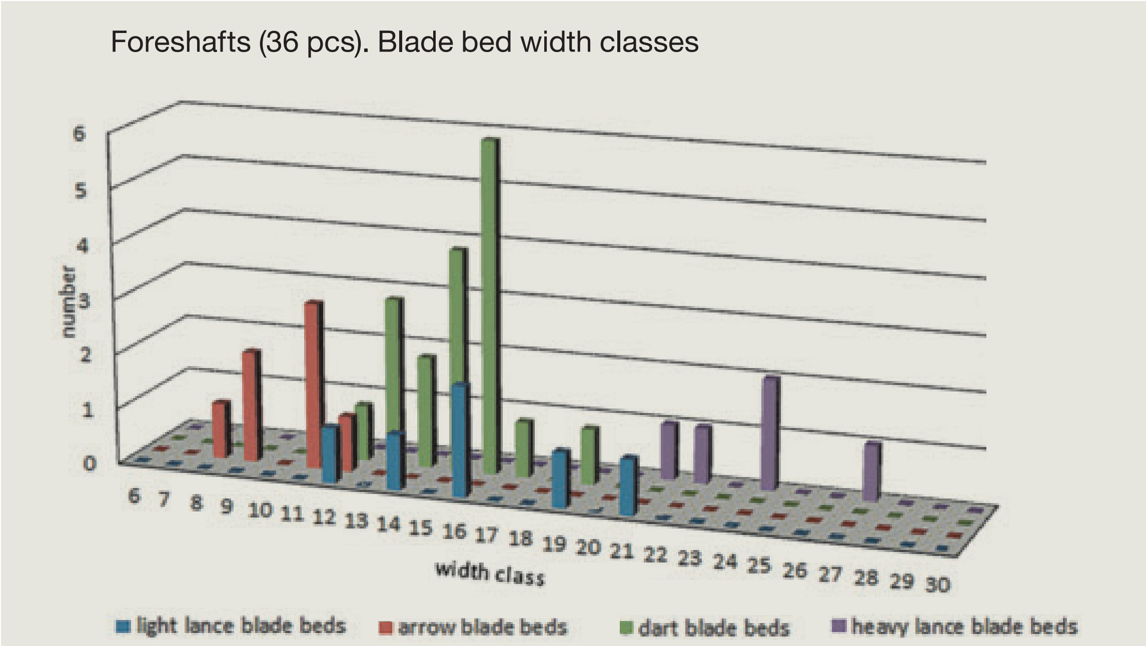


Fig. 3.18 *The width classes of the blade beds of dart foreshafts (green) in comparison with the other missile foreshafts from Qt.*

3.2.3.4 Light lances (Fig. 3.19)

Type 2 foreshafts – 20 fragments in total – are characterized by their wedge-shaped proximal end with a rivet hole, the flat oval cross section of the middle section and often a very shallow and narrow, probably ornamental, furrow along the central axis of each side. No main shaft with a distal socket fitting these foreshafts has yet been identified in the material, and so it is not a straightforward matter to determine the function of these weapons. Considering the construction, which incorporates a rivet locking the basal end of the foreshaft to the main shaft, the joint was made to resist not only longitudinal pushing forces, but also pulling forces (in contrast to the simple scarf joints of arrows and darts described above). Thus, these Type 2 foreshafts were probably made for light lances – a weapon with which the hunter would kill the prey by stabbing (pushing and pulling).

The find material includes six fragments with preserved wedge-shaped proximal end. Fig. 3.19a, made of very dense wood, is representative of these Type 2 foreshafts. The wedge end is about 40 mm long and 17 mm wide. The base is a butt (thickness 5 mm) and carefully smoothed, so that it did not split the main shaft during action. A double-sided, carved, oblong rivet hole is seen at the centre of the joint, which shows dense, fine oblique scratches. The foreshaft tapers towards the distal end and the cross section gradually changes from oval (16 × 12 mm) to flat oval (13 × 7 mm). Starting 75–80 mm above the base, a narrow and shallow furrow runs along the central axis on each side of the shaft. The very distal end is broken. Some proximal end fragments like Fig. 3.19b – 1 represent small foreshafts of this type (proximal end: 14–15 mm wide), while others are quite large (Fig. 3.19b – 2). A single, split fragment of a wedge-shaped end, 12/24: 5A, shows two carved rivet holes through the joint. This construction would have locked the joint between the foreshaft and the main shaft and prevented any lateral movement of the foreshaft following impact.

No foreshaft of Type 2 is intact. Thus, mid- and distal fragments are connected to this category based on their cross sections and/or central furrows on the sides. Six fragments are considered mid-fragments (14–19 mm wide). A couple of these show signs of repair and/or reuse (with scarf joints).

Seven fragments are of distal ends (Fig. 3.19c). Fig. 3.19d is representative of the larger foreshafts of Type 2. It tapers smoothly from the proximal part (oval cross section: 18 × 10 mm) to the distal end (12 × 8 mm), which holds a blade bed (18 mm wide, 48 mm long) with imprints of the basal end of a lithic projectile point and, on the opposite side, a lowered zone for the lashing below the pointed distal end. All distal fragments show these characteristics, and furthermore the best preserved specimens show oblique scratches on the lowered bed for the lashing. The maximum

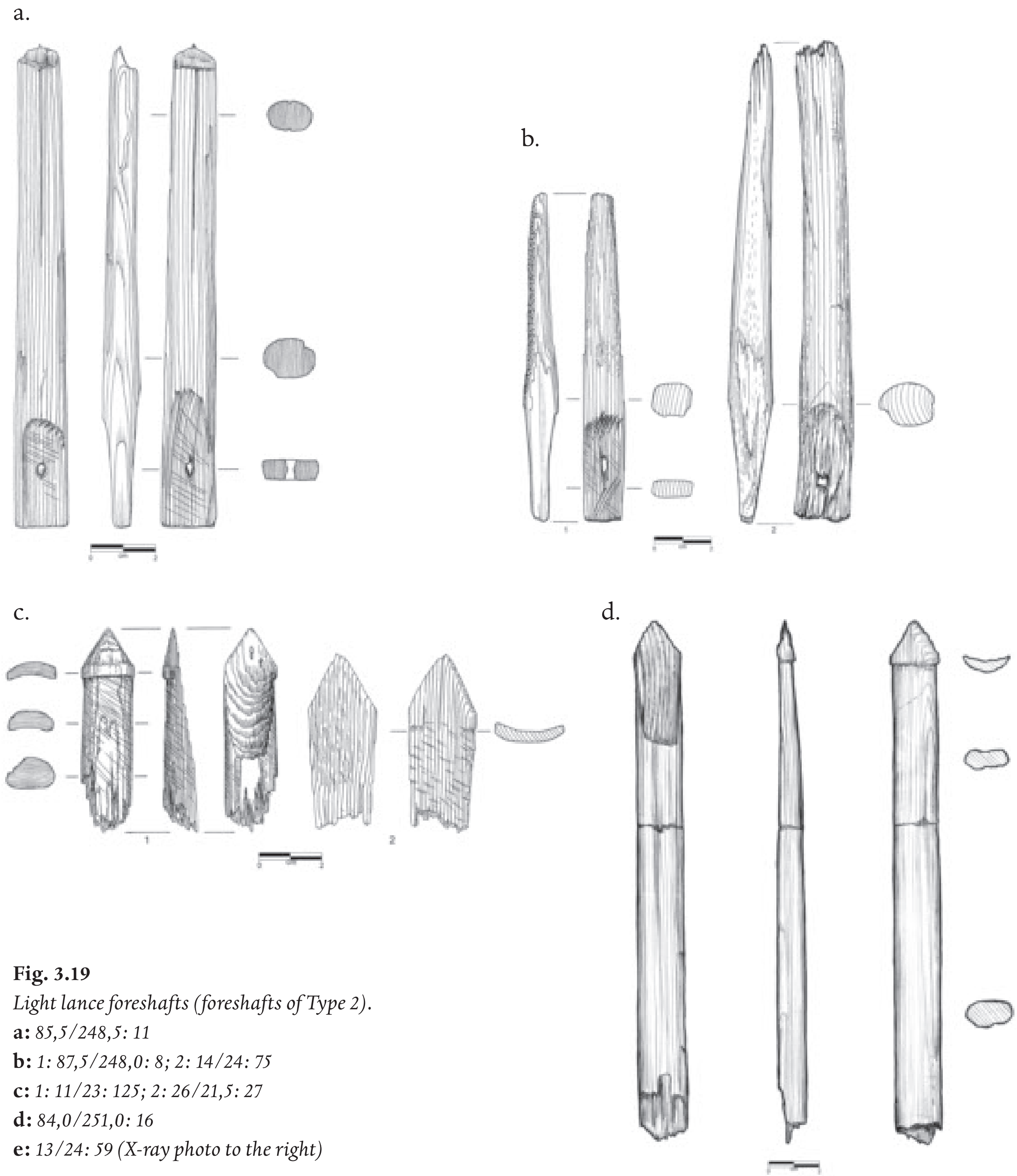


Fig. 3.19
Light lance foreshafts (foreshafts of Type 2).
a: *85,5/248,5: 11*
b: *1: 87,5/248,0: 8; 2: 14/24: 75*
c: *1: 11/23: 125; 2: 26/21,5: 27*
d: *84,0/251,0: 16*
e: *13/24: 59 (X-ray photo to the right)*

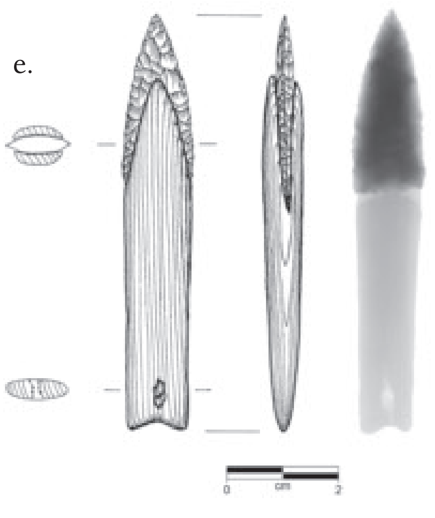
width of the blades beds varies from 12 to 21 mm (average: 18.6 mm). Fig. 3.18 shows the blade bed width classes of the light lances.

A complete foreshaft with an endblade *in situ* (Fig. 3.19e) probably belongs to the class of light lances as well. A bifacial, triangular endblade (l: 31 mm; w: 12 mm) of greenish mcq sits embedded and locked by a black 'glue' (probably blubber or blood) in a slot in a 62 mm long foreshaft with a flat oval cross section (see X-ray photo). The proximal end of the foreshaft is wedge-shaped and provided with a rivet hole. The shaft is only 11 mm wide, and thus it rather fits the dimensions of an arrow. However, none of the preserved arrow main shafts shows a distal end which could hold the wedge-shaped end of this particular foreshaft and the rivet hole indicates that this projectile was well suited for pushing as well as pulling actions.

The wood species in a sample of eight pieces were determined. Three were *Larix* sp., four *Picea* sp., and one *Salix* sp. Thus, except for the atypical specimen of *Salix* sp., high quality dense coniferous wood was selected for these foreshafts.

Finds from Qajaa:
Six specimens from Qa are categorized as light lances with foreshafts of Type 2 (A20; A23,38; A25,13; C91,3; C91,6 and C 95). A20 is a mid-fragment of a foreshaft broken at both ends but with a very nicely polished surface, and characteristic 16 × 8 mm oval cross section. A23,38 is a 17.8 cm long Type 2 foreshaft, which was longitudinally split along the ornamental furrow. A25,13 is a 5 cm long piece of the point of a light lance of Type 2, broken off towards the proximal end and with a characteristic triangular or pointed blade bed where an ornamental furrow has been cut from the proximal point of the blade bed and down along the centre line of the broad side of the shaft. C91,3 and C91,6 are 19 cm and 9.5 cm long pieces of distally broken foreshafts with furrows along the middle axes and a markedly flattened or oval cross section. Proximally both have a scarf indicating a different mounting from the wedge-shaped proximal end with a rivet hole typical for the Type 2 foreshafts, probably a result of reworking. C95 is a typical specimen of a Type 2 foreshaft showing the characteristic rivet hole and (on the preserved side) a furrow along the central axis (Fig. 3.20). The wedge-shaped proximal end of this small shaft is 15 mm wide, tapering to a width of 12 mm at the distal break. Furthermore, a distal end and a mid-fragment of light lance foreshafts of Type 2 have been identified. The oval cross section of the distal

e.



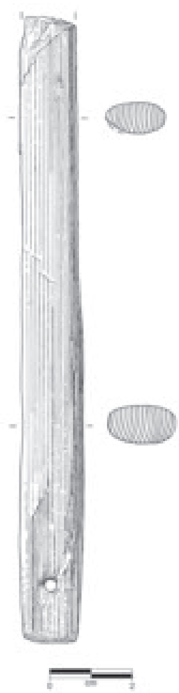


Fig. 3.20
Light lance foreshaft (C95) from Qa. (Drawing: PB)

shaft fragment is 14 × 9 mm. Finally there is a burin handle (A26) which shows an ornamental line along the central axis of one broad side, and a characteristic 18 × 11.5 mm cross section. This was presumably made from a foreshaft of Type 2 and it illustrates that the high quality wood used for larger shafts could be recycled into smaller handles and household utensils when broken.

3.2.3.5 Heavy lances (Fig. 3.21)

Four fragments of foreshafts, with cross section diameters varying from 22 to 27 mm, are designated 'heavy lances'. Blade bed width categories of the heavy lances are shown in Fig. 3.18.

One specimen, 19/20: 125, is a Type 1 foreshaft, which is no less than 450 mm long and 22 mm in diameter. The shallow blade bed is 100 mm

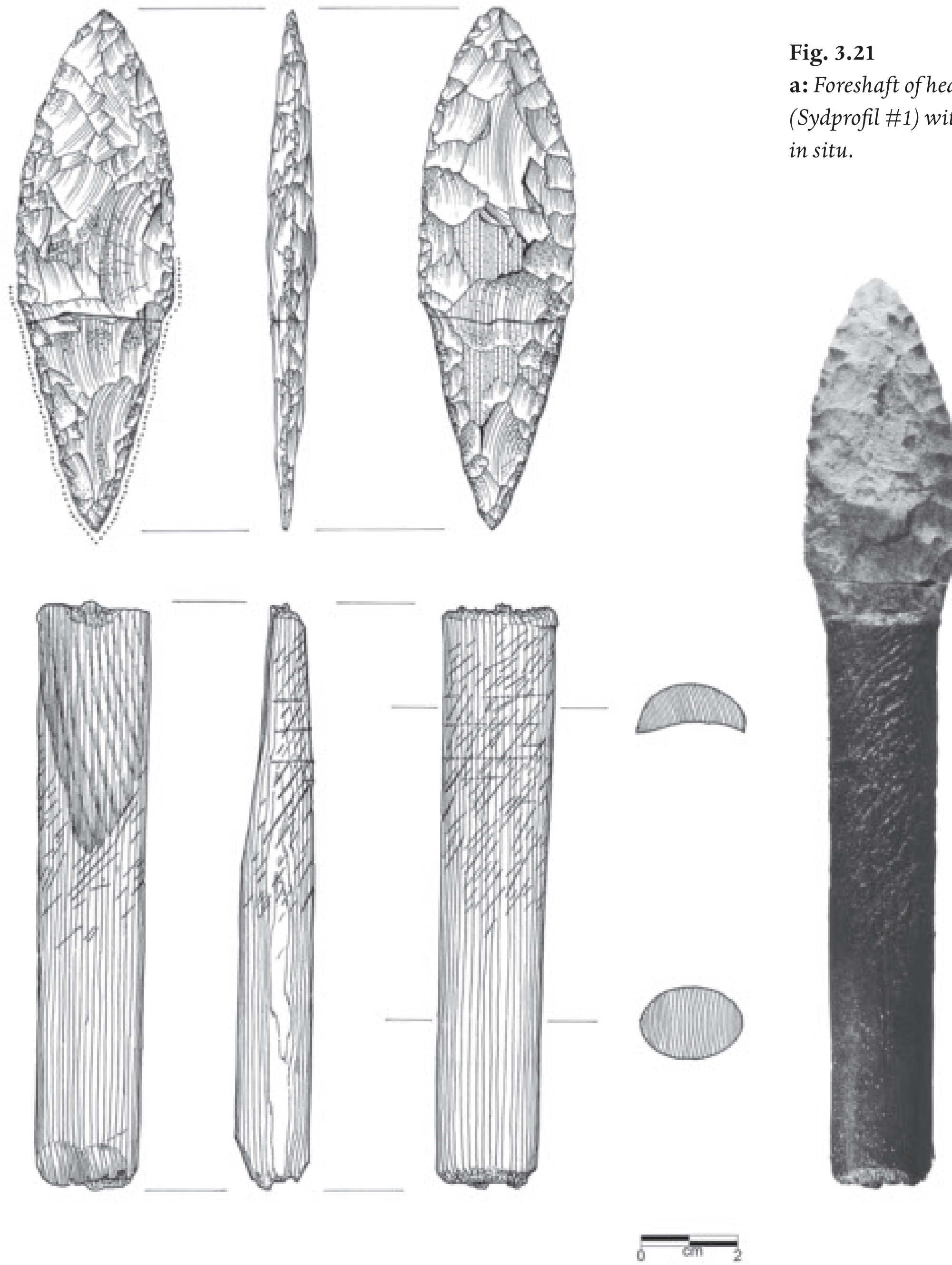


Fig. 3.21
a: *Foreshaft of heavy lance (Sydprofil #1) with endblade in situ.*

long and shows scratches and probably marks of a blade base. Scratches are seen around the distal end in a 110 mm broad zone. The proximal end is bluntly pointed and obliquely scratched.

Another specimen was found with the base of a large leaf-shaped bifacial endblade in its original position in the blade bed (Fig. 3.21a). The distal part of this killiaq endblade was located in the same layer about half a metre from the hafted part. This Type 2 foreshaft with oval cross section (22 × 15 mm) was cut and broken, so that the length of the shaft had been reduced to 120 mm when it was discarded. The very distal end of shaft was cut off as well, probably as a result of repair. The 65 mm broad lowered zone for lashing shows oblique scratches and a few dark traces of the lashing itself running across it. The bifacial endblade (l: 109 mm; w: 33 mm; thickness: 9 mm) is leaf-shaped and has a tapering, pointed stem, the edges of which are made dull by a light basal grinding. Thus, in this case a 33 mm broad endblade is hafted in a 22 mm broad shaft. A piece of *Larix* sp. with dense year rings was selected for this heavy lance foreshaft.

Two distal end fragments with lowered zones for lashing – both probably from Type 2 foreshafts – are 22 and 27 mm wide, and thus they must have been provided with heavy lance heads as well (Fig.3.21b). Finally, a single distal end fragment is probably from a blank for a Type 2 foreshaft (w: 22 mm).

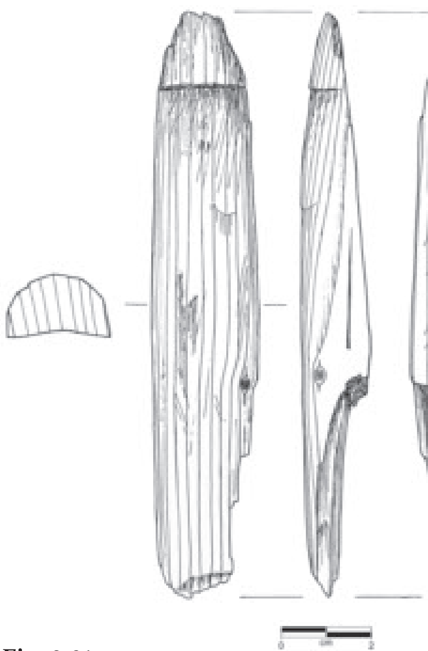


Fig. 3.21
b: *Foreshaft fragment of heavy lance with blade bed (13/24: 87).*

Finds from Qajaa:
Only a few fragments of heavy weapons come from Qa. A 25,6 is a broken distal end of a 40 mm wide blade bed, which must have been a very heavy weapon. There are no marks from lashing, and unfortunately the fragment is just 68 mm long, so the proximal end of the blade bed is not present. Apart from this, there is only a single shaft piece (C88,9) with a diameter of 22 mm.

3.2.3.6 Lithic projectile points for arrows, darts and lances (Fig. 3.22)

A total of 98 symmetrical bifaces were identified. Almost all (92) were made from killiaq. Three are of mcq and three of quartzite.

Among the large symmetrical endblades (40) the majority (27) show a slightly marked tapering stem and basal edge-grinding. The remainder either have no stem at all (7) or a clearly marked tapering stem (6). The small projectile points (56 in total) show much the same relative distribution: 36 show slightly marked tapering stems, 9 show no stem and 11 show clearly marked tapering stems.

Edge serration, normally very fine on the small blades and coarse on the larger, is seen on about 50% of the symmetrical endblades.

The recovery of three wooden foreshafts with points *in situ* – one light dart, one light lance and a heavy lance (described above) – in combination with analyses of the metric attributes of the symmetrical bifaces, provided clues for fitting the symmetrical bifaces into the functional classes described above.

Metric analyses focus on the widths of the stems and the maximum width of the blades – measures that are not normally affected by breakage or resharpening. The lengths (60 specimens; average: 50 mm) are obviously a problematic metric parameter as several projectile points have been resharpened or show broken distal ends.

The diagrams in Fig. 3.23a and Fig. 3.23b illustrate the stem width (SB) classes and plot SB versus maximum blade width (B) of 75 symmetrical endblades (mm), as well as comparative data from Qa, including 50 symmetrical endblades. From the peaks in the histogram it can be seen that the SB measure hints at a division into four metric types: a, b, c/d and e, where Type a peaks around the 7 mm bin, Type b around the 9–10 mm bins, Type c/d around the 12–13 mm bins, showing a long 'tail' until the 18 mm bin, and Type e with SB exceeding 20 mm. This can be further elaborated by including the maximum blade width in a plot against SB (Fig. 3.23b). The plot is, as expected, strongly linear correlated (correlation coefficient: 0.96) and to a large degree continuous. However, there is a tendency to form clusters supporting the division into the Types a–e. When morphological and metric data from the preserved wooden missile and lance foreshafts, in particular blade bed width (see Fig. 3.18), are combined with the results of the plot, it is reasonable to conclude that the lithic endblades, Type a–e, reflect five different types of projectile point (with some overlap):

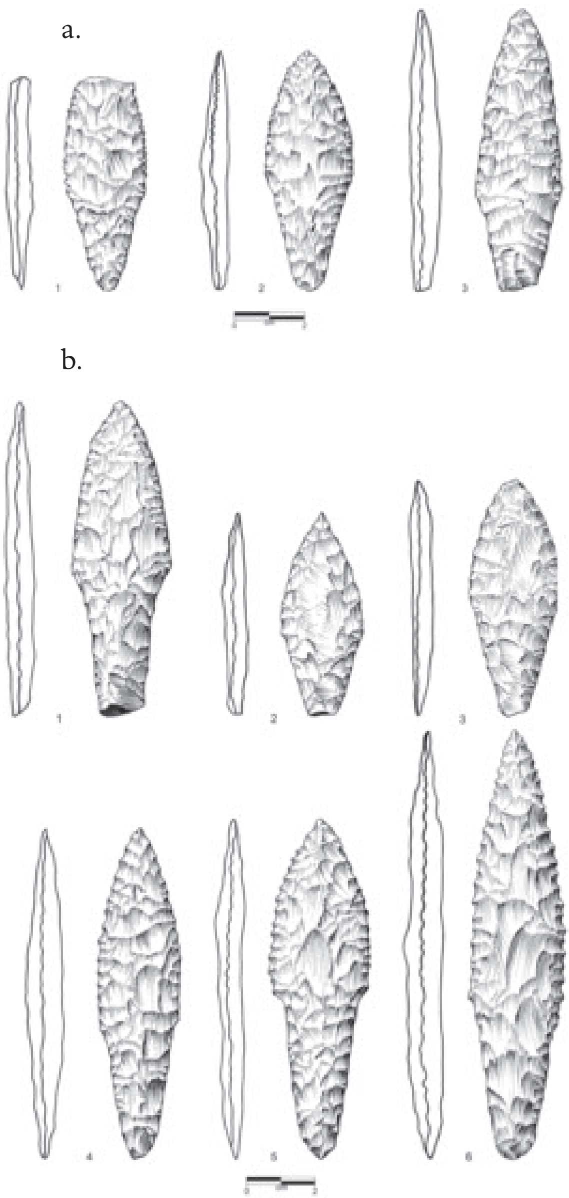


Fig. 3.22
Lithic projectile points for darts and lances.
a: *Type c endblades (projectile points).*
b: *Type d endblades (projectile points).*

Type a: 8 < B < 11 and 6.5 < SB < 8.5: This cluster (9 specimens) represents *small arrowheads*. There might be toy arrowhead among these. Only one of the preserved arrow foreshafts fits this type of arrowhead (compare with Fig. 3.10 and Fig. 3.18).

Type b: 9.5 < B < 15.5 and 8.5 < SB < 11.5: This cluster (21 specimens) consists mainly of standard *arrowheads* of different calibres. Whereas the variation in the stem width is limited, the wide range of the maximum blade width classes indicates that arrows with different functionality were probably used. A tendency to a further division into a type of *slender arrowheads* (9.5 < B < 12.5) and a type of *broad arrowheads* (12.5 < B < 15.5) is seen from the plot. The stem width range fits the width measurements of the arrow foreshaft blade beds perfectly (compare with Fig. 3.10 and Fig. 3.18).

Type c: 14.0 < B < 19.0 and 11.5 < SB < 15.5: This large group of endblades (30 specimens) served as heads for the *lightest category of darts and lances*, which is also the dominant calibre among the foreshafts (Fig. 3.19). Based on metric analysis it is not possible to distinguish heads for darts and lances from each other (Fig. 3.22a). The blade bed width measurements of the identifiable foreshafts overlap as well.

Type d: 18.0 < B < 22.0 and 15.5 < SB < 20.0: This type of lithic endblade (12 specimens) contains heads that fit foreshafts of *light darts and lances which are broader than the average* (Fig. 3.22b).

Type e: 22.0 < B and 20.0 < SB: Three endblades, including the hafted specimen described above (Fig. 3.21a) as a far outlier, fit the rare type of wooden foreshaft designated *heavy lances* based on the metric analysis of blade bed widths.

The metric analyses of lithic endblades thus add the following information to the characterization of the hunting weapons:

Leaving aside a group of small arrowheads, two types of ordinary arrows are identified: slender heads and broad heads. All types of arrowheads include short and long versions.

Furthermore, the endblades reflect the use of a *wide range of light darts and lances* (including 'very light') in accordance with the analysis of the wooden foreshafts.

Lithic heads for *heavy lances* are few, but they reflect the wide range of calibres within this tool type in accordance with the results of the analyses of wooden foreshafts.

Out of a total of 581 bifacial endblades at Qt, no fewer than 177 are indeterminable fragments representing different stages of use, resharpening and discard of the blades. Through a targeted study of the breaking patterns of these indeterminable fragments, it might be possible in the future to separate fragments of projectile points

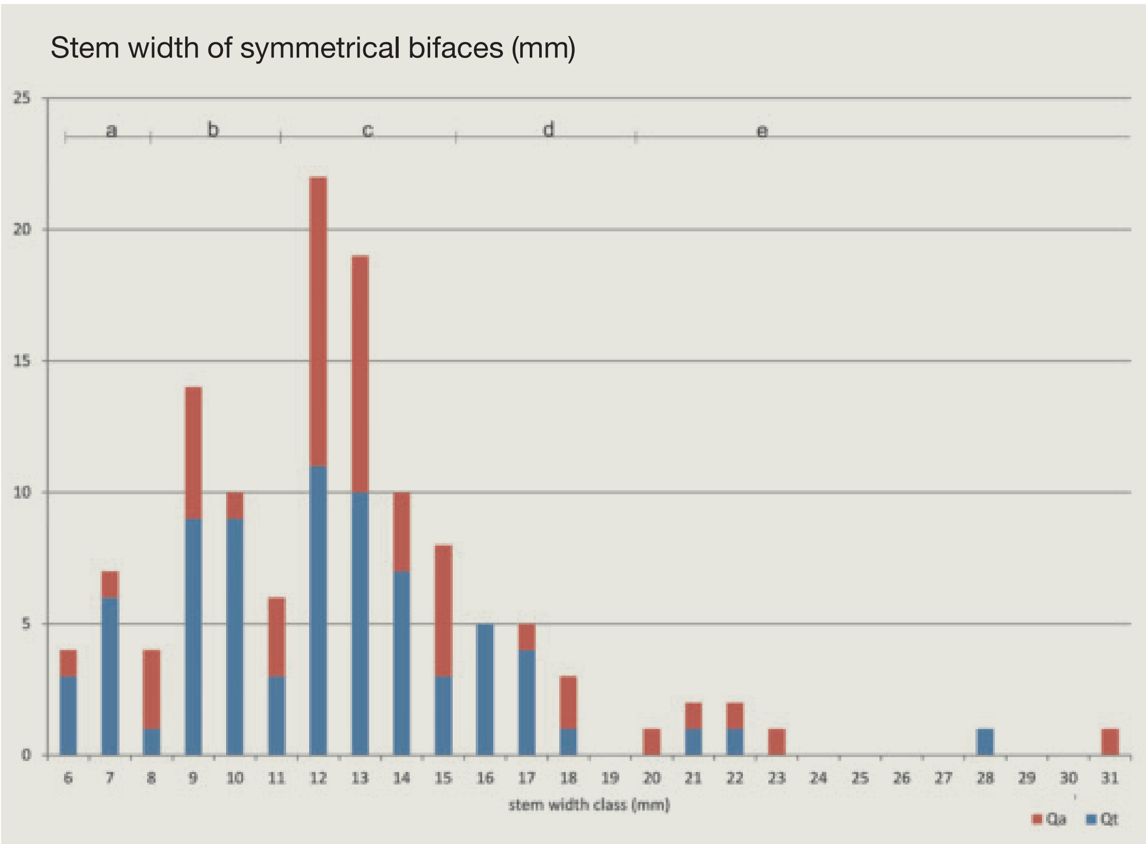


Fig. 3.23 a
Stem width classes of symmetrical endblades from Qt and Qa. The defined ranges of Types a–e are indicated.

from the many fragments of other sorts of end-blades (including knives).

Likewise, 135 specimens included in the total of 581 bifacial endblades are preforms. They have tentatively been divided into preforms for small (76) and large (69) bifacial blades. Both categories probably include several preforms for projectile points (Fig. 3.24), but as points and knife blades have overlapping early stages in their *chaîne opératoire* it is not possible to quantify this in further detail.

Finds from Qajaa:

One hundred specimens from Qa are catalogued as symmetrical endblades, including 19 arrowheads. Morphologically the symmetrical endblades show characteristics similar to the symmetrical endblades from Qt. The lengths of the 18 complete specimens vary between 25 and 70 mm and the widths between 15 and 25 mm. Three blades are made of quartzite, four of mcq, and the remaining 93 (93%) of killiaq. When the blade and stem widths of symmetrical bifacial projectile points are compared to the Qt specimens, it is seen that the Qa specimens show the same general distribution, although there are more outliers than at Qt (Fig. 3.23b).

3.2.4 Harpoons

Insight into the harpoon technology at Qt is based on 55 harpoon heads of antler, bone, ivory or wood, 93 triangular harpoon points of killiaq, eight foreshafts of bone or antler for toggling harpoons and a single eyelet of antler. No socket pieces for barbed harpoon heads have yet been identified in the material. Many harpoon shafts may 'hide' among the unidentified shaft fragments (see 3.2.5 below), but it is not possible

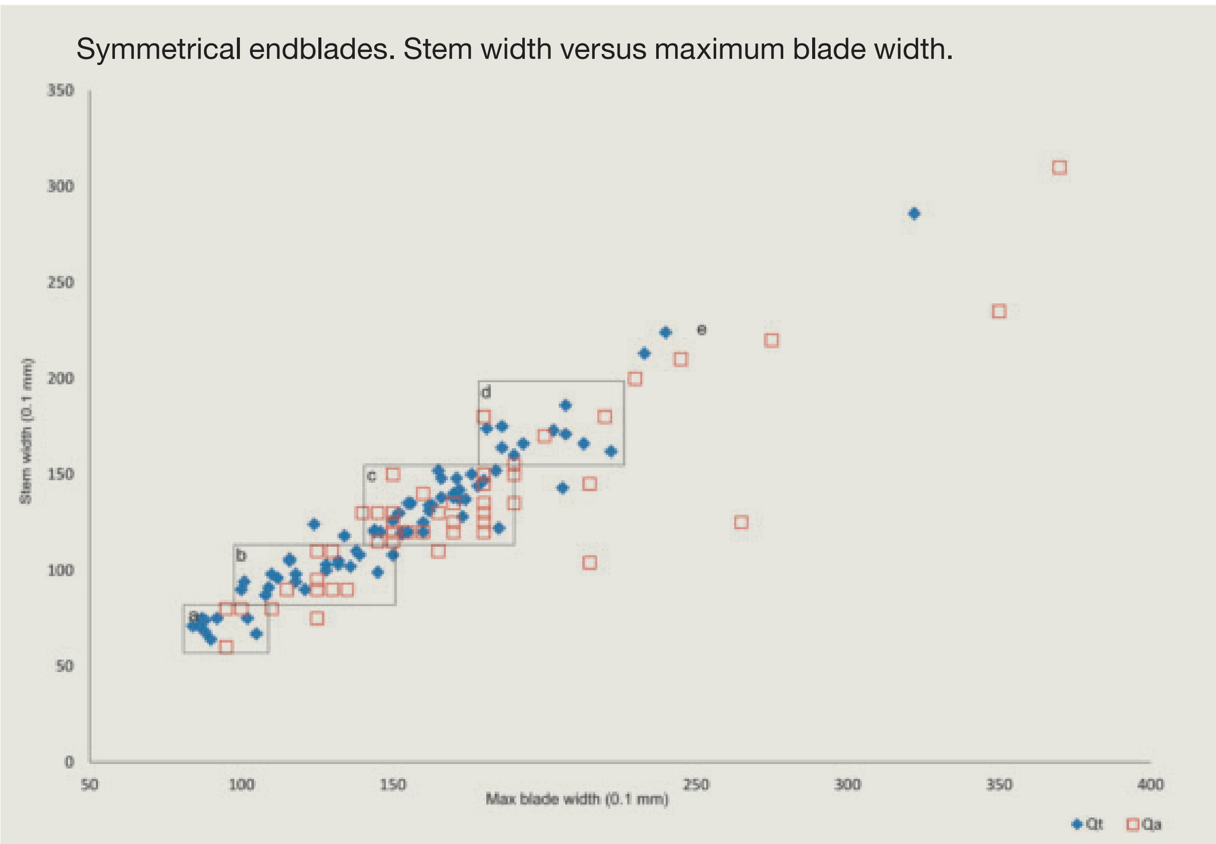


Fig. 3.23 b

Stem width versus maximum blade width of symmetrical endblades (75 specimens from Qt and 53 from Qa). The boxes show the metric definitions of Types a–e.

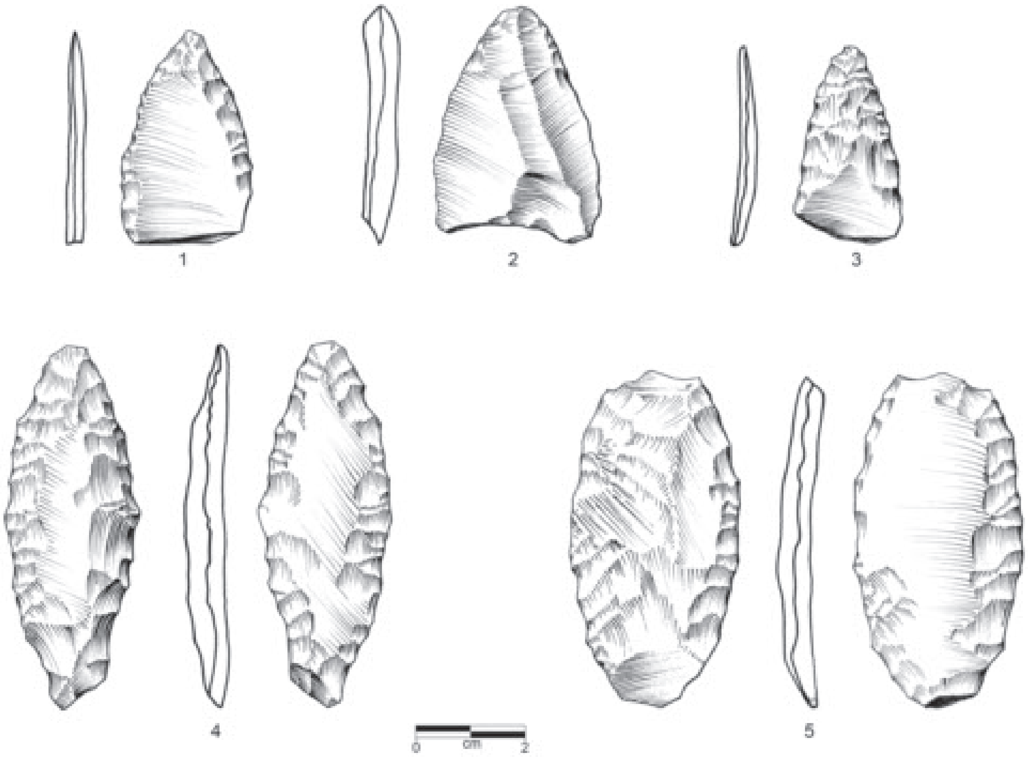


Fig. 3.24 *Preforms for different lithic projectile points.*

to distinguish these from dart shaft fragments. Like the darts and most of the lances, the harpoons are very light missiles.

The 55 harpoon heads show variation concerning raw material and details, but basically they can be divided into toggling harpoon heads with open sockets and barbed harpoon heads with tang (Grønnow 1997).

Table 2.2.4-1 shows that, by a distance, the preferred raw material for harpoon heads was antler. No fewer than 48 out of 55 specimens are of antler. Ivory accounts for four and wood for four heads. It is remarkable that whalebone, which from a functional point of view would be a perfect raw material, was not used at all for harpoon heads.

3.2.4.1 Harpoon heads, Type Qt-A (Fig. 3.25)

This type comprises all the toggling heads – 16 specimens including two rough-outs. All the complete specimens are self-bladed, provided with an open socket and one to three spurs in the proximal end. All, except one of ivory (Fig. 3.25b – 5), are of antler. Three specimens are complete in the sense that they still show a single lateral barb in the distal end, and thus they were not resharpened. The majority of the heads were completely worn down and resharpened. Their distal ends were reduced to a 'plump' point above the line hole. The remainder are fragments of proximal parts.

The shape of the proximal spur varies. Six heads show a single spur (e.g. Fig. 3.25a – 3–4), four are provided with two proximal spurs ('cloven-foot-like') (e.g. Fig. 3.25a – 1–2 and Fig. 3.25b – 7–8), and four heads have three small spurs (e.g. Fig. 3.25b – 4–5).

The open sockets of Qt-A are only about 6 mm in diameter (range: 5.5–7.6 mm) and accordingly they were mounted on foreshafts with a thin distal end. They all show a narrow, lowered zone with horizontal incisions on the opposite side of the open socket – a basis for the lashing, which held the head firmly to the point of the foreshaft.

The position of the carved, elongated line hole varies in relation to the plane of the socket and the distal end. Out of 13 heads, only two are provided with a line hole parallel to this plane (e.g. Fig. 3.25a – 1). The remainder have a line hole running perpendicular to the plane. The narrow line hole is normally placed 5–10 mm above the socket, but in a few cases it is situated in a lowered position in prolongation of the socket (e.g. Fig. 3.25b – 4).

a.

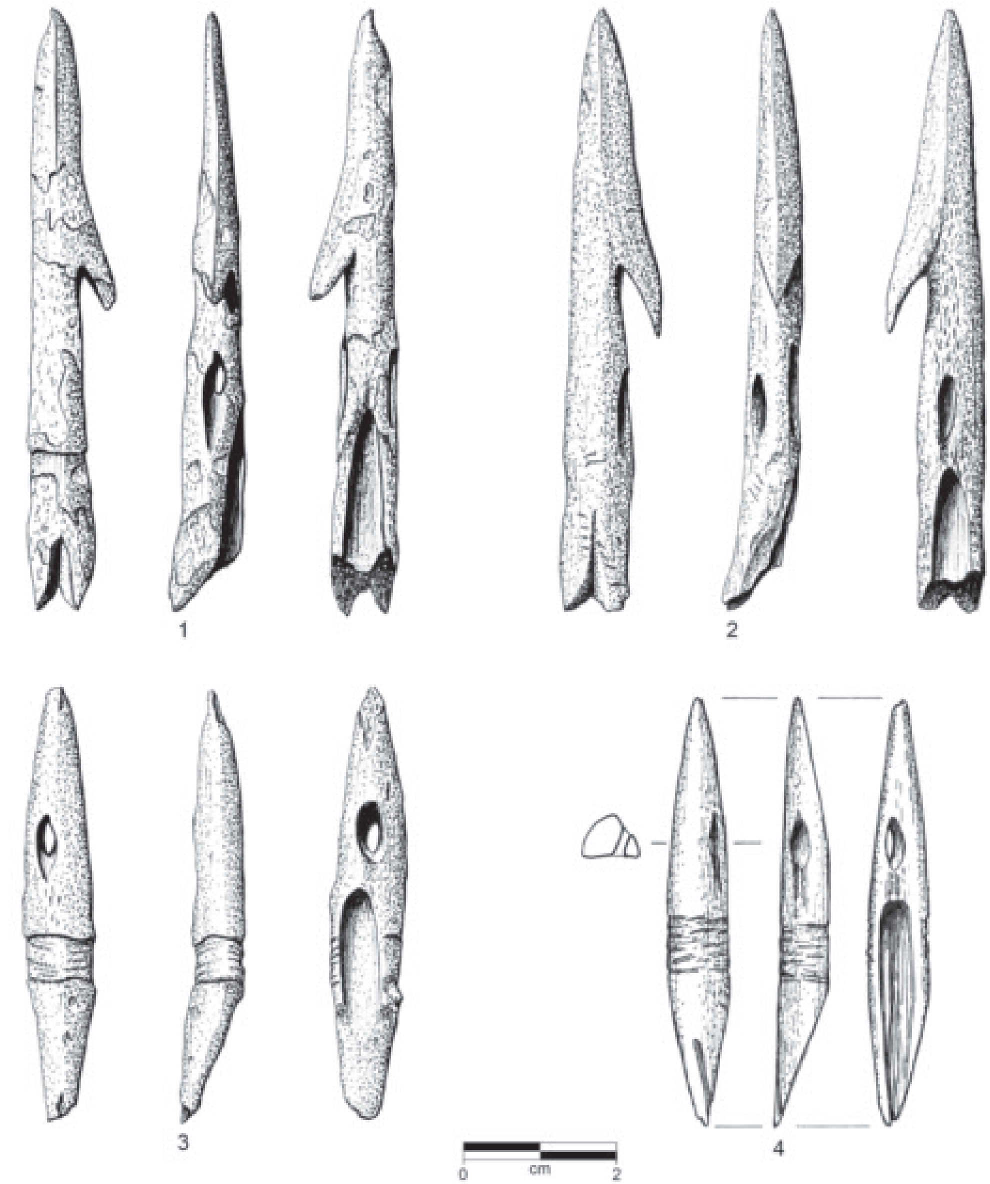
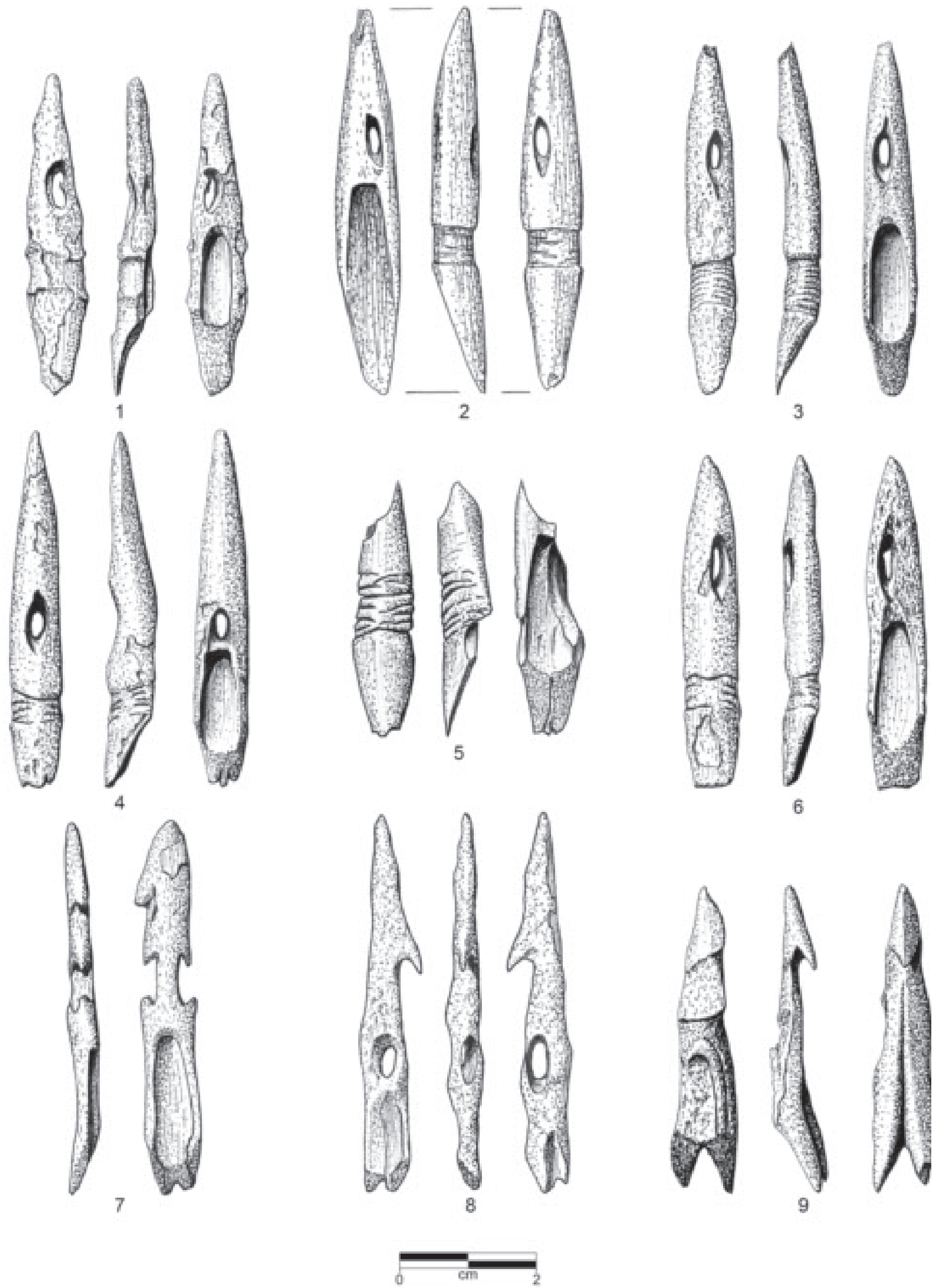


Fig. 3.25
Type Qt-A harpoon heads.
a: *1: 89/252: 11; 2: 20/26: 19; 3: 11-12/25: nn; 4: 11/23,5: 72*
b: *1: 13/23: 98; 2: 11–12/25: layer 8; 3: 86,5/249,5: 26*
4: 13/24: 18; 5: 88,5/252,0: 12; 6: 85/253: 7; 7: 25/21,5: 8
8: 26/21: 9; 9: 11,0/23,5: 26

As mentioned, only three heads of Type Qt-A still have a prominent lateral barb in the distal end, which tends to have sharp sides.

The intact specimens of Type Qt-A are about 80 mm long. Harpoon heads like these were resharpened to a length of about 40–60 mm – and could have changed function during their 'life', for instance from a sealing to a fishing harpoon – before they were finally discarded. A preform for a miniature Qt-A head which

b.



is only 36 mm long must also be mentioned (83,0/251,5: 23).

Finds from Qajaa:
Four complete type Qt-A harpoon heads and a preform are included in the Qa assemblage. The length varies between 9.2 and 41 mm. Just one has a single lateral barb. Like the toggling harpoon heads from Qt, the toggling harpoons from Qa are self-bladed, heavily worn and resharpened (E233) (Fig. 3.26 – 1). The unfinished specimen (C61) (Fig. 3.26 – 2) indicates that occasionally this harpoon type could also be manufactured from quite small pieces of bone. The width of the open socket can be measured on three specimens: from 4 mm to 5.8 mm. One specimen (E231) is unusually broad (Fig. 3.26 – 3). The blunt point appears to be in the process of resharpening, and there is a groove or ornamental line towards the point.

Fig. 3.26
Type Qt-A harpoon heads from Qa.
1: E233; 2:C61 (blank); 3: E231

3.2.4.2 Foreshafts for Type Qt-A (Fig. 3.27)
Foreshafts with more or less pointed distal ends fit the harpoon heads of type Qt-A. There are surprisingly few of these foreshafts.

The most convincing candidate is a 296 mm long tapering whalebone rod (Fig. 3.27 – 1), carefully made with a blunt pointed distal end and a bevelled proximal end (which seems not to have been finalized). It would fit a wooden shaft with a diameter of 18 mm, i.e. a shaft belonging to the upper end of the light hunting weapons. One piece could be a mid-fragment of a comparable foreshaft.

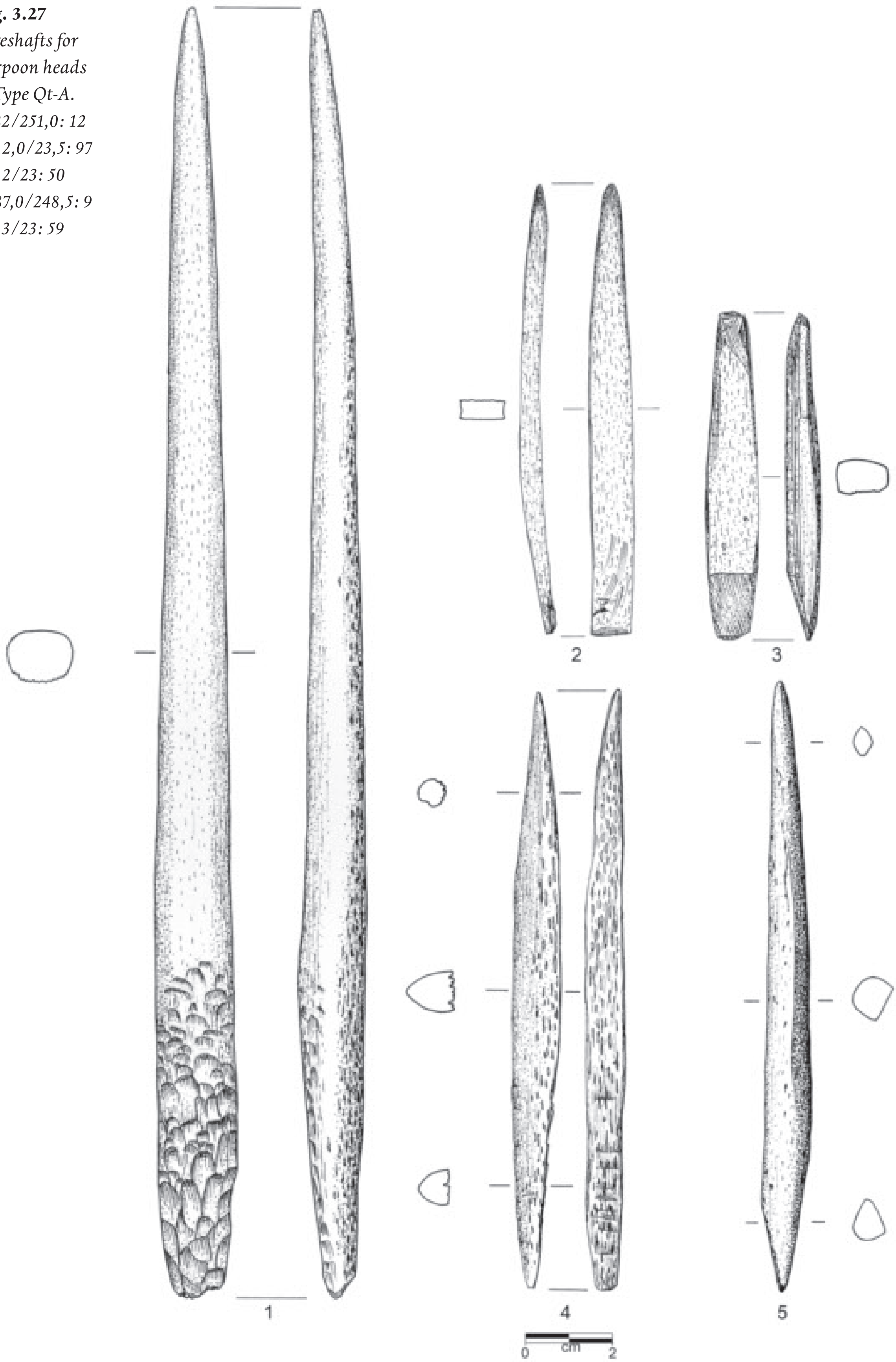
Four specimens also of whalebone could have served as foreshafts for toggling harpoons as well. They are from 110 to 180 mm long and show bluntly pointed distal ends and scarfed proximal ends (Fig. 3.27 – 4–5). However, they could all just be reworked prongs for bird spears, as they are very slender and would only fit shafts with diameters of about 8–10 mm, i.e. within the range of arrow shafts.

Finally, a 75 mm long specimen with a wedge-shaped (unfinished) distal end and a proximal scarf end, and a 103 mm long piece with a blunt point, both of antler, could be foreshafts (Fig. 3.27 – 2–3). They would fit wooden main shafts measuring 13 and 10 mm in diameter, respectively.

11,0/23,0: 20 is a possible wooden foreshaft. It has a carefully made blunt distal point, somewhat flat on the one side – a shape that would fit into the sockets of the larger Qt-A harpoon heads. The badly preserved fragment is 317 mm long and the diameter of the round cross section is 17 mm. It must be mentioned that more foreshafts for Qt-A heads might 'hide' among the wooden shaft fragments, which are classified as possible tapering proximal shaft ends.

Finds from Qajaa:
A total of ten nicely worked bone points have been estimated to be harpoon head foreshafts in the Qa material. However, among these eight are broken or partly reworked, making them difficult to assess. Two are made from whalebone and show a scarfed proximal end (1:

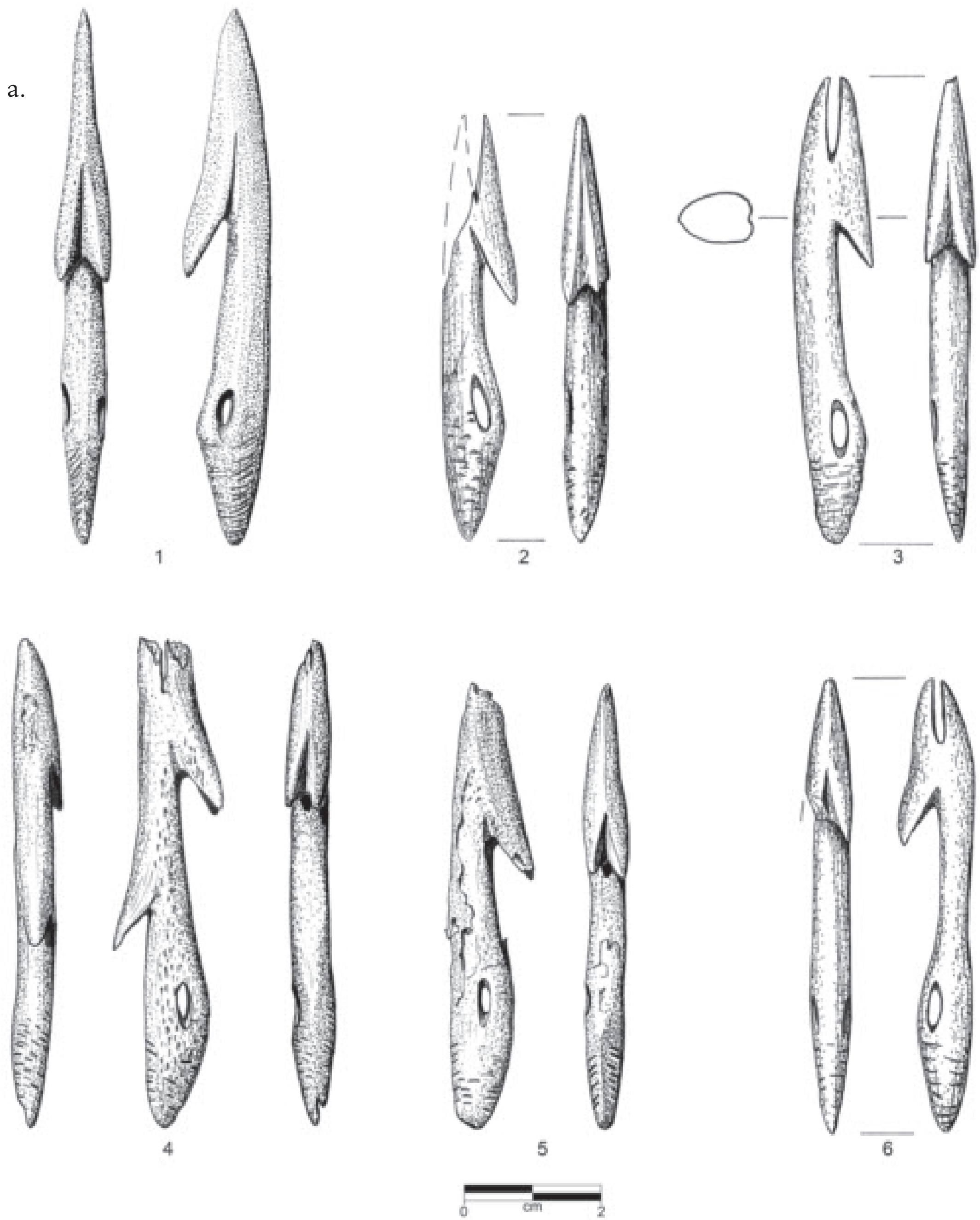
Fig. 3.27
Foreshafts for harpoon heads of Type Qt-A.
1: 82/251,0: 12
2: 12,0/23,5: 97
3: 12/23: 50
4: 87,0/248,5: 9
5: 13/23: 59



93 mm, diam.: 8.5 mm; l: 67 mm, diam.: 7 mm). They fit the open sockets of the Type Qt-A harpoon heads. Like the four whalebone foreshafts from Qt, they would have fitted quite slender shafts.

3.2.4.3 Harpoon heads, Type Qt-B (Fig. 3.28)

This is the ‘typical’ Saqqaq harpoon head. Twenty of the heads (plus four rough-outs) in the assemblage belong to this type. It is a barbed harpoon head with tapering tang (‘male harpoon’). The overwhelming majority of these



heads are of antler (18), three are of ivory (e.g. Fig. 3.28a – 1–2) and three of wood (Fig. 3.28d and Fig. 3.28e).

The tapering tangs are pointed oval in cross section and made rough on the surface by horizontal scratching. At a protruding part of the basal end of the head, just above the tang, a narrow, elongated line hole was carved (on average only about 6.6 × 2.5 mm). The line hole is situated a little to the ventral side of the head in relation to the point of the tang. Thus, following impact, the pull of the harpoon line would tend to draw the head to an oblique position inside the animal.

b.

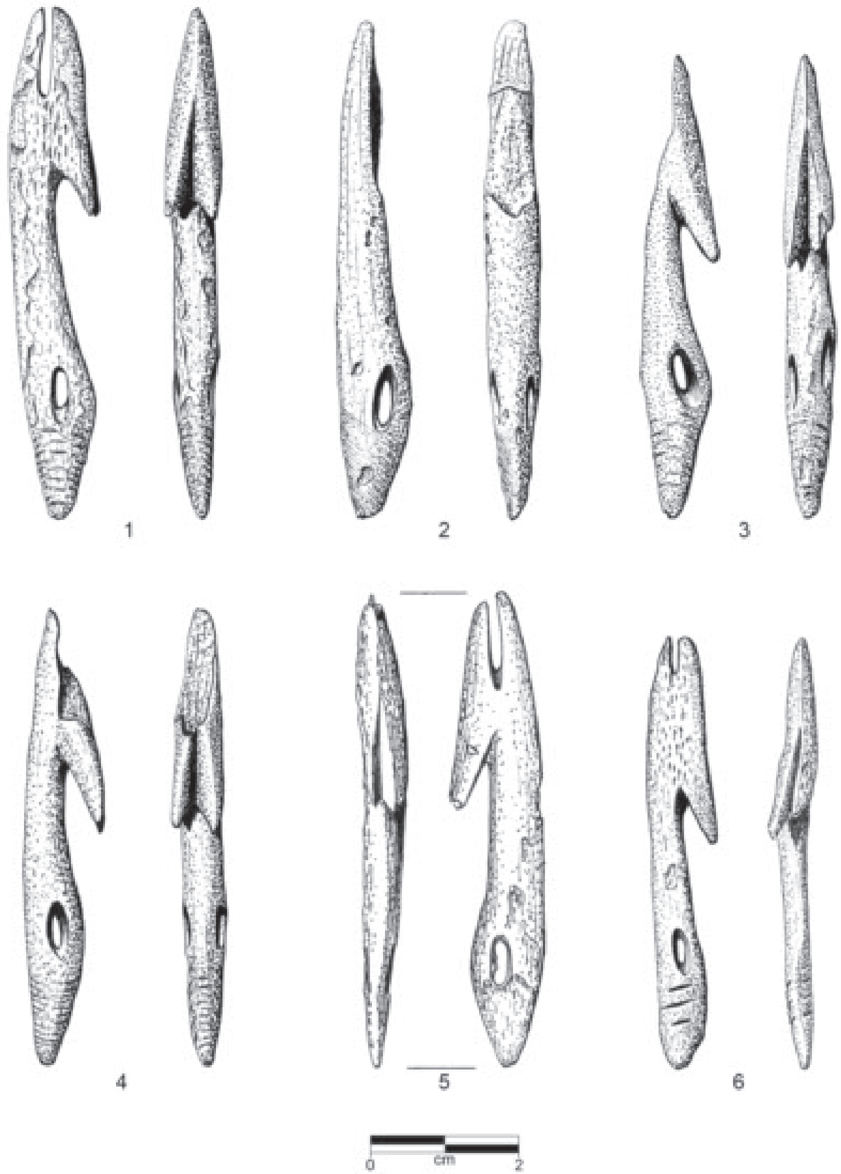
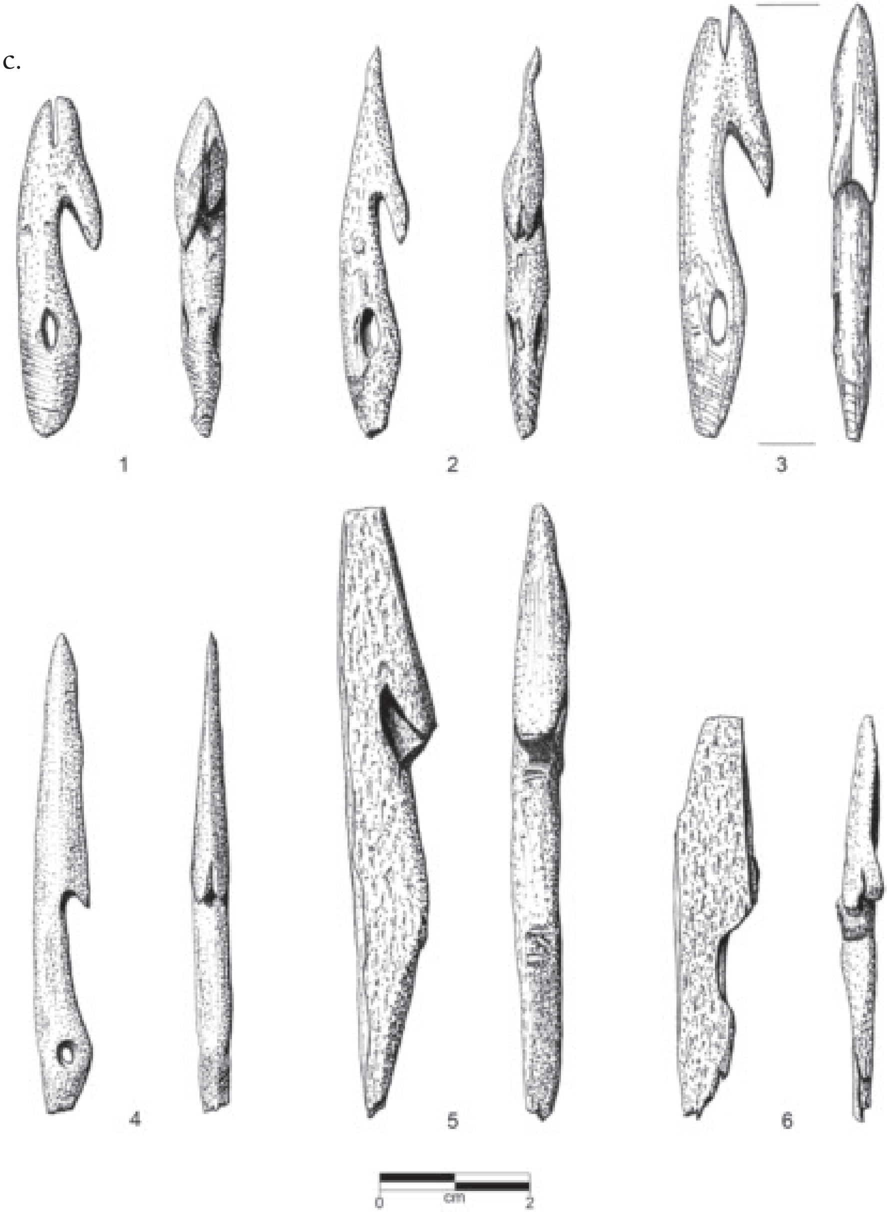
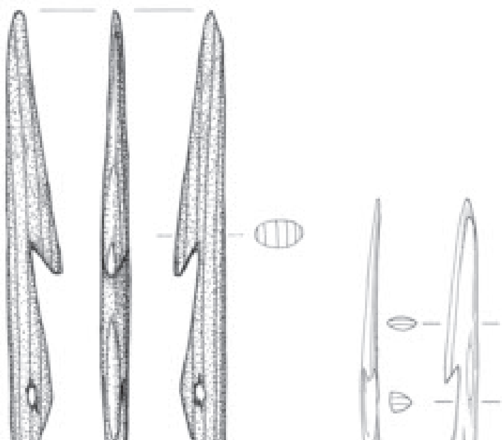


Fig. 3.28
Type Qt-B harpoon heads.
a:
1: 13/23: 68; 2: 10/24: 17
3: 11,0/23,0: 122
4: 26/21,5: 19
5: 84,45/255,23 layer 15
6: 82,0/250,0: 9
b:
1: 11,0/23,0: 122
2: 86,5/252,0: 15
3: 10/24: 17
4: 12-13/25: nn
5: 10,0/23,5: 45
6: 19/19: 137

c.



d.



e.

Fig. 3.28

c:

1: 89,0/251,0: 20

2: 85/253: 11

3: 13/24: 33

4: 86,0/251, 5: 21

5: 88,5/251, 5: 14

6: 89/248: 15

d:

1: 85/253: 22

2: 86,0/252,0: 16

e:

19/19: 99

All preserved Type Qt-B heads show a unilateral distal barb on the ventral side, and this barb, except on the three wooden harpoon heads, is divided into two spurs. In addition, a single specimen shows a lateral barb on the dorsal side about halfway between the distal barb and the tang (Fig. 3.28a – 4).

Only three Qt-B harpoon heads (plus the three wooden heads) are self-bladed (Fig. 3.28a – 1 and Fig. 3.28c – 2 and 4). Fourteen of the heads are provided with a narrow slot for the harpoon point, which is placed parallel to the plane of the line hole. Well-preserved specimens show that the opening of the slot narrows at the distal end, and thus that the triangular harpoon point was wedged tightly into the head, while still being easily replaceable. The blade slots are on average 5.3 mm wide and 10.1 mm deep, and thus, as expected, the slots' measurements fit nicely as sockets for triangular points.

Several harpoon heads of Type Qt-B are missing the barb. This is due to impact fractures. In some cases, e.g. when the head struck a bone, the point was pressed into the slot and sometimes its impact cut off the ventral barb –a built-in 'weakness' of the design.

The intact Qt-B heads are typically quite small: 64–67 mm long (Fig. 3.29) with outliers at 46 mm and 82 mm. One of the wooden heads (Fig. 3.28d – 1) is exceptionally long (125 mm).

Four rough-outs show that the first step in the making of Qt-B harpoon heads consisted

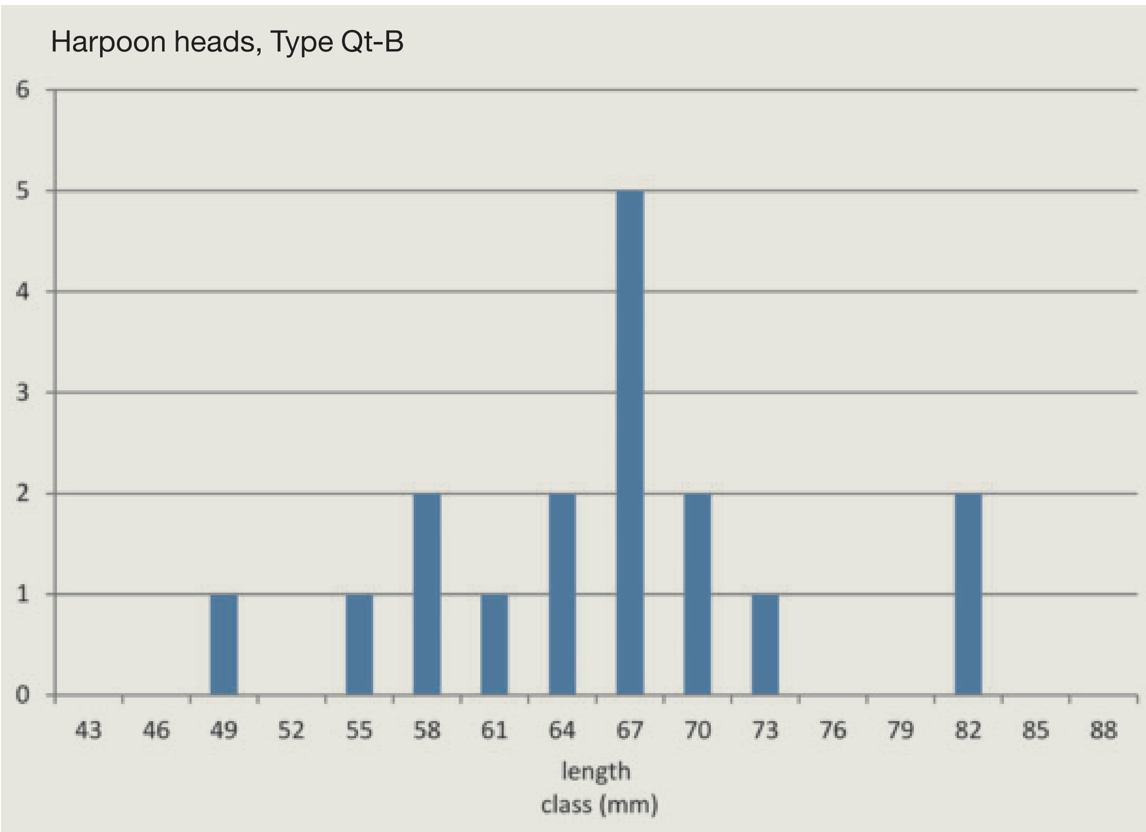


Fig. 3.29 *Lengths of Qt-B harpoon heads from Qt.*

of a list. Two of the antler rough-outs were made from 12 mm broad lists, mainly of massive antler, but with one broad side of spongious matter (Fig. 3.28c – 5–6). The edges of the list were cut with burin, but the rough outline of the barbed head was done with an implement with a sharp edge. Judging from the character of the cut marks the cutting was done in antler, which was fresh or softened by soaking in water or urine. Fig. 3.28e depicts a preform for a wooden harpoon head of Type Qt-B. A 10 mm broad list was the starting point for the carver.

Finds from Qajaa:
Seven harpoon heads and one rough-out from Qa are of Type Qt-B. These specimens conform closely to the male harpoon heads from Qt. In four cases the lengths of the finished specimens can be measured: 56.5 mm, 60 mm, 63 mm and 63 mm. This is a few millimetres shorter than the average length of the Qt-B harpoon heads from Qt. Two specimens have characteristic impact fractures: a fracture from the base of the blade slot has resulted in the splitting-off of the barbs (Fig 3.30 – 1 and 2). A rough-out is cut from caribou antler and shows preparation for two asymmetrical lateral barbs. The length

Fig. 3.30
Type Qt-B harpoon heads from Qa. (Photos: JL)
1: (left) Head with broken-off distal barb (F286).
2: (right) Typical distal barb fragment (E234).

of the preform of 71 mm fits nicely into a category of small caribou antler lists that are proximally and distally split by chopping and breaking, and laterally detached by burin work (see 3.9.3.1 below).

3.2.4.4 Harpoon heads, Type Qt-C (Fig. 3.31)

This type, comprising only six pieces and a rough-out of antler, is closely connected with Qt-B. Type Qt-C is a barbed harpoon head with a tapering tang. The elongated, carved line hole is situated at the central axis of the broad side of the relatively flat tang and above the scratched zone covering the proximal part of the tang. In contrast to Qt-B, the pull of a harpoon line would be along the longitudinal axis of the Qt-C-head, and thus the head did not toggle.

The positions of the barbs on two of the heads are quite spectacular. Fig. 3.31 – 1 shows distal barbs, one on each side of the blade slot. One of these barbs has two spurs. Fig. 3.31 – 2 is a very long (84 mm) and slender head with a distal two-spurred barb and opposite barbs situated at the middle of harpoon body. Originally the head probably had a blade slot, but it was resharpened to its current self-bladed state.

Fig. 3.31 – 5 is a proximal fragment, the tang of probably one of the largest harpoon heads at Qeqertasussuk. It is not possible to reconstruct the morphology of this Type Qt-C head, but it must have been about 100–150 mm long, to judge by the size of the tang.

Fig. 3.31 – 7 is a rough-out of a quite small Qt-C head of antler. The working traces indicate that the raw material was softened before it was shaped.

Finds from Qajaa:
Two Qt-C harpoon heads are known from Qa (Fig. 3.32 – 1 and 2). They are nicely manufactured with two spurred lateral barbs at one side. Ornamental longitudinal lines are placed on the side opposite the barbs, ending approximately where the harpoon head begins to narrow at the point. Such ornamental lines on harpoon heads are not known from Qt.

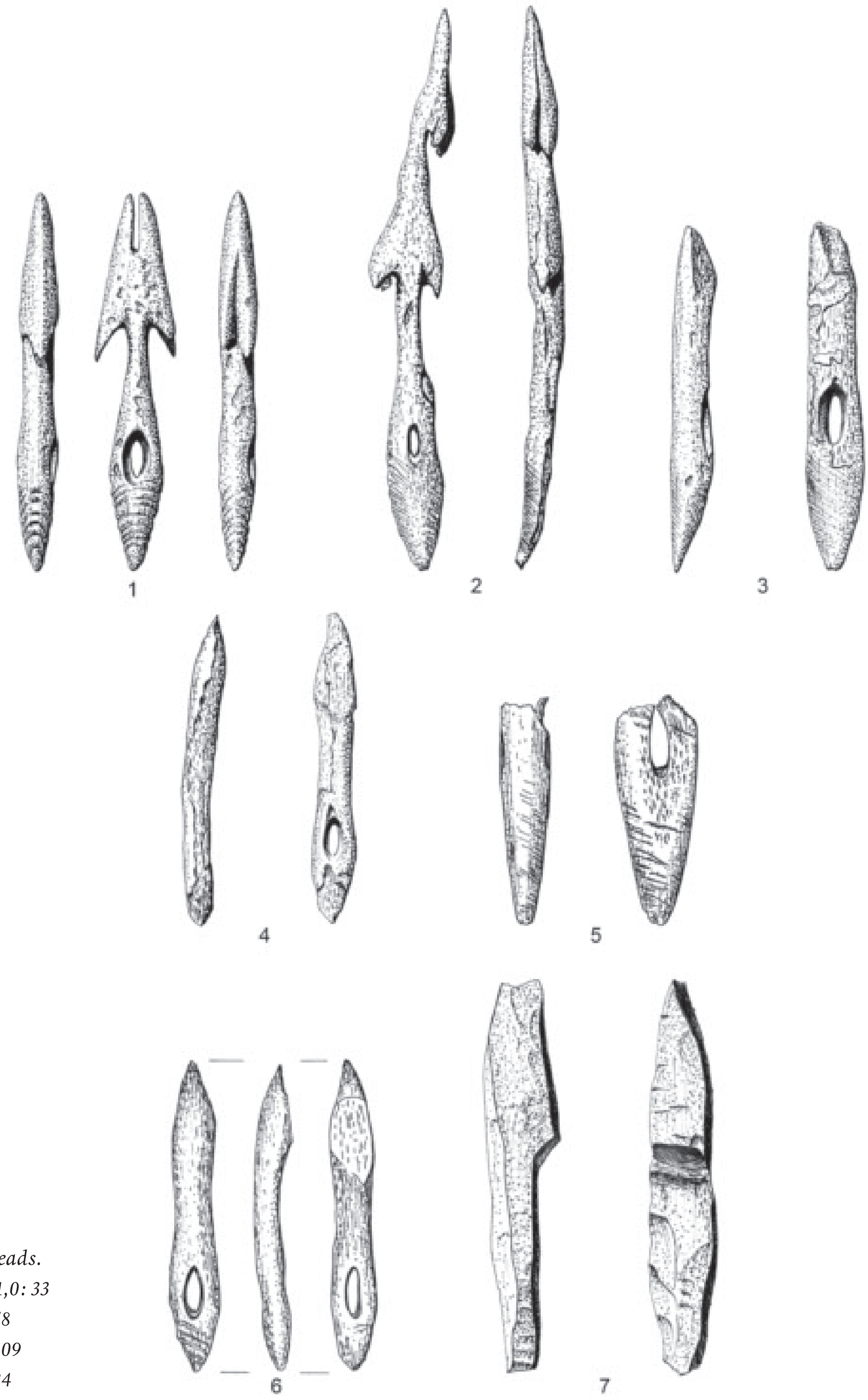


Fig. 3.31
Type Qt-C harpoon heads.
1: 89,0/251,0: 33
2: 13/23: 58
3: 19/20: 109
4: 14/24: 24
5: 11/23,5: 28
6: 14/24: 24
7: 19/20: 58

3.2.4.5 Harpoon heads, Type Qt-D (Fig. 3.33)

This type, represented by seven heads of antler, is characterized by the position of the oval line hole above a lateral barb at the middle of the harpoon's body. The carefully carved line hole is parallel to the plane of the slot for the endblade. The lateral barb on the dorsal side is in one case (Fig. 3.33 – 5) provided with two spurs. The distal barbs on the ventral side of the heads have two spurs. Due to the high position of the line hole on these Type Qt-D heads, and the displacement of the hole in relation to the longitudinal axis, a pull in the harpoon line would result in toggling that would reinforce the effect of the barbs. Type

Fig. 3.32
Type Qt-C harpoon heads from Qa. (Photos: JL)
1: (left) Head E218 from the side.
2: (right) Head E219 from the dorsal side.

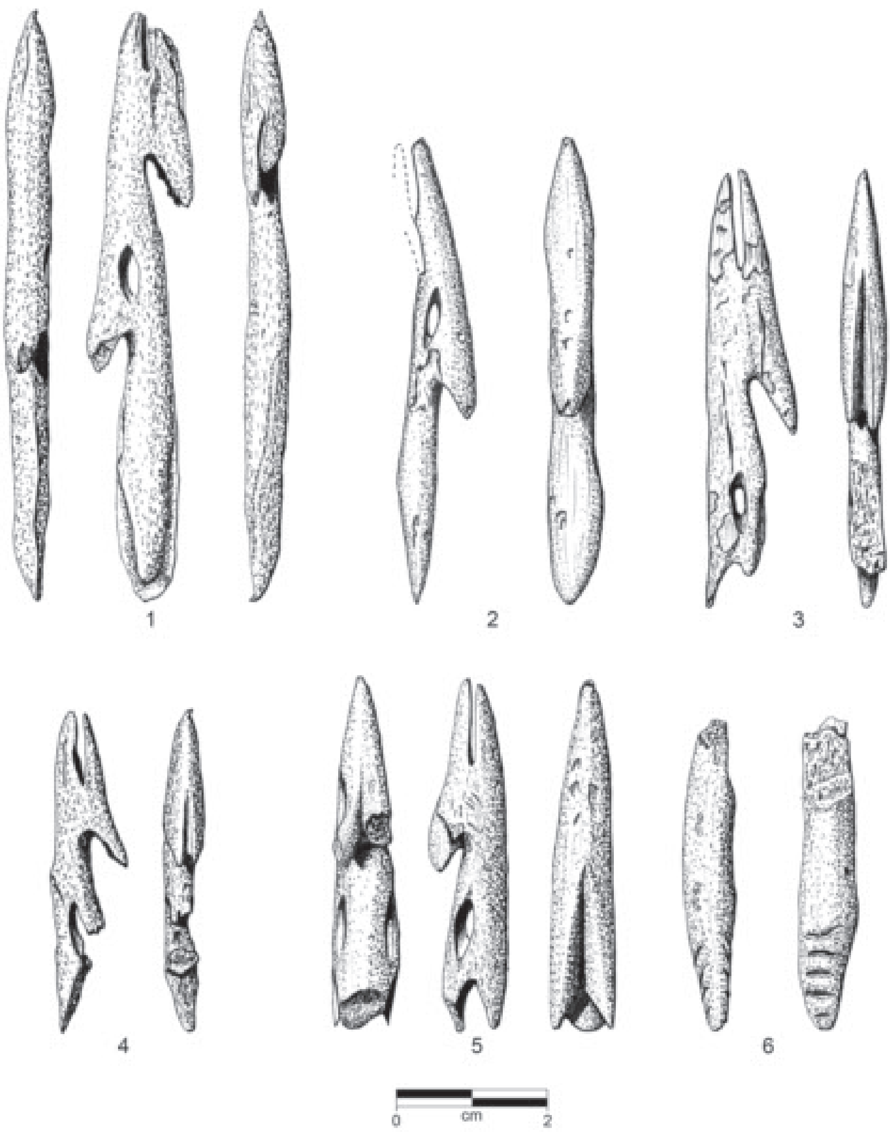


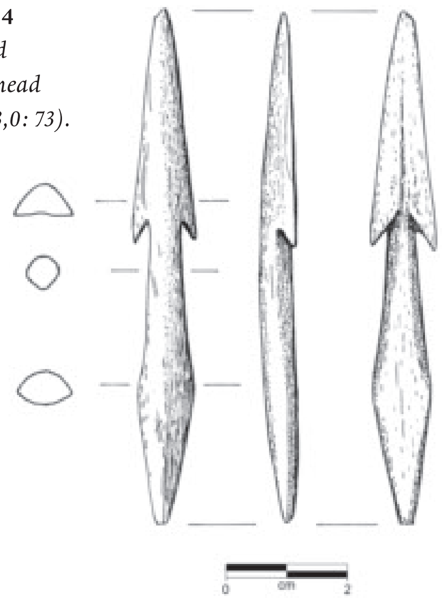
Fig. 3.33
Type Qt-D harpoon heads.
1: 83,0/252,0: 12
2: 26/21,5: nn
3: 19/19: 119
4: 82,5/249,5: 13
5: 88/251: 6
6: 91/250: 6

Qt-D is the most complex of the barbed harpoon head types.

The body of the Qt-D type is quite thin just below the line hole and the lateral barb. Five of the seven heads have snapped exactly there. Consequently, only two of these heads are in a state where the total length can be measured (62 mm and 77 mm), but judging from the snapped heads, they probably belonged to the longest group of barbed heads.

Finds from Qajaa:
A single specimen of Type Qt-D has been recovered from Qa (F285). The line hole is placed just above the barb and the distal end is broken off.

Fig. 3.34
A barbed missile head (10,0/23,0: 73).



3.2.4.6 Other harpoon heads

The barbed head in Fig. 3.34 shows a tanged proximal end and two opposite lateral barbs at the base of a long self-bladed distal end. Either this specimen was not finished (there is no line hole at the proximal end) or it functioned as an end prong of an otherwise unknown type of dart. From Qa there is an atypical head (A9) with straight base at the tapering stem.

3.2.4.7 Harpoon endblades (Fig. 3.35)

As already seen, the great majority of the harpoon heads of types Qt-B, Qt-C and Qt-D are provided with a slot for an endblade. The design of the slot indicates, as mentioned above, that the endblade was wedged into it. There are no traces of any kind of 'glue' or rivet that would have locked the endblade in the slot of the harpoon head.

Obviously, the small triangular endblades of killiaq are candidates for Saqqaq harpoon blades (Fig. 3.35). However, it must be mentioned that the point of a single, short foreshaft for a light lance or missile was of this shape, an isosceles triangle (Fig. 3.19e). The material comprises 93 of these harpoon points: thin, narrow triangles of killiaq, of which 13 are preforms showing different stages of the working process (bifacial technique) from flake to finished endblade.

All harpoon endblades have slightly convex long sides, but the shape of the bases varies. The majority of the points, 32 specimens, show a slightly concave base (e.g. Fig. 3.35 – 1 and 15), 19 have a straight base (e.g. Fig. 3.35 – 2 and 9), and 11 have a slightly convex base (e.g. Fig. 3.35 – 12). The proximal part of the remainder is lacking. The assemblage includes a few points for miniature harpoon heads (e.g. Fig. 3.35 – 5 and 10).

The broad sides of almost all endblades (71 specimens) were ground/polished before the edges were finally dressed by careful bifacial pressure-flaking. The edges of about half of the endblades are finely serrated and a few (five) show coarse serration (e.g. Fig. 3.35 – 12 and 14). The sides were ground so that the base of the en blade became thin, almost sharp, whereas the thickest part of the endblade (typically 1–1.5 mm) is situated midway – or above that – between the base and the tip. This longitudinal profile is in accordance with the hafting principle: the tight wedging of the triangular endblade in the tweezer-like slot of the harpoon head. Thus the tiny endblade was easily replaced when it snapped in use, or when the hunting situation demanded a point with, for example, a finely serrated edge.

Metric analysis of 38 specimens shows a tendency to a linear correlation (correlation coefficient: 0.76) between maximum width and total length of the triangular harpoon endblades. The average width of the endblades is 8 mm (min.: 4 mm; max.: 11 mm) and the average

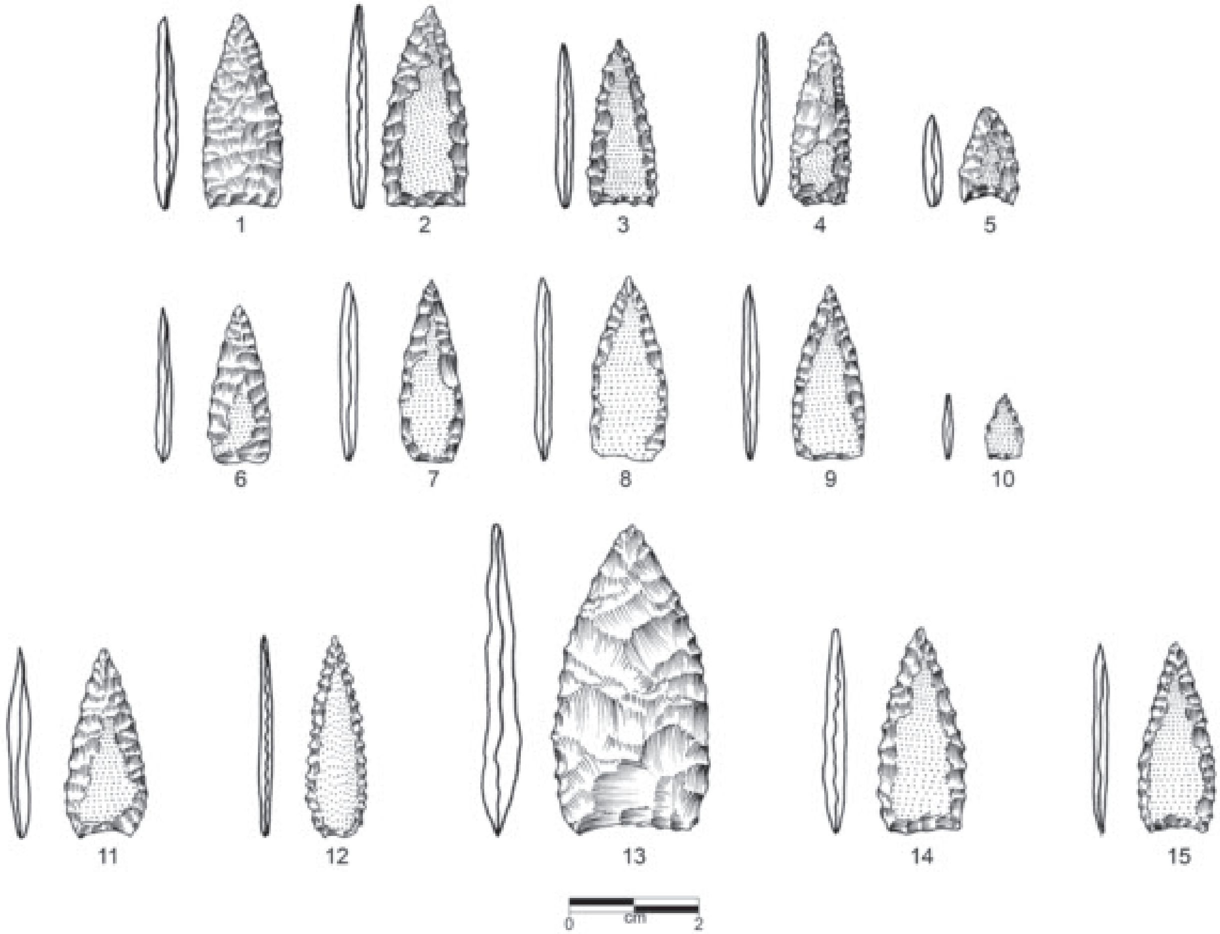


Fig. 3.35 *Triangular harpoon endblades.*

length is 18 mm (min.: 5 mm; max.: 27 mm). When the width and length of the blade slots in the harpoon heads of the barbed types are plotted in the same scatterplot as the endblades (Fig. 3.36) it is seen that the blades are generally longer and wider than the slots, and thus that almost all (except for the miniature ones) could be used as points for all slotted harpoon heads in the Qt assemblage.

Finds from Qajaa:

Nineteen harpoon endblades are included in the Qa assemblage. All are of killiaq, and they are typologically similar to the harpoon endblades from Qt. Four are without polishing of the broad sides, meaning that 79% have polished broad sides. The length varies between 15 and 28 mm and the width between 6 and 10 mm. There is a clear linear correlation between length and width just as at Qt (Fig. 3.36). A single large specimen is 38.5 mm long and 12.5 mm wide.

3.2.4.8 Accessories: eyelets and harpoon endblade containers

Considering the ethnographic sources and archaeological materials from later cultures, one would expect that a wide variety of finger rests, knobs, mouthpieces for bladders, and toggles – all kinds of accessories connected with harpoon/bladder technology – would have been found among the rich organic material from Qt. This is not the case. Only a few pieces belong with some probability to this group of accessories.

An eyelet for holding the harpoon head and its line tight to the shaft is among the probable harpoon accessories. The fragmented specimen is 46 mm long, 13 mm wide and provided with

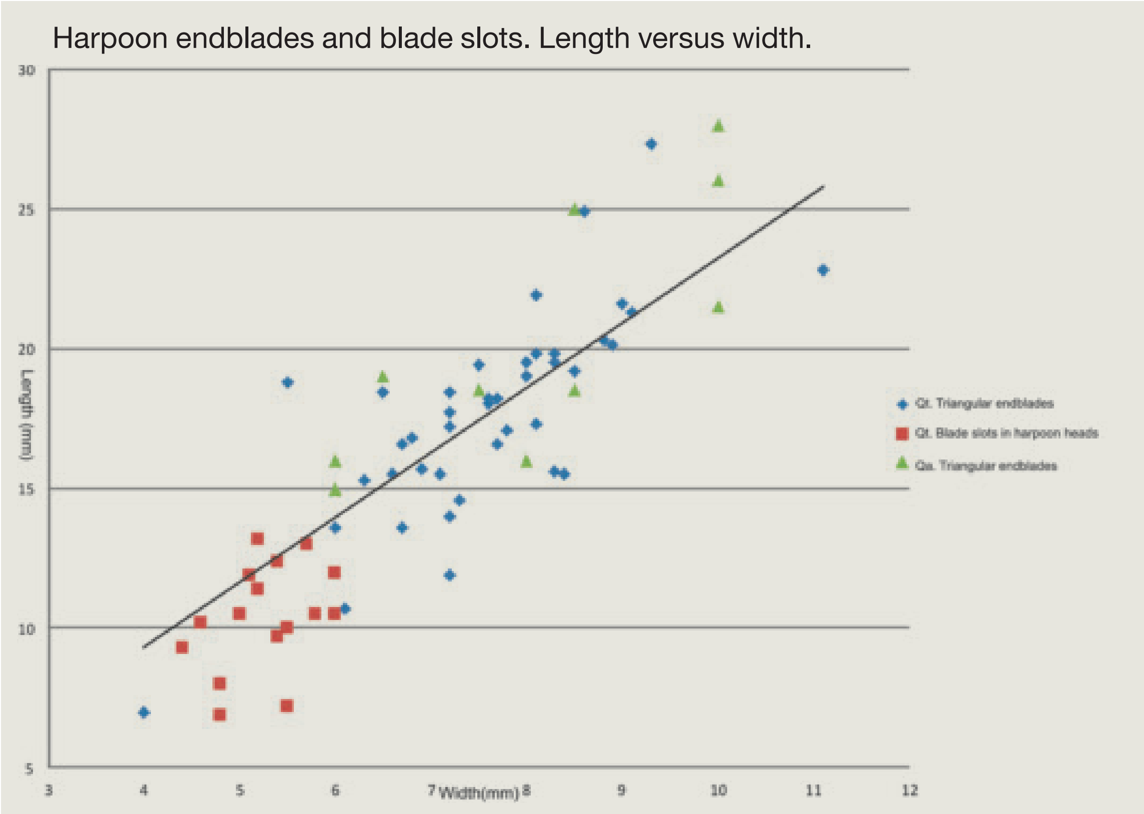


Fig. 3.36 *Scatter plot of length versus maximum width of the 24 intact triangular endblades from well-defined horizons at Qt (blue) and 10 specimens from Qa (green). For comparison, the maximum length and width of the blade slots of the Qt-B harpoon heads from Qt are plotted as well (red). The dimensions of the blades from Qt correlate, as shown by the line (correlation coefficient: 0.76).*

three holes for keeping the harpoon line tense (Fig. 3.37).

Four tubular objects from Qt, as well as four from Qa (including one preform), could be containers or dispensers for spare harpoon points:

The assemblage from Qt contains three oval antler tubes (Fig. 3.38 – 1–3) and a round narwhal tusk tube (Fig. 3.38 – 4). The tubes are quite uniformly designed: the sides have been worked down to a thickness of only one or two millimetres and the surfaces are carefully polished. One end is straight and shows a 'sharp' edge close to which a little oblong hole, presumably for a thin string, is cut in one side. The opposite end of the tube is shaped like a swallow's tail. The antler and bone tubes show a simple decoration: incised lines run in a longitudinal direction down the centre of each of the broad sides of the tube all the way from the ends of the 'swallow-tail' to the rim. Some have lines on the narrow sides of the oval tubes as well. The tube of narwhal tooth clearly shows the original spiral pattern of the tooth, even though the surface was thoroughly polished.

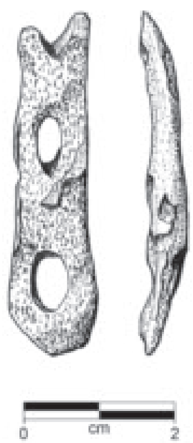


Fig. 3.37 *Eyelet of antler (19/20: 70), probably for holding the harpoon line tight to the shaft.*

Finds from Qajaa:
The three tubes from Qa, all of antler, show the same characteristics as those from Qt (Fig. 3.39a and Fig. 3.39b). Importantly, the contexts of two of the finds at Qa provide clues to an interpretation of the function of the tubes as small containers for spare harpoon points. The X-ray of specimen C113 (Fig. 3.39c) shows that it contains three triangular harpoon points, now partly hidden in a turf-like substance filling the tube.

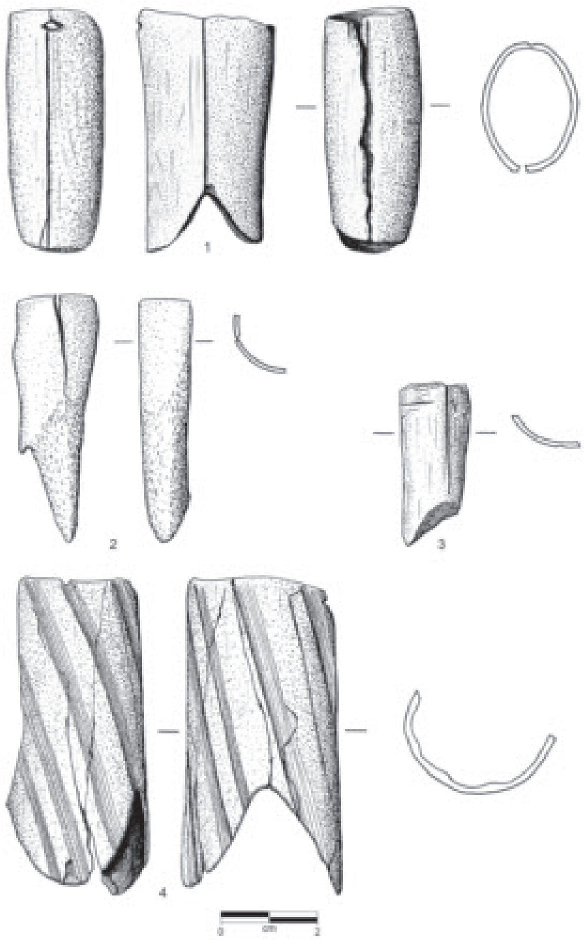


Fig. 3.38
Tubes of antler (1–3) and narwhal tusk (4) from Qt. They are interpreted as containers for spare harpoon points (small triangular endblades). 1: 19/20: 105; 2: 89,0/252,0: 16; 3: 19/20: 106 4: 20/20: 20

A similar antler tube (C,a,70–75) was recovered in the frozen layers in association with the remains of a dissolved sealskin bag. In total, 14 different artefacts connected with repair and resharpening of hunting tools were recovered inside the supposed hunting bag: 1 tube of antler, 8 pressure flakers of antler, 1 burin of killiaq, 1 possible antler shaft for a small cutting tool, 1 end or side prong of bone, 1 preform of a symmetrical endblade of killiaq for a dart or an arrow, and 1 preform for a harpoon head of type Qt-B or Qt-C. Fig. 3.39d and Fig. 3.39e show *in situ* photos. A beak (mandibula) of a gull was probably also contained in the skin bag.

The tubes or 'spare point dispensers' described above must originally have been provided with a wooden lid closing the straight end, probably secured by a string running through the carved hole, and a kind of plug in the distal end for holding the points inside the tube.

3.2.5 Hunting implements: shaft fragments

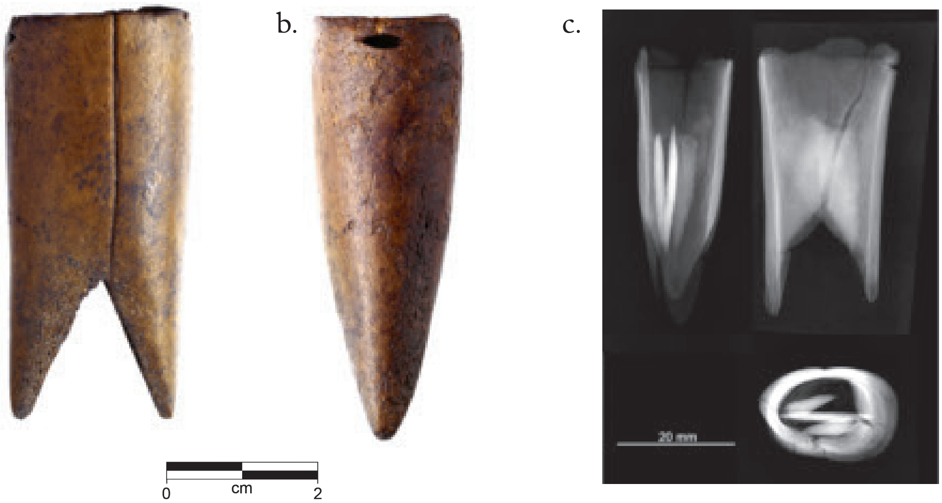
Wooden shaft fragments for hunting implements make up a comprehensive body of material. Fragments of arrow shafts have been described in 3.2.2.3 above. This section deals with the evidence from fragments of dart and lance shafts: 6 possible fragments of proximal ends, 2 'repair kits', 70 fragments of light weapon shafts (38 with bevelled ends for scarf joints and 32 without) and 13 fragment of shafts for heavy weapons (6 with bevelled end and 7 without).

3.2.5.1 Proximal shaft ends for light darts (Fig. 3.40)

This class of fragments is characterized by a slightly tapering outline with a carefully carved butt end, which is sometimes scorched. They are tentatively interpreted as proximal end sections of darts, which were thrown by hand – not by throwing board, as none of these shaft ends show sockets for an throwing board-peg.

Bevelled distal ends are partly preserved on four out of a total of six shaft end sections (e.g. Fig. 3.40 – 1), and accordingly their lengths can be estimated: they vary from 270 to 360 mm.

a. b. c.



d.

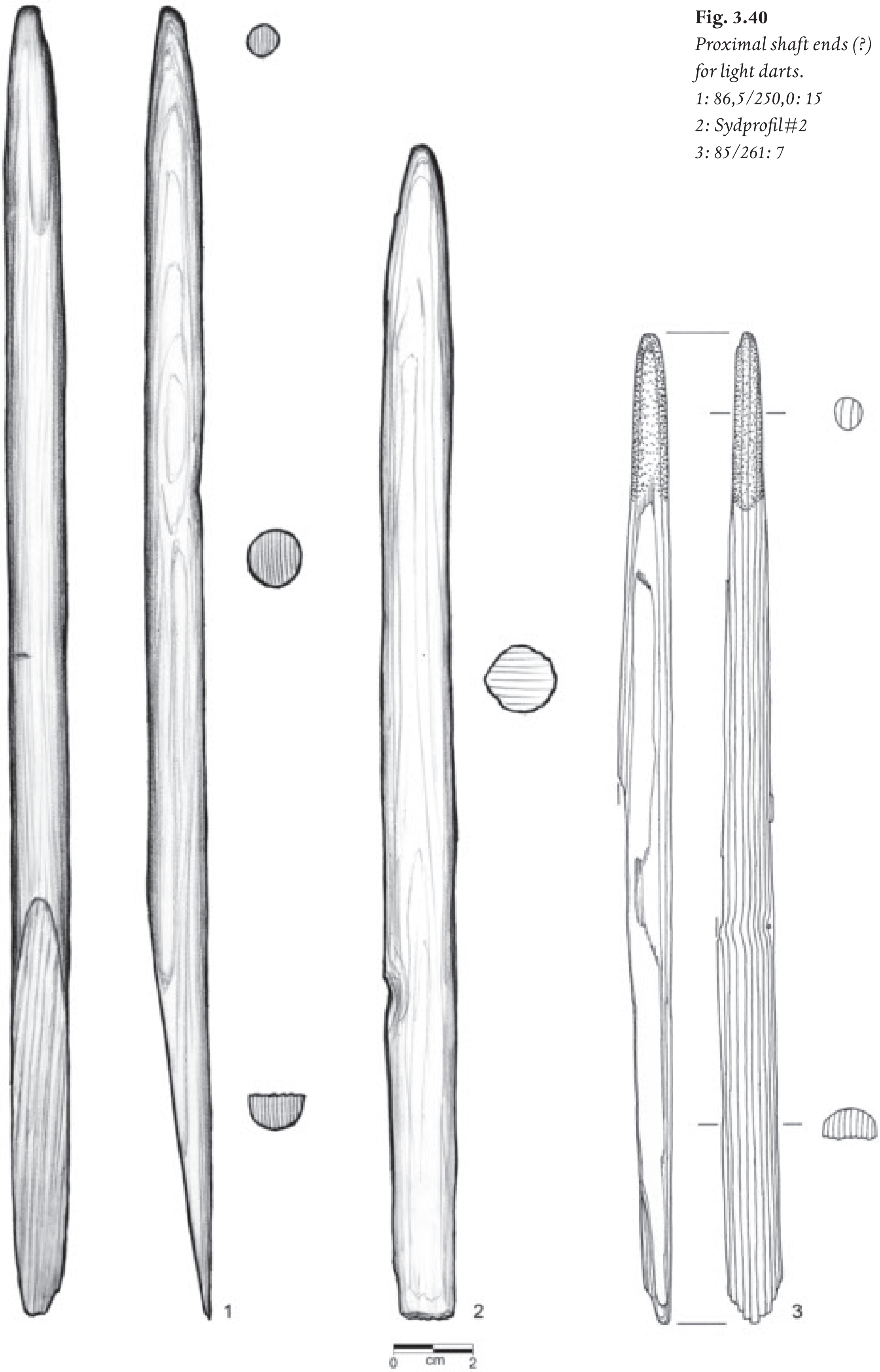
e.

Fig. 3.39
a: *Tube E232 seen from the broad side. (Photo: JL).*
b: *Tube E232 seen from the side. Note the cut hole near the rim. (Photo: JL).*
c: *X-ray of C113 showing the three triangular harpoon endblades inside the tube.*
d: *The contents of the sealskin bag with an antler tube (C,a,70-75). The first stage of excavation. (Photo: Jørgen Meldgaard).*
e: *The second stage of excavation of the skin bag. Preserved hair from the bag is seen in particular to the left of the burin. (Photo: Jørgen Meldgaard).*

The maximum cross section diameters are 17–18 mm, with an outlier at 14 mm, and accordingly they all belong to the light darts.

Finds from Qajaa:
E236 and C67 (Fig. 3.41a and Fig. 3.41b) are two informative proximal shaft ends for light darts (or harpoons?). These nicely polished shaft ends are carved from whalebone and are circular or slightly oval in cross section, respectively 12 and 13.5 mm in diameter. At the proximal end, two opposed slots are seen. In the case of E236 an inserted hook, probably of antler, is preserved. Explaining the presence of two opposing slots is difficult, but upon close inspection of the specimens it appears that the edges of the slots, which originally provided grip for a countersunk 'hook', are broken off (Fig. 3.41b). Probably the open slots result from breaks during use. The reason

Fig. 3.40
Proximal shaft ends (?) for light darts.
1: 86,5/250,0: 15
2: Sydprofil#2
3: 85/261: 7



for the presence of two opposed slots might thus be that the shaft ends with broken slots were reused by carving a new slot and mounting a hook on the opposite side to the original broken one. The specimen C67 broke twice and is thus completely worn out, whereas the end of E236 was only repaired once. These special shaft end fragments indicate that the Saqqaq hunter used a certain kind of throwing board, which was tailored for propelling darts or harpoons with a durable 'hooked proximal shaft end'. Obviously, such proximal shaft components of whalebone must have been quite short and lashed to a main missile shaft of wood with a comparable diameter (12–13.5 mm).

Fig. 3.41
Proximal shaft ends of whalebone for light darts or harpoons from Qa.
a: *E236 seen from two sides. Note the hook, probably of antler, which sits countersunk at the end of the shaft.*
b: *The proximal end of E236 (left) and C67 (right) showing broken slots for countersunk hooks.*

3.2.5.2 Repair kits (?) (Fig. 3.42)

The function of two shaft components (Fig. 3.42 – 1–2) is not obvious. They are very short (162 mm and 157 mm) and provided with bevelled ends which overlap a little from each side. Thus they would not have added to the length of the dart shaft. The surfaces of the scarf joint ends and the zones for lashings show the obligatory oblique scratching. The cross section diameters are 15 and 18 mm respectively and the estimated maximum lengths of the bevelled ends are 85 mm and 105 mm respectively. Thus the scarf joint ratio for both sections is a little less than 6:1.

These components of light darts may have been part of the hunter's repair kit for expedient mending of broken shafts in the field.

3.2.5.3 Shaft fragments from light hunting weapons

Seventy fragments are classified as light shaft fragments. These specimens probably include fragments of darts and harpoons as well as lances. However, the 38 fragments showing bevelled ends for scarf joints are definitely from darts and harpoons, as these joints – unlike the wedge-shaped and riveted ones – are primarily resistant to pushing longitudinal forces.

The 38 fragments with bevelled ends all show the usual oblique scratches on the surfaces for stabilizing the simple joint. As the average length of the scarf is 89.2 mm and the average cross section diameter is 15.2 mm, the average scarf joint ratio is about 6:1, in accordance with the ratios of arrow shafts and 'repair kits'.

Fig. 3.43 shows the cross section diameters of 62 fragments of light shafts and 9 of shafts of heavy weapons (excluding identified foreshafts). The bar graph shows a clear distinction

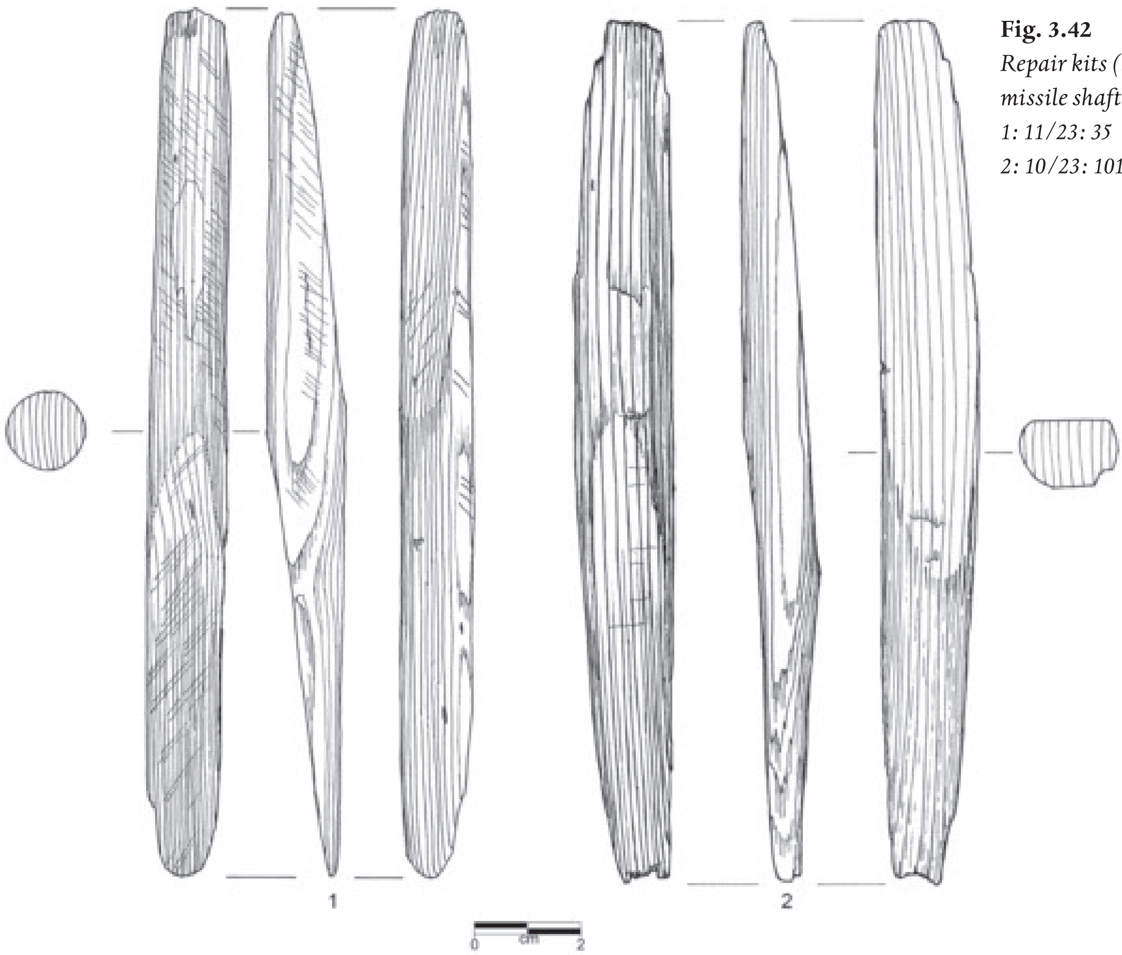


Fig. 3.42
Repair kits (?) for missile shafts.
1: 11/23: 35
2: 10/23: 101

between the large cluster of light shafts (diameters between 11 and 21 mm) and that of heavy shafts (25–33 mm). Fragments of light weapons like darts, harpoons and lances overlap and cannot be distinguished based on measurements of the diameters.

Six specimens show a characteristic surface: traces of grating made with a quite coarse-edged tool run in a spiral pattern all around the shaft, resembling the natural pattern of a narwhal tusk (Fig. 3.44).

The wood species used in 30 fragments of light shafts have been identified. *Larix* sp. is preferred (19 specimens) to *Picea* sp. (11 specimens).

Finds from Qajaa:
Twenty-nine wooden shaft fragments from Qa with a diameter between 12 and 22 mm are categorized as shafts from light hunting weapons (Fig. 3.43). There is a scarfed end on 15 pieces that are broken at the other end.

3.2.5.4 Shaft fragments from heavy hunting weapons

Thirteen fragments are from heavy hunting weapons. Five specimens show partly preserved bevelled ends for scarf joints, and one – a rough-out – shows an intact bevelled end with a scarf joint ratio of 6:1. Oblique scratching of the surfaces of the joints is visible. Three specimens show grated surfaces in a spiral pattern, like that mentioned above. The specimen in Fig. 3.44 is close to the dimensions and surface structure of a narwhal tusk but it is of course difficult to say if the rare spiral grating of the shafts was made as an ornament or symbol, or whether it

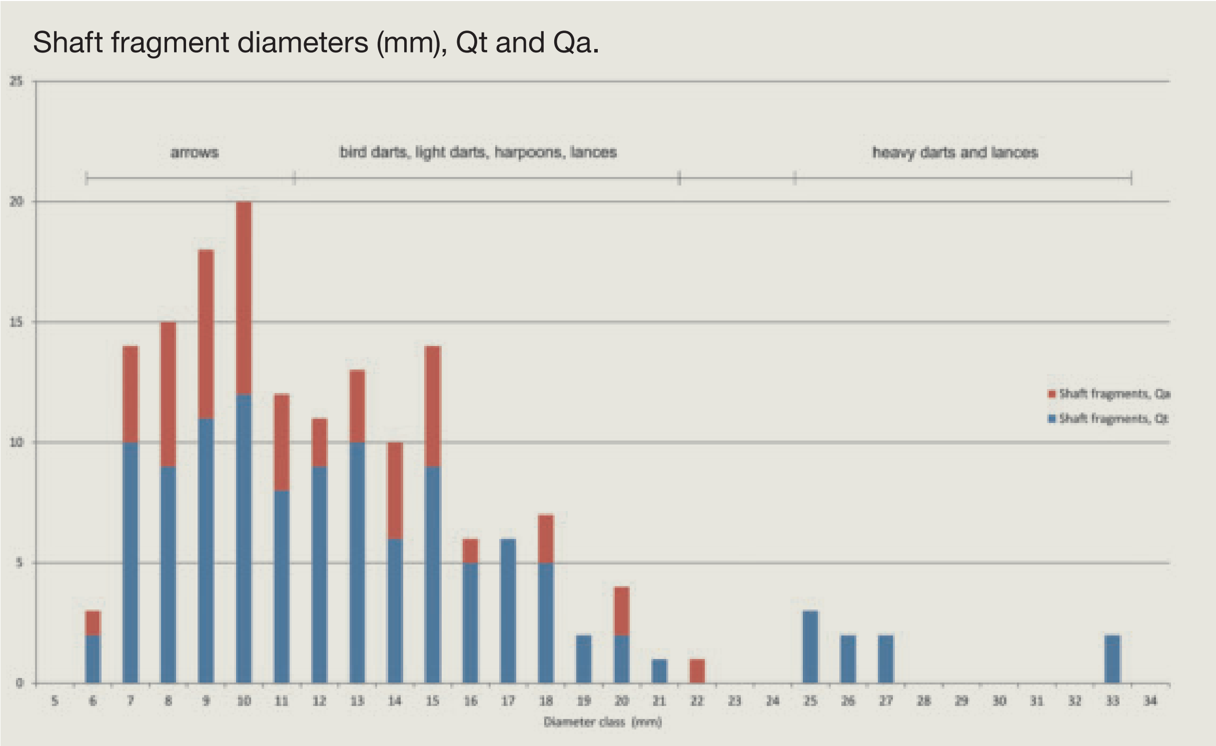


Fig. 3.43 *Cross section diameters of 62 fragments of light shafts and 9 shafts of heavy weapons from Qt (blue) and 31 shaft fragments from Qa (red). The ranges of the different types of missiles are indicated above the graph.*

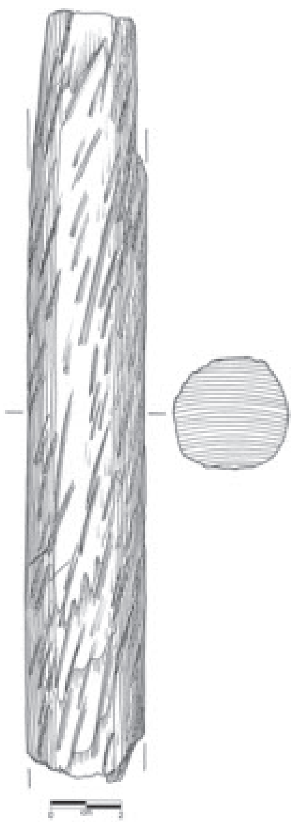


Fig. 3.44
Shaft fragment with spiralling surface pattern (20/20: 48).

had a practical function. This kind of grating would help achieve a firm grip, even if the shaft (or the mitten of the hunter) was wet or greasy. The cross section diameters of the heavy shafts vary between 25 and 33 mm (Fig. 3.43) and thus they are clearly distinguishable from the group of light weapons.

3.2.5.5 Steps of the *chaîne opératoire*

A single piece is a rough-out for a heavy shaft made of *Larix* sp. (Fig. 3.45). The bevelled end surface shows clear traces from chopping with an adze, and oblique scratching is seen in the lashing zone. The distal end was probably reworked. The specimen is heavily damaged by holes made by periwinkles, and for this reason it was probably never finished and used for its original purpose. But it demonstrates that the Saqqaq adze with its narrow, slightly hollow edge was used for the shaping of the shafts all the way up to the stage before the surface was finished with a side scraper and/or a pumice grater.

3.2.5.6 Fragments of weapons with detachable heads (?)

A few finds from Qa (and Nipisat, see below) indicate that some lances with detachable heads were used. At Qa a proximal fragment of a very heavy ivory head was found (Fig. 3.46). It is characterized by a bevelled proximal end for a scarf joint and a proximal large blunt barb pointing in a forward direction. The middle part is unfortunately broken just above the barb, but it shows an oval cross section (35 mm wide; 12 mm thick). A find from Nipisat of a complete specimen, although of a smaller type (Gotfredsen and Møbjerg 2004: 79), shows that the mid-section is quite long and ends in a blade bed for a lithic projectile head. It is difficult to interpret the function of these strange and rare heads, but the position and shape of the barb suggest that a string with a loop could have

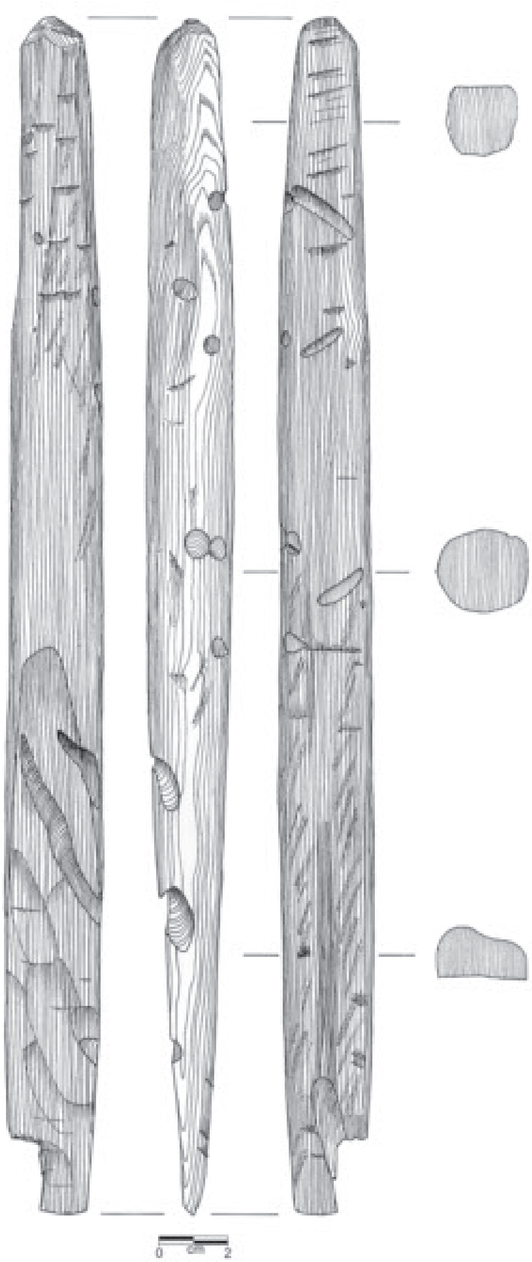


Fig. 3.45
Rough-out for a heavy shaft (85/262: 10).

Fig. 3.46
Detachable lance head (?) of ivory from Qa.

held the head in place at the end of the main shaft. When the lance hit the game, transverse impact would detach the heavy head with its point from the main shaft, and subsequently the hunter could quickly mount a spare head and stab with his lance again.

3.2.6 Throwing boards (Fig. 3.47–Fig. 3.51)

As seen above, a variety of light darts and harpoons were important parts of the Saqqaq hunter's gear. Some of these missiles were launched by means of throwing boards, and we must turn to the Qa assemblage to get a starting point for a description of this quite advanced part of the Saqqaq hunting tool kit.

Two specimens from the Qa assemblage are with certainty fragments of throwing boards. The best preserved (C70) is a 223 mm long and 29 mm wide fragment of a throwing board made from whalebone (Fig. 3.47a and Fig. 3.47b). The handle part (proximal end) is missing. The upper side shows a rounded groove, which fits a round shaft with a maximum diameter of 11–12 mm, i.e. a very light missile shaft (dart or harpoon). The underside of the throwing board is rounded. The shaft groove on the upper side stops about 29 mm from the intact distal end of the object. A slender peg, 22 mm long and 2 mm wide, of a hard material (antler or ivory) with a trapezoid cross section is countersunk into a precisely cut slot in the distal end of the throwing board. The blunt end of this peg protrudes 1.5 mm into the shaft groove. Thus the peg would touch the rim zone of a flat proximal end of a dart or harpoon shaft, which rested in the groove of the throwing board before launching.

The second throwing board fragment from Qa (C,b) is quite small and also made from whalebone (Fig. 3.48). It is a distal end fragment, 75 mm long and 22 mm wide. However, along one lateral side the edge is cut with a burin and broken off. The original width must have been 28 mm at the chopped and broken-off proximal end. It tapers slightly towards the distal end. A groove for a countersunk peg is visible, and this is relatively wide: 7 mm towards the shaft groove,

Fig. 3.47
Throwing board of whalebone (C70) with inserted hook of antler, from Qa.
a: *C70 seen from the ventral side.*
b: *C70, lateral view.*

which is considerably more than the slim slot of the more complete specimen described above. The width of the shaft groove is estimated at 13–14 mm, which would fit missile shafts of a slightly larger diameter than the more complete specimen.

The throwing board fragments described above do not fit shaft ends with a proximal countersunk 'hook' or peg like the whalebone shaft ends described above. However, a specimen from Qa, C78 (Fig. 3.49a and Fig. 3.49b) probably represents this second type of the Saqqaq hunter's throwing boards. The carefully worked whalebone object is broken and reworked at its proximal end, but the intact distal end shows an elongated cut hole, which would fit a missile shaft end like E236 (Fig. 3.41). The longitudinal furrow on the upper broad side of C78 is shallow compared with the distinct shaft grooves of the throwing boards provided with a countersunk hook (e.g. C70). Therefore, missiles of slightly different shaft diameters could fit one and the same throwing board of this second type. The proximal end of this throwing board type was provided with at least two pairs of elongated cut eyes on each side. This could indicate either that a counterweight was originally lashed to the dorsal side of the throwing board, or, perhaps more likely, that the grip was secured by a (baleen) cross-lashing running through the lateral holes and thus covering only the underside of the throwing board's handle end. Modern recon-

Fig. 3.48
Distal fragment of throwing board of whalebone (C,b) with groove for a hook, seen from the ventral side. From Qa.

Fig. 3.49
Probable throwing board (C78) of whalebone with distal hole from Qa.
a: *C78 seen from the ventral side.*
b: *C78, lateral view.*

structions and experiments would be a means to explore Saqqaq throwing board technology further.

The background knowledge from Qa provides a new interpretation of some objects from Qt that were earlier suggested to be midsections of bows (Grønnow 2012: 34):

Fig. 3.50 is a 260 mm long fragment of solid whalebone (max. w: 35 mm; max. thickness: 18 mm) comparable to the dimensions and cross

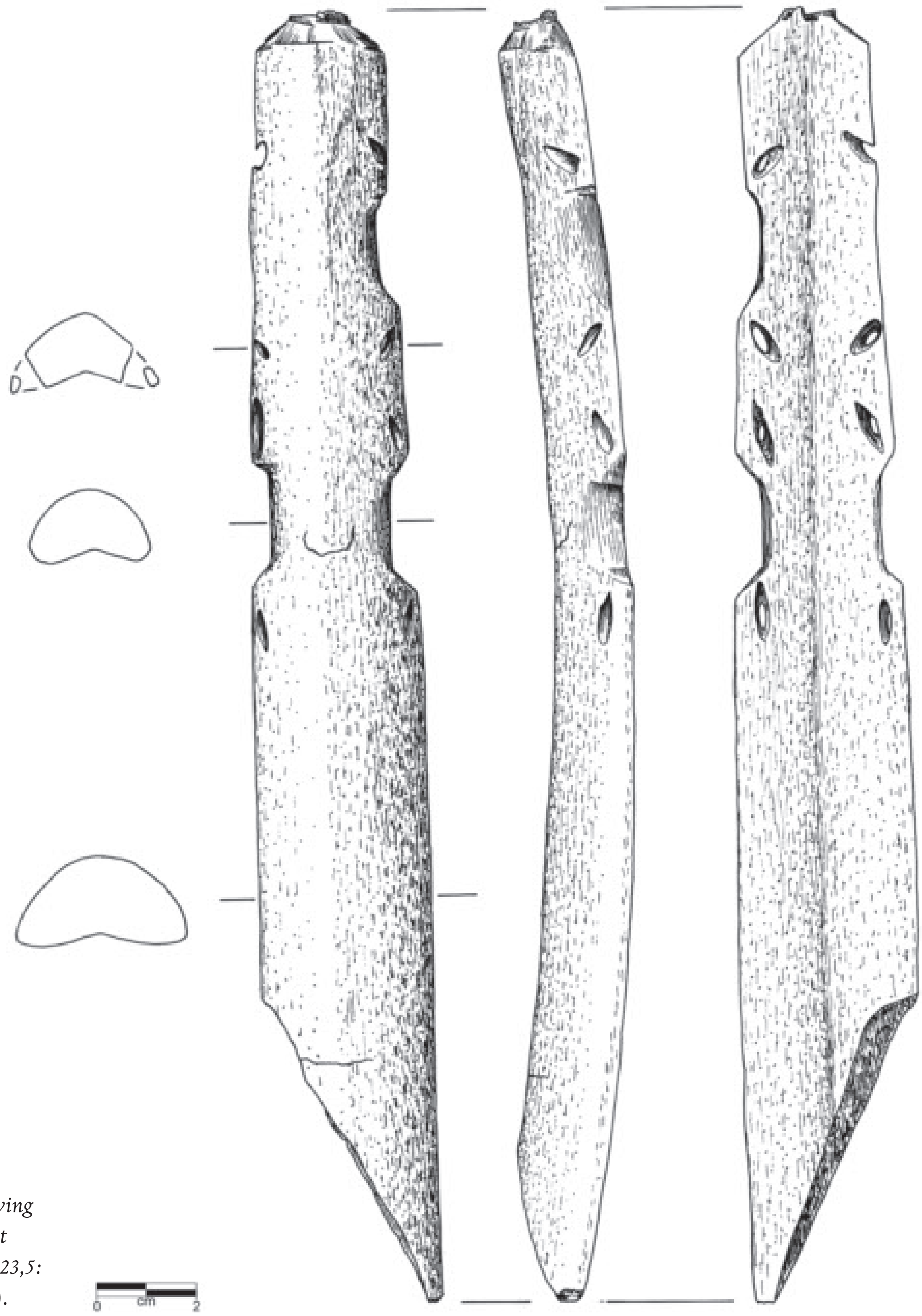


Fig. 3.50
Probable throwing board fragment from Qt (13,0/23,5: 'from column').

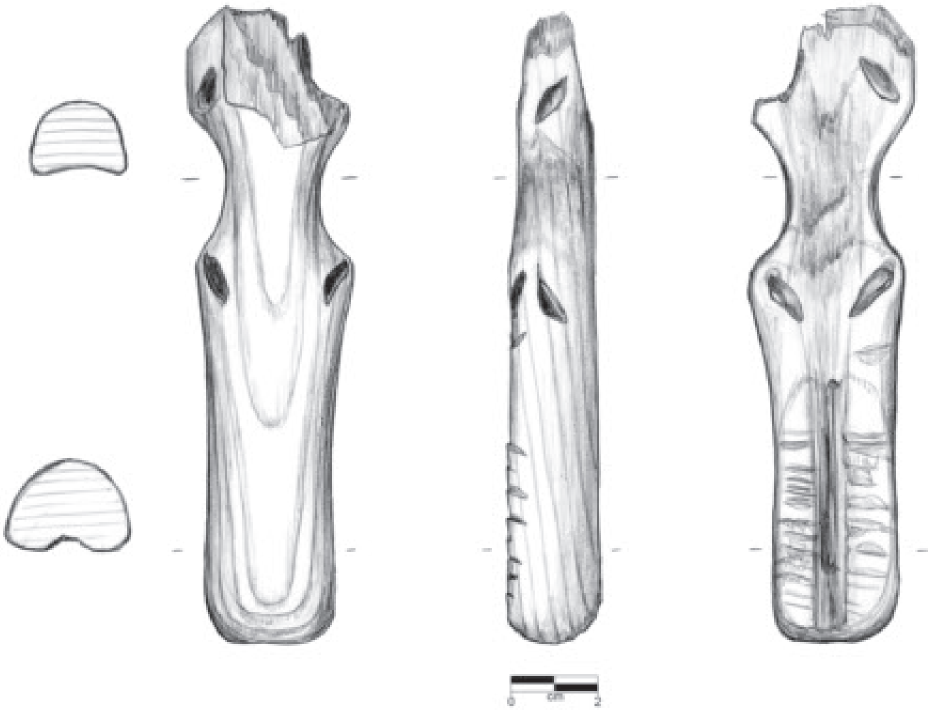


Fig. 3.51 *Probable throwing board fragment of wood from Qt (89,0/251,5: 18).*

sections of C78 from Qa. On the flat upper side runs a shallow, longitudinal groove and four pairs of carved eyes are located at the edge of the piece next to two carefully carved 25 mm broad side notches. The piece was secondarily worked along the edges of one end and it was cut off and snapped. The broad notches probably mark the position of the throwing board handle part. The bent shape of the object is probably the result of a tendency of bone and antler objects to return to the original shape of the piece of raw material from which they were cut after some years in the ground. According to this interpretation, Fig. 3.51 of wood and another badly preserved specimen of whalebone, 'Southprofile #18', are also reworked fragments of throwing boards of this characteristic second type.

3.2.7 Sea-going vessels

3.2.7.1 Ribs for kayak-like vessels (Fig. 3.52)

Twenty fragments of ribs document that the Saqqaq used skin-covered vessels. Six of these fragments belong together, and they form an almost complete specimen with a number of characteristics which provide a key to the identification even of small fragments of rib: 1) the cross sections are almost flat on the outer side and rounded on the inner side; 2) the inner sides show characteristic compression marks from bending of the softened wood by means of heating (steam) and a blunt instrument; 3) the outer side of the curved parts show damage from stretching; 4) the ends are roughly cut from the inside at an angle of about 45 degrees, probably in order to fit mortises cut into the gunwale strakes; 5) the surfaces are roughly ground (not neatly finished like shafts); and 6) the growth rings run parallel or almost parallel to the flat outer side of the cross section.

Qt 14/23: 24, 31 and 33 together form a rib, which only lacks one end (Fig. 3.52a). Originally the specimen constituted a 68–70 cm long list, of which about 56.5 cm is now preserved. The list, which is flat on the outer side and convex on the inner side, is bent into a flat U-shape with vertical sides. The width of the cross section is 12–15 mm, whereas the thickness varies from a mere 7–9 mm at the bending zones to 12–13 mm at the flat bottom part and 9–11 mm at the preserved cut end. The frame is about 21 cm high and about 35 cm wide. Weak traces of lashing and scratches across the inner side at the central part of the rib are visible, as well as horizontal cut marks and traces of lashing at the preserved end. The piece was probably originally broken across the central part prior to being discarded. This rib was made from *Picea* sp.

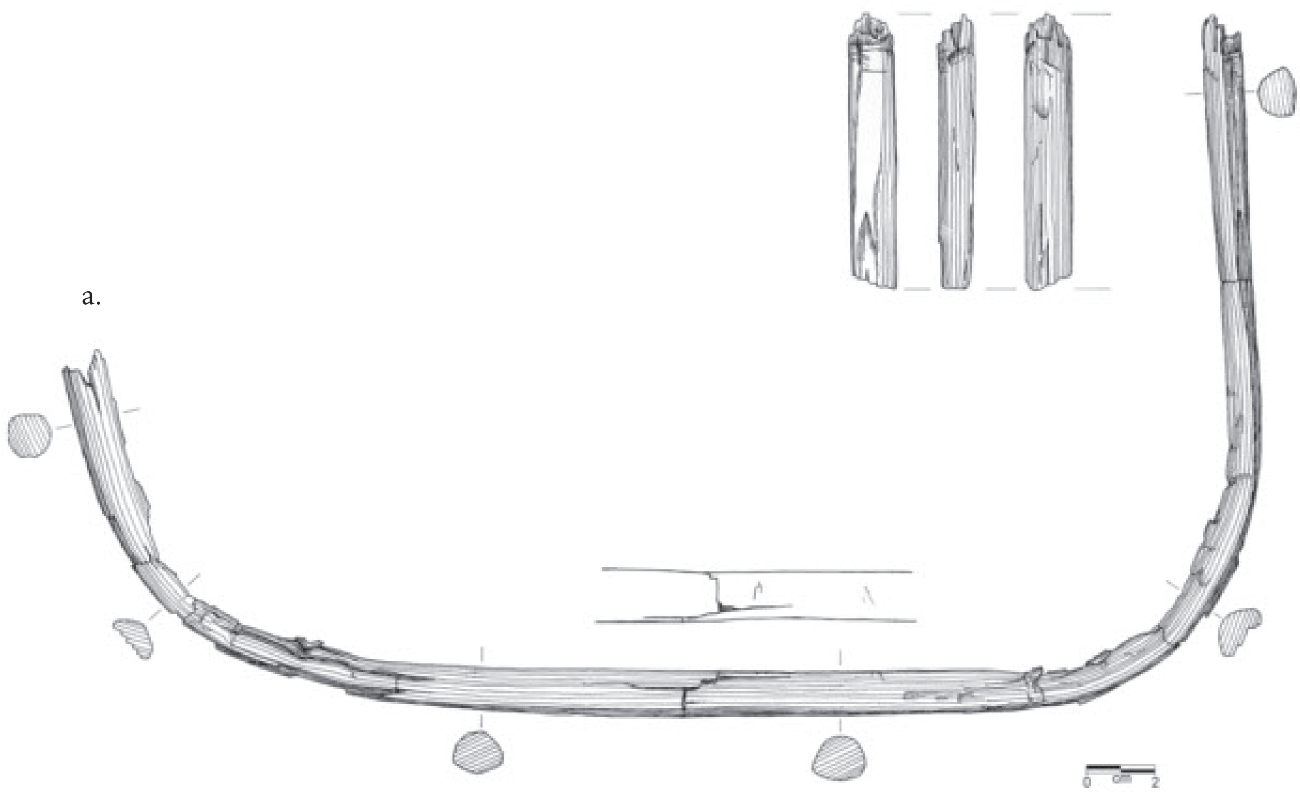
Fig. 3.52b is informative as well. It shows a 27.7 cm long, 20 mm wide and 12–14 mm thick side fragment, which is broken at the zone with characteristic bending marks. It has an intact, obliquely cut distal end with traces of lashing on the inner side just below the cut. The outer side shows two narrow smoothly worn zones (20–40 mm). They are about 15 cm and 21 cm from the distal end of the rib. Weak scratches run across these polished areas, which probably indicate the position of the side stringers to which the ribs were lashed. It was made from *Picea* sp.

Fig. 3.52c is probably a bottom fragment of a quite robust rib. The fragment is 36 cm long, 27 mm wide and 19 mm thick. The piece bears traces of use: two 20–45 mm wide worn spots are seen on the inner side.

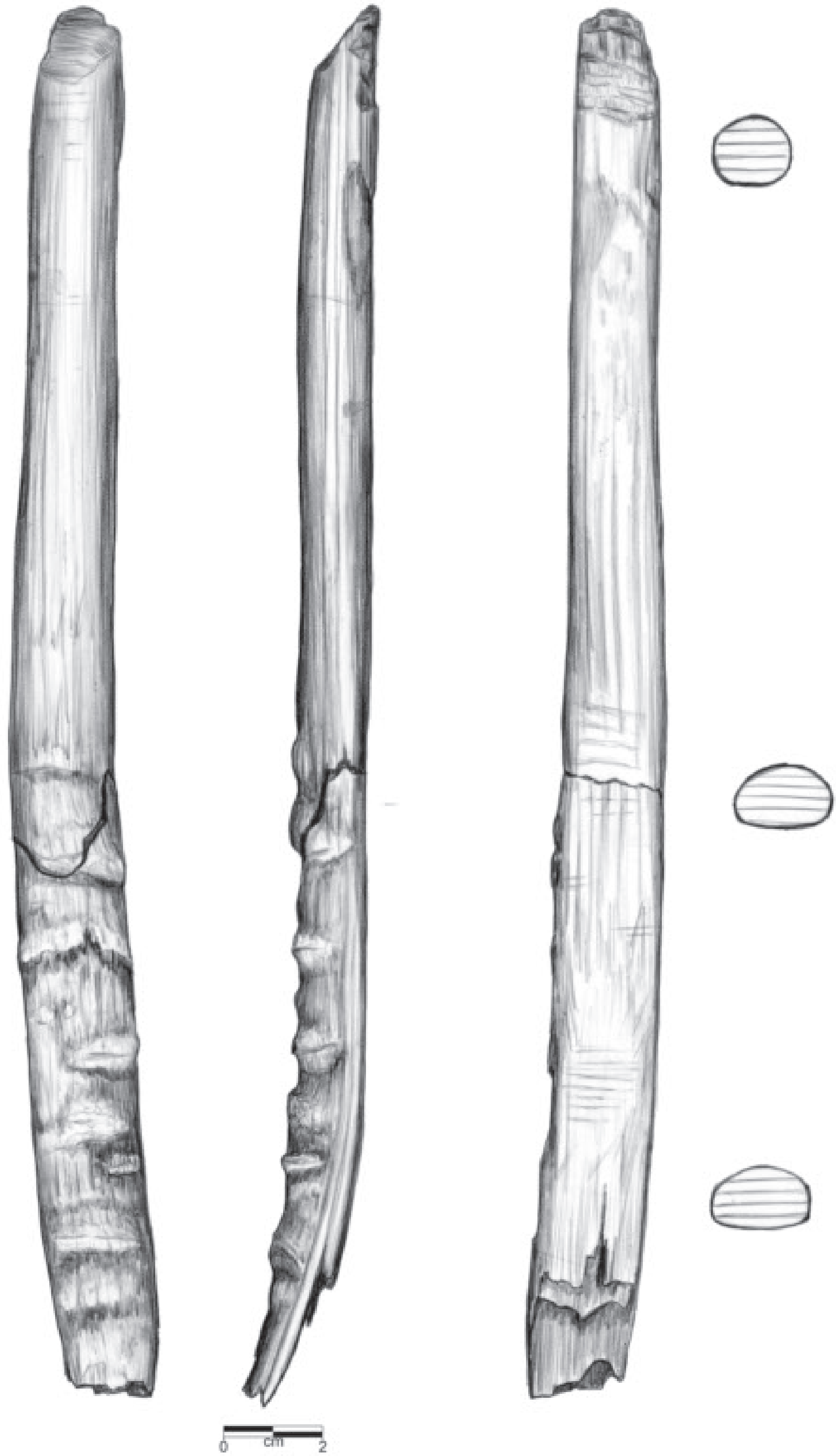
The remaining eleven rib fragments all show bending marks and/or the characteristic cross section of the ribs. The dimensions of the cross sections vary within the sizes indicated by the descriptions above. Two fragments show intact, obliquely cut ends (e.g. Fig. 3.52d – 1) and another (Fig. 3.52d – 2) shows a notch at its carefully worked end. Three fragments have been identified as being made from *Picea* sp., and one is Abies Alba.

Fig. 3.52
Ribs for kayak-like vessels.
a: *14/23: 24, 31, 33*

a.



b.



c.

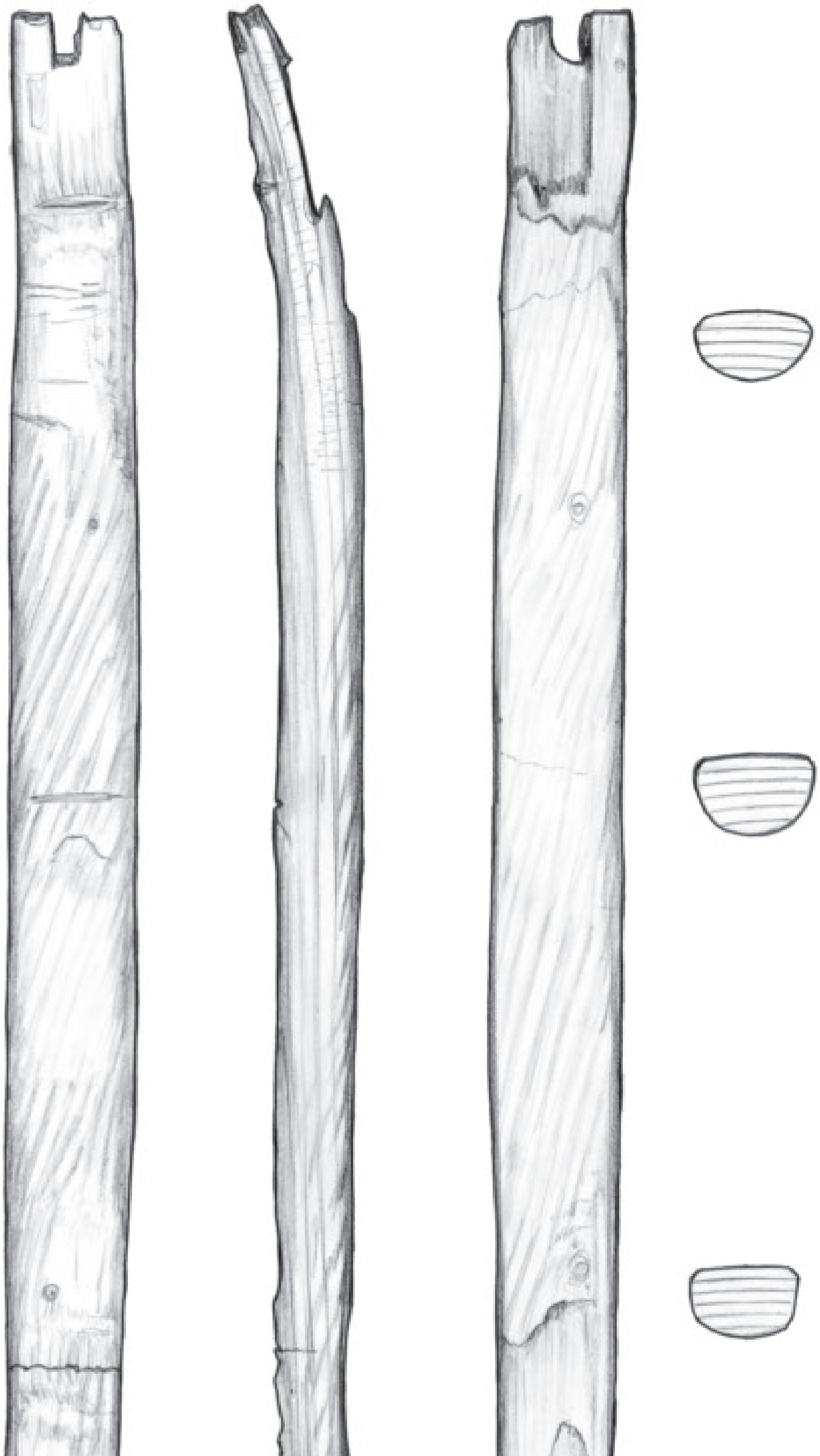
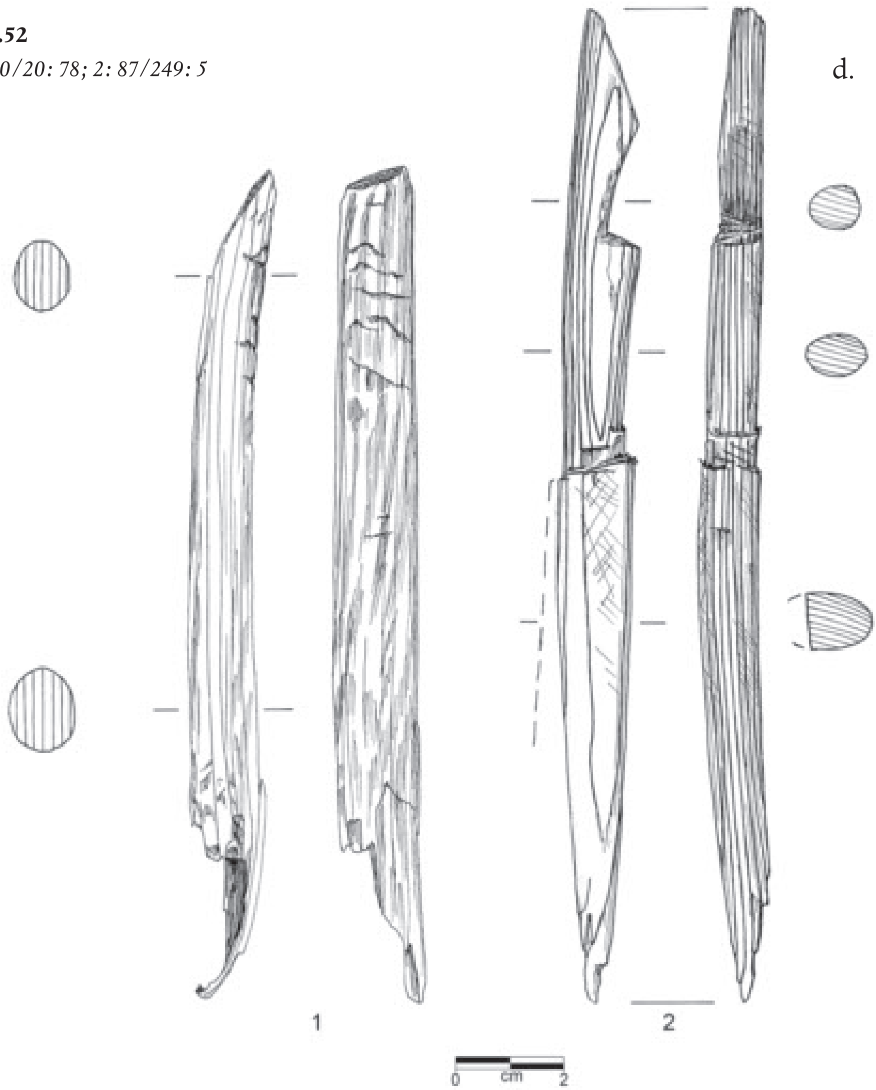


Fig. 3.52
b: *89,0/251,0: 34*
c: *19/19: 53*

Fig. 3.52
d: *1: 20/20: 78; 2: 87/249: 5*



Finds from Qajaa
From Qa nine small fragments are classified as possible rib fragments based on their cross sections. The specimens are between 11 and 16.6 cm long, between 10 and 20 mm wide and between 9 and 15 mm thick; all have an oval or flattened cross section, often with one side more flat than the other.

3.2.7.2 Paddles (Fig. 3.53)
This artefact class consists of a large fragment of the distal end of a paddle blade, a small distal fragment and twelve small fragments of paddle blade edges.

Fig. 3.53a is a 280 mm long distal end fragment of a slender and tapering paddle blade, which is 83 mm wide at its broadest part and only 13 mm thick. The cross section is pointed oval. The blade broke at a weak point due to a large knot. The surface finish of the paddle was made with a serrated edge, and the tapering end shows light crushing marks from use. The piece was made from *Picea* sp.

Fig. 3.53b is probably also a distal fragment of a paddle. With a thickness of about 17 mm and a rounded end this paddle was probably of a heavier type than the first mentioned. It was made from *Picea* sp.

Among the twelve small or narrow fragments, which were all originally cut or split from blade edges, there are fragments from thin as well as sturdy paddles (within the range of the two

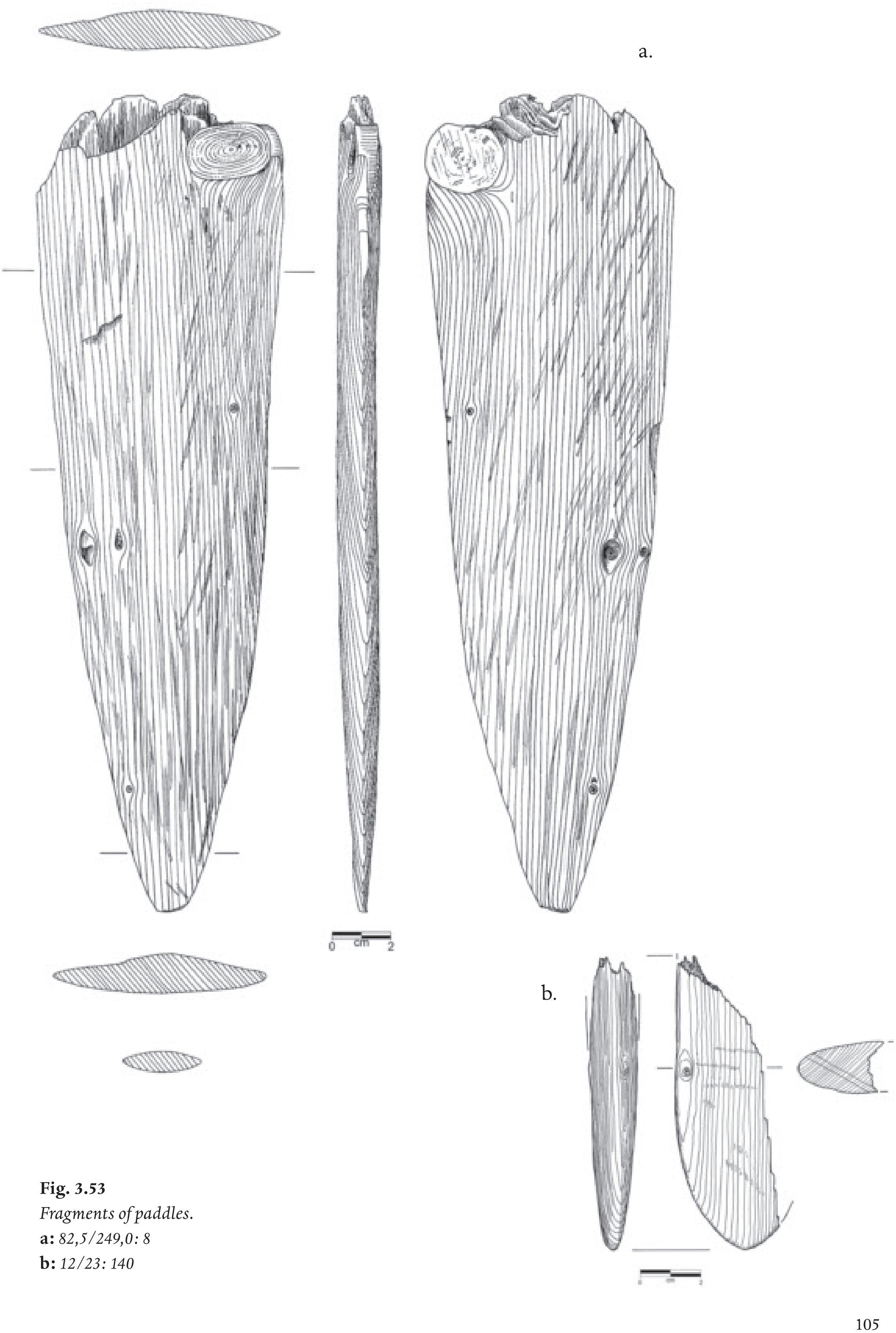


Fig. 3.53
Fragments of paddles.
a: *82,5/249,0: 8*
b: *12/23: 140*

aforementioned specimens). The edges and surfaces of the paddles are carefully finished with tools that had a serrated edge. One specimen (11/23,0: 83) shows an interesting repair. A developing split that threatened to spoil the edge of the paddle was stopped by a reinforcing lashing of baleen thread, which was countersunk and locked by a wooden nail or wedge. Moreover, two small fragments with preserved edges show quite large, cut holes for lashing. In conclusion, it seems as if paddles were so important that they were repaired several times during their use before being reworked into other tools or probably ultimately serving as firewood.

It is not possible with certainty to identify paddle shafts and obviously the present material does not reveal whether the Saqqaq paddler used single or double paddles.

3.2.8 Snares and nets? (Fig. 3.54)

No certain net or snare remains have been identified yet from Qt and Qa. However, analyses of knots seen on some baleen thongs like 85,0/251,5: 21 and 19/19: 48 (see also Chapter

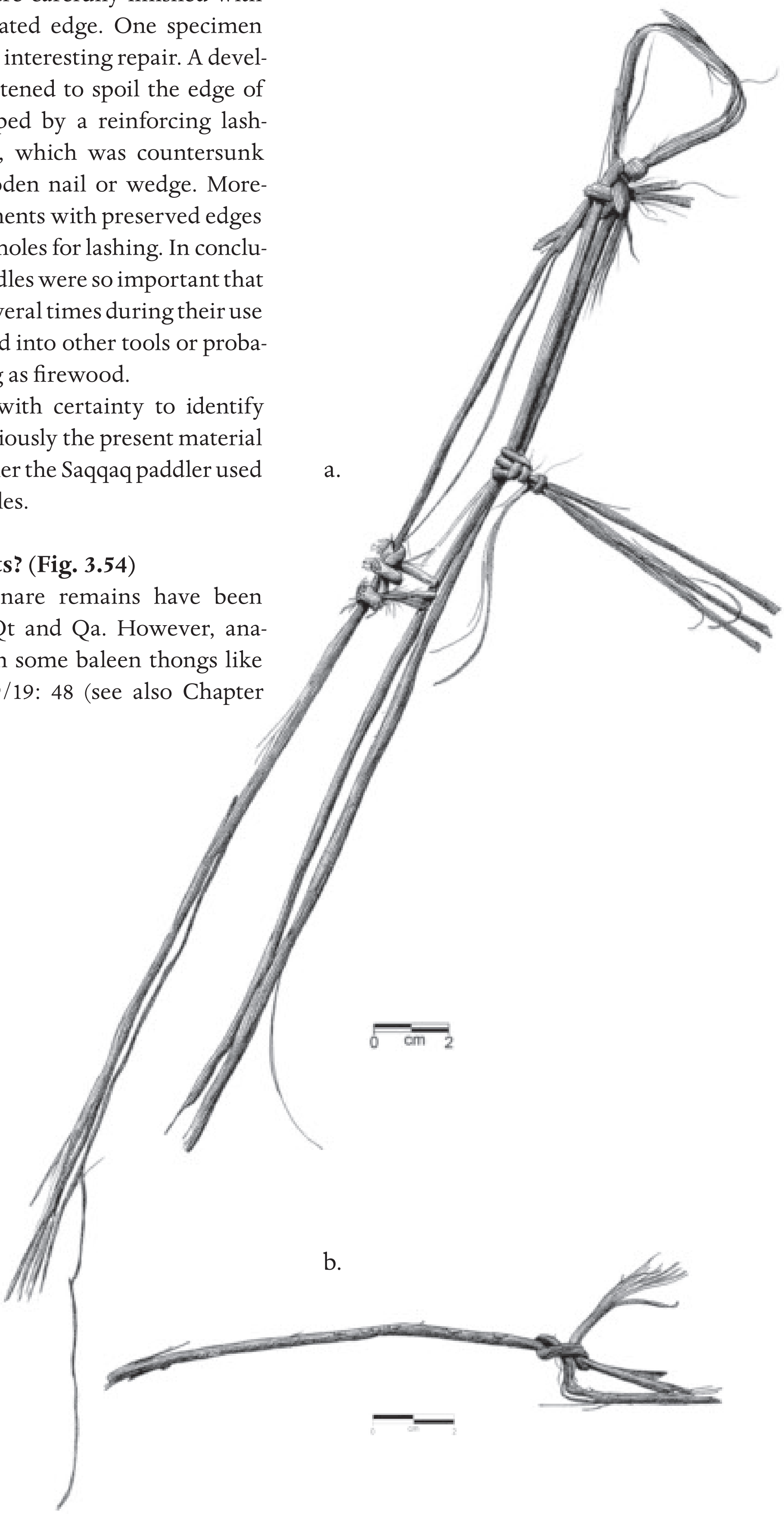


Fig. 3.54
a: *Fragment of baleen thong with knots, possibly from a snare or net (85,0/251,5: 21).*
b: *Fragment of two baleen thongs connected perpendicular to each other via a clove hitch (19/19: 48).*

3.8) make it likely that nets and snares were part of the Saqqaq hunting tool kit (Fig 3.54a and Fig. 3.54b). As seen in 5.4.1 below, the faunal material points to mass kills of harp seals during some settlement periods (Meldgaard 2004: 120), and sealing nets of strong baleen thongs that do not get 'sloppy' when soaked would have served this purpose very well.

3.2.9 The Perfect Hunter: summary of the finds from Qt and Qa and evidence from other Saqqaq sites

Due to excellent preservation conditions the finds from Qt and Qa provide for the first time a detailed picture of the technologically complex and comprehensive hunting tool kit of the Saqqaq hunter. Based on the descriptions and analyses presented above, in combination with comparative materials from sites in other regions of Greenland (Fig. 3.55a-d), it is possible to describe what is probably close to a complete hunting tool kit (Fig. 3.56).

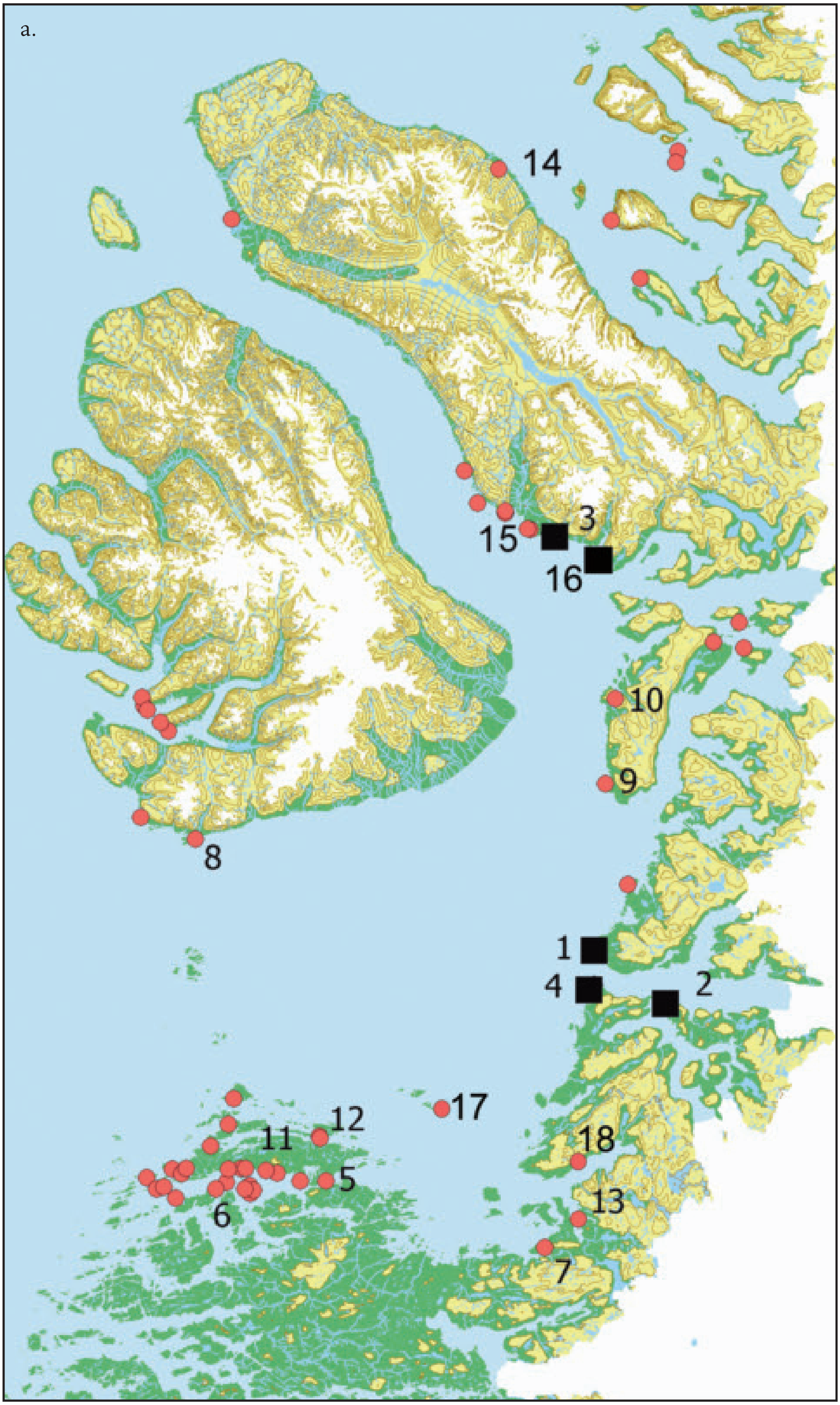
3.2.9.1 Composite and backed bows. Arrows

Bow limb fragments show that the Saqqaq bows were composite. A typical bow leg is 29–33 mm wide and maximum 12–19 mm thick, with a flat back and a convex belly side. A complete limb is 45 cm long, but fragments of longer bow limbs have been identified as well. Only a few pieces show distal side notches for the bow string. No certain mid-sections or 'handle parts' of bows were identified. The composite and probably backed Saqqaq bow is estimated to have been 1.2 m or longer. A few fragments could represent more 'gracile' composite bow types with a width of only 21–23 mm. Two small specimens are interpreted as toy bows. *Larix* sp. was preferred as raw material for bows.

Saqqaq arrow shafts were made from fine-grained *Larix* sp. At least three components made up a complete arrow: a main shaft, a foreshaft and a head. Typically, the main shafts consisted of two or more pieces linked by simple scarf joints. The proximal end of the arrows show a notch for the bow string and marks reveal that splitting of the notch end was prevented by means of a lashing in front of the notch. Other lashing traces reveal that the feathers attached to the proximal end were at least 8 cm long. The main shafts show diameters of *c.* 10 mm, and they tend to taper a bit towards the proximal end. The longest complete main shaft is about 63 cm long. A scarf joint linked the foreshaft to the main shaft, adding on average about 8 cm to the length of an arrow. Finally, a bifacial arrowhead of killiaq with a tapering stem was mounted in a shallow blade bed at the distal end of the foreshaft and secured by lashing. The length of a complete Saqqaq arrow from notch to the point of the arrowhead is estimated to have been 70–90 cm. The 'normal' arrowheads tend to divide into two different groups (calibres): a slender blade (w: 9.5–12.5 mm) and a broad blade (w: 12.5–15.5 mm). A cluster of very small arrowheads probably represent toys.

Finds from the site of Nipisat in the Sisimiut area add some information on Saqqaq bow and arrow technology. Most of the possible antler foreshafts from the site are too small to fit the size range of an arrow foreshaft as deduced from Qt and Qa, but a few of the fragments show dimensions and bevelled proximal ends similar to the wooden ones from Qt and Qa (Gotfredsen and Møbjerg 2004: Fig. 93). One 'foreshaft-like' implement (ibid.: Fig. 105) is provided with a blunt distal end and is interpreted as a special arrowhead for hunting birds or small furred animals.

Concerning lithic arrowheads, Nipisat again provides comparative material (ibid.: Fig. 115). The maximum widths of the heads were, as seen above, the basis for identifying two calibres of 'normal' arrows from Qt and Qa. At Nipisat 22 out of the 31 measured bifacial projectile points cluster within the group of the broad calibre of arrowhead (w: 12.5–15.5 mm), and none of the slender ones were present. Two projectile points are so tiny (max. w: 4–5 mm) that they are even less wide than the group of 'small arrowheads' from Qt, and they probably represent miniature models.


a.
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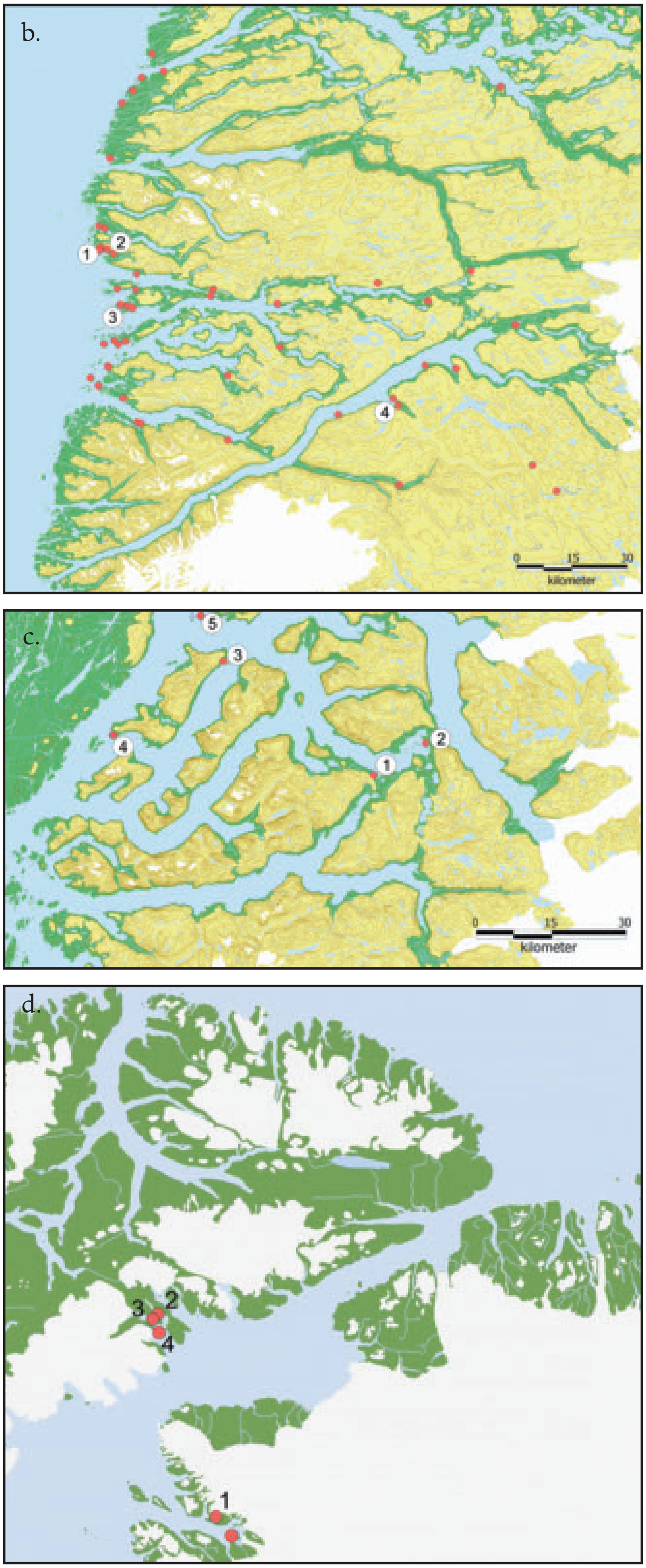


Fig. 3.55
Geographical position of Saqqaq sites in Greenland included in the comparative analyses. Maps reproduced from Grønnow 2004 and Grønnow and Sørensen 2006 (with additions).

a: *The Disko Bay area. Red dots: Saqqaq sites. Black squares: Focal Saqqaq sites. Site names: 1: Sermermiut; 2: Qajaa; 3: Saqqaq; 4: Eqi; 5: Niuertussannguaq; 6: Tupersuai; 7: Qeqertasussuk; 8: Østelien; 9: Klokkerhuk; 10: Arlunngavik; 11: Kuup Qalorsaa; 12: Akunaap Nunaa; 13: Orpissooq; 14: Qaarsut; 15: Hannibal's Site; 16: Illuutsiaat; 17: Angissat; 18: Illorsuatsiaat*

b: *The Sisimiut area. Red dots: Saqqaq sites. Site names: 1: Asummiut; 2: Akia; 3: Nipisat; 4: Angujaartorfik*

c: *The Nuuk area. Red dots: Saqqaq sites. Site names: 1: Itinnera; 2: Nuunnguaq; 3: Tuapassuit; 4: Marianes Pynt; 5: Narsaarsuup Nuua*

d: *The Nares Strait area. Red dots: Saqqaq sites. Site names: 1: Qorluulasupaluk; 2: Bight Site; 3: Topo Site; 4: Lake View.*

Representative metric data on projectile points from a number of sites in the Nuuk area have been presented by Hinnerson-Berglund (2004: Tables 21–23). In contrast to Nipisat, the majority (29 out of 42) belong among the slender arrowheads (blade w: 9.5–12.5 mm), 5 fall within the range of the broad arrows whereas the remainder of the heads (8) are broader and thus considered dart and lance heads.

The comparative studies have thus supplemented the Qt and Qa materials with the information that Saqqaq arrow foreshafts were made not only from wood but also from antler, that specialized bird hunting and/or small mammal hunting arrowheads were used, and that the division into two calibres of stemmed lithic arrowheads – the slender and the broad classes – were probably determined by function as well as by regional preferences: the broad arrowheads were used in the Sisimiut area whereas the hunters in the Nuuk area preferred the slender heads. However, these observations should be qualified by future metric analyses on several sites from different regions.

Finally, a few tiny arrowheads from Nipisat indicate the rare presence of miniature arrows among the Saqqaq. This is supported by the single miniature antler arrow foreshaft with blade bed from Qa.

3.2.9.2 Darts

Fragments of three-winged foreshafts and long, unilaterally barbed end prongs demonstrate that light bird darts were among the Saqqaq missiles. The diameter of the shafts is on average 14.5 mm, and three longitudinal grooves symmetrically cut into the distal end held the proximal end of the end prongs in place. Scratched

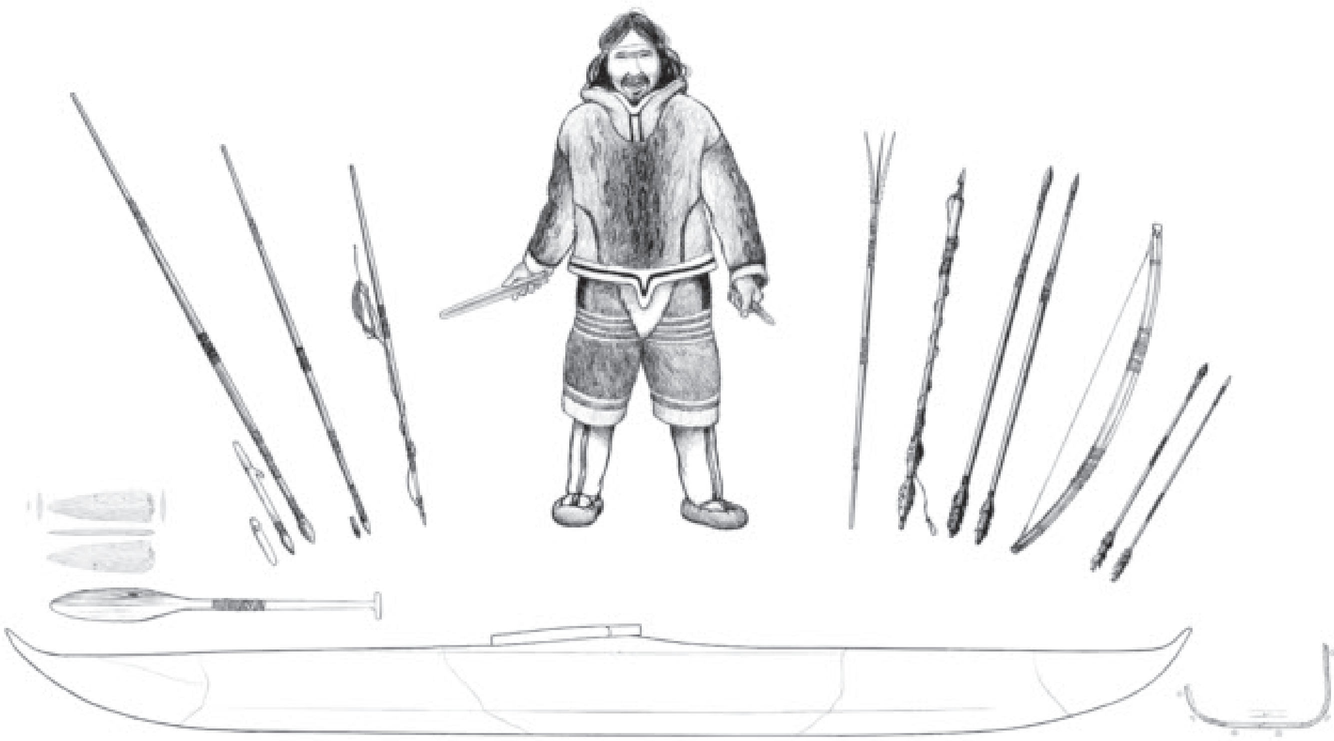


Fig. 3.56 *A reconstruction of the Saqqaq hunter and his hunting tool kit based on interpretations of the finds from Qt, Qa and other Saqqaq sites. (From Grønnow 2012b: 45. Drawing: Nuka Godtfredsen).*

zones and pressure marks on the shafts show that the slender proximal ends of the prongs were lashed firmly in the grooves and that the relatively thin and flexible shafts were reinforced by girdles of lashing, which partly prevented the wood from splitting and partly – if these lashings were made with one piece of string like their counterparts from historical times in Alaska – kept the shaft parts together in case of breakage during use. Fine-grained *Larix* sp. was the preferred raw material for shaft components, which were linked together by simple but precisely made scarf joints. Some foreshafts are so short that they might represent spare parts, which could be used on any standard dart main shaft if an original distal end was damaged during hunting.

All end prongs for bird darts from Qt and Qa are of whalebone. They were originally quite long – up to about 300 mm – but most of them broke during use. They were resharpened and consequently became quite short before they were discarded. The end prongs show a number of quite widely spaced barbs on one side (the concave side). The prongs were, as the shafts show, mounted with three forks at the end of the shaft.

Only the Nipisat site has produced comparative material: here, fragments of two-barbed end prongs were recovered (Gotfredsen and Møbjerg 2004: 75–76). The dimensions of the end prongs are similar to the ones from Qt and Qa, but the barbs are longer and considerably denser, and, importantly, the Nipisat prongs were carved from ivory. Taken together, these differences could mean that the end prongs from Nipisat, as suggested by Møbjerg, were parts of fishing leisters rather than of bird darts.

A number of dart foreshafts are characterized by a single, unilateral blade bed for a tapering stemmed lithic dart head. The average diameter of these foreshafts, almost exclusively made from fine grained *Larix* sp., is 15 mm. Some of the foreshafts are so short that, like some bird dart foreshafts, they probably served as spare parts for repair. The simple scarf joints of the components facilitated such a flexible technology. Some foreshafts show a lowered zone for the lashing of the endblade, making the dart foreshaft completely streamlined.

The projectile points for the darts consisted of bifacial symmetrical endblades of killiaq, often with edge serration and tapering stems. Metric analysis of stem and blade widths indicates a division into 'very light darts' and 'light darts'. However, it is not possible at present to distinguish between endblades for darts and endblades for lances from morphological or metric data.

3.2.9.3 Harpoons

Numerous harpoon heads from Qt (57) and Qa (18) hold evidence on the Saqqaq harpoon. They were divided into four main types: Qt-A, Qt-B, Qt-C and Qt-D. A small number of atypical heads must be added. The great majority were made from antler and only in rare cases were ivory or wood used. Many of the heads are resharpened or fragmented, but a number of intact heads show that generally they were quite small, only 60–80 mm long, and made for very light shafts. However, a few larger harpoon heads with a length of up to 100–150 mm were used as well. It is not possible to distinguish harpoon shaft components from the large assemblage of wooden main shaft fragments for missiles and lances.

Self-bladed, toggling harpoon heads of Type Qt-A are provided with a narrow open socket and one to three spurs in the proximal end. The line hole typically runs perpendicular to the plane of the distal point, which has sharp sides and a lateral barb. Likely foreshafts for Type Qt-A harpoons are found in the material. They are made from whalebone or wood and consist of rods with bluntly pointed distal ends, which fit into the harpoon sockets, and scarfed proximal ends. The foreshafts are short (up to 180 mm long) and were originally linked to a quite light main wooden shaft. However, one specimen is exceptionally long (almost 300 mm) and would fit a wooden shaft with a diameter of 18 mm.

Barbed and tapering tanged harpoon heads of Type Qt-B represent the most common Saqqaq harpoon. The elongated line hole is cut above the tang and situated a little displaced to the ventral side of the harpoon's body. Thus the pull of the harpoon line would be oblique and reinforce the effect of the distal bifurcated barb in the distal end. Typically the Qt-B head shows a narrow distal slot for a triangular (isosceles) killiaq point parallel to the plane of the line hole. This often finely-edge serrated endblade with ground broadsides was wedged into the slot and thus replaceable. Metric analysis show a division into two size clusters of harpoon endblades: a 'small and narrow' and a 'large and wide' cluster, with a few very large outliers. No socket pieces for Qt-B and the other tanged or 'male' harpoon heads have yet been identified in the find materials.

Qt-C harpoons are rare. The type is distinguished from the Qt-B by the position of the elongated line hole, which is cut through the centre of the relatively flat tapering tang. Thus the ability of the Qt-C harpoon head to hold the harpooned animal depended on the barbs. Accordingly, barbs are situated on both sides of the Qt-C harpoon's body, which is very rare in Type Qt-B.

Harpoon heads of Type Qt-D are rare as well. They are quite characteristic with their tapering, flat tang and an oval line hole situated at the centre of the harpoon's body above a bifurcated dorsal barb. The distal barb, also bifurcated, is positioned on the ventral side. No Qt-D heads are intact but judging from the resharpened or fragmented specimens, this type included some very long heads, i.e. more than 100 mm long.

Almost all harpoon heads of types Qt-B, Qt-C and Qt-D are provided with a tweezer-like slot for a small, triangular endblade (isosceles triangle), which was wedged into the slot. The blades were made of killiaq and show polished ventral and dorsal sides and often fine edge serration. The harpoon endblades from Qt have an average size of 8 mm in width and 18 mm in length and generally all of them would fit any of the slotted harpoon heads, according to measurements of the width and length of the slots. A single miniature endblade and a couple of unusually large blades are outliers.

Triangular harpoon endblades are known from several Saqqaq sites in Greenland, albeit often in small numbers. Hinnerson-Berglund's metric analysis of 27 triangular endblades (2004: Tables 19 and 20) from a number of sites in Nuuk (mainly Marianes Pynt) shows average width (7.8 mm) and length (18.7 mm) dimensions which nicely fit the Qt endblades.

Harpoon accessories are rare in the assemblages. If the Saqqaq utilized a complex bladder technology, like the Inuit during the Thule culture era, one would expect to find a lot of small objects of antler or ivory: valves, toggles and swivels. But this is not the case. A single piece of antler from Qt was designated as probably an eyelet for tightening the harpoon line by fastening it to a peg on the harpoon shaft. Moreover, a small number of characteristic, carefully carved tubes of antler and narwhal ivory with 'swallow-tail' end and simple line decorations are, based on a find from Qa, interpreted as 'dispensers' containing spare harpoon endblades.

Though harpoon endblades are common, preserved harpoon heads from Saqqaq sites beyond Qt and Qa are extremely rare. At present, two heads are known from Itinnera in the Nuuk area (sketch of one of them published in Gynther and Meldgaard 1983: 42), three heads are known from Nipisat (Gotfredsen and Møbjerg 2004: 70–72), a single harpoon head was collected from the Qorluulasupaluk site close to Qaanaaq (Diklev and Madsen 1992: 20), a single head was excavated at Bight Site on Ellesmere Island (Schledermann 1990: 65, 88), and finally one head was collected a century ago in Disko Bay (Grønnow 2004: 76).

The harpoon heads from Itinnera (Fig. 3.57) are self-bladed Qt-B type heads of antler. One of them shows a slightly bifurcated barb. The lengths of these heads are 72 mm and 73 mm, i.e. they are longer than most of the specimens from Qt and Qa. The Nipisat find includes two Qt-A heads of antler, both heavily resharpened. One is within the 'normal' size range (length in resharpened state: 46 mm), whereas the second one is very small (l: 37 mm). The third head was made of antler as well. It is tanged and the distal end is reworked so that any original slots and barbs are missing. The morphology and size

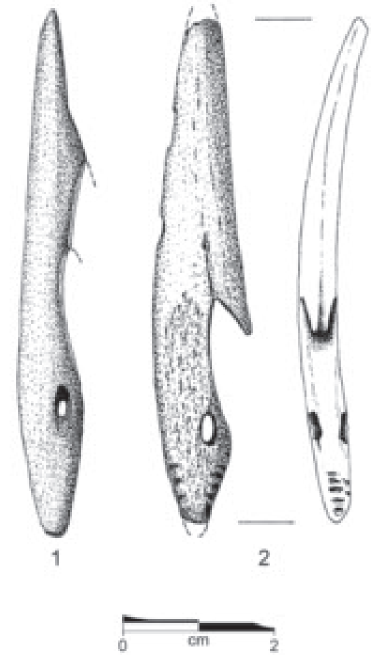


Fig. 3.57
Two harpoon heads of antler, Type Qt-B from Itinnera, Nuuk area. (Drawing: H.C. Gulløv).

(present l: 47 mm) nicely fit the Qt-B type. The specimen from Qorluulasupaluk is quite fragmented but clearly a Qt-B type (possibly self-bladed) made from antler. It shows the common bifurcated, unilateral barb in the distal end. With its proximal end (the tang) broken off, this head is *c.* 40 mm long. The Bight Site head is a Qt-A type (Fig. 3.58) made of antler with a bifurcated spur and a line hole perpendicular to the plane of the socket and a distal barb, the traces of which are just seen below the break that removed the entire distal part of the head. Finally, the stray find from Disko Bay consists of an extraordinarily large Qt-B head (l: 166 mm) made of ivory. The distal barb is bifurcated and the distal end shows traces of an endblade slot oriented perpendicular to the plane of the line hole, which is quite unusual.

The Nipisat material includes 28 antler rods, some of which could have been foreshafts for harpoons of Type Qt-A. They are very light (mean diameter of cross section: 9 mm), and this dimension fits the size of the lightest presumed foreshafts from Qt. A single presumed harpoon foreshaft from Nipisat of whalebone is unusually heavy and long (400 mm) (Kramer 1996b: 94) and does not seem to fit any of the known Qt-A type heads. Socket pieces for the tanged/male harpoon heads have not been identified.

Obviously, these sparse finds do not add much information to the Qt and Qa materials. However, the stray find from Disko Bay tells us that the Saqqaq possessed harpoons of a size that was large enough to be used for marine big game hunting.

3.2.9.4 Throwing boards

The Saqqaq missiles – harpoons, bird darts and darts – were launched by means of throwing boards. Finds from the Qa assemblage yield important information on this subject. There seem to have been two different launching principles (techniques for transferring the force from the throwing board to the proximal dart end).

The first principle is documented by two distal end fragments carefully made from whalebone. The longitudinal groove for the dart shaft on the upper side of these throwing boards shows that they fitted quite light missiles (diameter about 12 mm). At the end of the shaft groove, a countersunk peg of antler or ivory was mounted. This was the point of contact between the throwing board and the edge of the proximal end of the missile shaft.

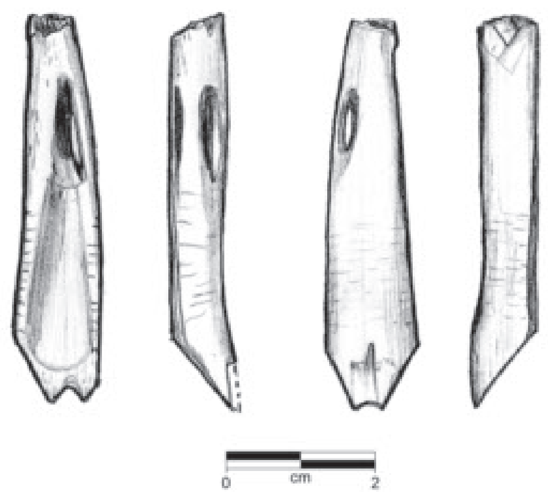


Fig. 3.58
The Bight Site harpoon head, Ellesmere Island. (Pencil drawing by BG of original artefact, 1991).

A counterpart to the two throwing boards with peg from Qa was recovered at Nipisat (Godtfredsen and Møbjerg 2004: 77). This 20 mm wide fragment shows a 9–10 mm wide, shallow groove on the upper side and – as at Qa – an antler peg was originally mounted and countersunk in the distal end of the throwing board in order to provide a firm contact point between the throwing board and the edge of the proximal dart shaft end. The groove indicates that this throwing board was fitted to launch extremely light darts, as light as arrows for bows.

A few proximal shaft ends and throwing board fragments of bone and wood from Qa as well as Qt indicate that a second throwing board launching technology was used by the Saqqaq. One of the proximal shaft ends of whalebone from Qa has a protruding, countersunk 'hook', which fits nicely into an elongated hole at the distal end of a narrow, supposed throwing board fragment, also of whalebone. The shaft fragment is 12 mm in diameter and this fits the shallow groove on the upper side of the supposed throwing board. Here the force from the throwing board was transferred to the dart via the smooth 'hook' in the shaft end. Comparable throwing board fragments characterized by a shallow groove on the upper side and lateral holes, probably for lashing a handle or a counterweight to the proximal end, were recovered at Qt.

3.2.9.5 Lances

Lances used for dispatching harpooned animals are identified in the Qt and Qa materials via their characteristic foreshafts. They show a wedge-shaped proximal end, an oval cross section and slight taper towards the distal end with a blade bed and sometimes a lowered zone for the lashing of the lance head. The peculiar proximal end was made to fit into a 'swallow-tail' at the end of a main shaft. The joint was locked by one or two nails pressed through the broad sides. This made the lance shaft resistant to longitudinal pulling as well as pushing forces – a property of a weapon suited for stabbing game. Lance foreshafts were made from high quality pieces of *Larix* sp. and *Picea* sp.

Metric analysis of the foreshafts and projectile points indicates that two or three calibres of lances were used. The majority were light lances with foreshafts with a distal end diameter of 14–21 mm. The blade beds of these were armed with symmetrical, tapering stemmed bifacial endblades within a maximum width range of 14–22 mm (Group c and d projectile heads).

A smaller number of foreshafts, including a specimen with the endblade still *in situ*, represent heavy lances with shaft diameters of 22–27 mm and blade beds that held bifacial endblades with maximum widths of more than 22 mm (Group e projectile heads).

The Nipisat material adds important information about the complex Saqqaq lance technology. Firstly, a basal fragment of an ivory item recovered at Qa has an intact, but slightly lighter, counterpart at Nipisat (Gotfredsen and Møbjerg 2004: 76, 79). This is provided with a blade bed for a projectile head with a stem width of *c.* 12 mm (Class c head), a characteristic (symbolic) longitudinal groove starting in the blade bed, and – on the opposite side – space for a countersunk lashing holding the endblade. In other words, it bears the characteristics of a distal end of a wooden foreshaft for the very light lances from Qt and Qa (see above). The proximal end is broader than the distal end. It has a wedge-shaped proximal end (to fit into a slot in a shaft) and a single, quite peculiar, dull lateral barb, which is directed in the 'opposite' direction, towards the distal end of the lance head. Thus, this is not a barb for holding the prey. It probably secured a firm, but flexible lashing between a main shaft and the detachable head. In this way spare lance heads could be mounted quickly and simply. A reworked fragment of a similar, but even lighter lance head of antler, showing the characteristic long, dull side barb was also recovered at Nipisat (Gotfredsen and Møbjerg 2004: 78). In contrast, the proximal end fragment from Qa, described above, must have belonged to the class of heavy lances.

Secondly, the Nipisat find includes three self-bladed lance heads of antler of a type which has no counterparts in the Qt and Qa materials (ibid.: 71–75). The proximal ends are wedge-shaped and provided with one or two lateral shoulders to fit into a distal slot in a main shaft. There is a large line hole situated asymmetrically at or above the 'shoulder' on these projectile heads, which have a sharp edge (not pointed) at the distal end. Obviously this kind of lance head was meant to break away from the shaft on impact, but, in contrast to the type described above, not to detach completely from the shaft. In their present, probably resharpened state, these heads are from 96 to 145 mm long and 23–26 mm wide, and thus they are classified as armatures for 'heavy lances' with a distal socketpiece. With their antler edges they would be suited to penetrating caribou skin rather than the skin of any marine mammals. Ultimately, the question about the function of these rare, but characteristic artefacts from Nipisat, as well as a peculiar antler projectile head with a unilateral bifurcated barb and linear ornamentation (ibid.: 79) is still open.

3.2.9.6 Leisters, snares and nets

It is difficult to identify parts of fishing leisters in the materials from Qt and Qa. Unless leister prongs were morphologically identical to end prongs for bird darts, there seems to be only one candidate for a leister prong. Made from antler, it has only two lateral barbs and a base which does not fit the three-winged foreshafts. It must be mentioned that the many resharpened harpoon heads, in particular the resharpened Qt-A heads, could have served as fishing harpoons.

The use of snares and nets during hunting, sealing and fishing is suggested by the large number of baleen string fragments with loops and knots of different kinds. Some strings show running loops that could represent snares, while others are provided with firm meshes.

3.2.9.7 Sea-going vessels

The picture of the hunting tool kit is not complete without the evidence of sea-going vessels from which a large variety of marine game, birds and fish could be caught.

Fragments of light ribs/frames of slender vessels have been recovered, in particular at Qt. An almost complete 35 cm wide and 21 cm high rib and several fragments from this site suggest that the Saqqaq vessel was quite low, so the deck must also have been skin-covered, like a kayak. Several fragments of paddle blades of *Picea* sp. were recovered.

With the wide range of tools described above, the Saqqaq hunters could select a weapon perfectly suited to the specific hunting situation, the game species, and the hunting methods and strategies. During the entire Saqqaq period this comprehensive tool kit facilitated a remarkably varied utilization of resources, and made possible the subsistence economy of that era. Moreover, no important deviances from the strict raw material choices and design norms of the hunting tools are seen. It is reasonable to assume that this complex and carefully designed hunting tool kit was a strong material expression of identity, and that the tools, as in every known historic Inuit group, were imbued with symbolic meanings expressed via designs, selections of raw materials and contexts. These dimensions of the hunting tool kit will be discussed in Chapter 6 below.

3.3 Saqqaq hand tools and household utensils

3.3.1 Knives with bifacial endblades

Bifacial knife blades, typically of killiaq, form a common lithic tool class at Qt. Among 581 lithic endblades and endblade fragments and preforms (27% of all lithic tools), 75 blades are classified as asymmetrical bifacial endblades, i.e. knife blades (13% of lithic endblades, and 3% of all lithic tools). Out of the 75 knife blades, 11 were found in their original wooden hafts.

3.3.1.1 Complete knives (Fig. 3.59)

Eleven knives with the endblade still in its original position were recovered at Qt. The hafting consisted of an often carefully made handle with oval cross section, longitudinally split into two almost identical halves. A shallow blade bed was cut into the inner side of the distal end of each handle part. Here the proximal end of the bifacial knife blade was placed, and a lashing – often covering the entire length of the handle – ensured that the proximal end of the knife blade was firmly held between the wooden handle parts.

In a single case the lashing of the knife handle is still preserved (Fig. 3.59a1 and Fig. 3.59a2). This knife consists of a 109 mm long wooden handle (*Picea* sp.) and a bifacial knife blade of killiaq (l: 70 mm, w: 28 mm). In its hafted state the total length of the knife is 164 mm. The lashing of thin baleen string covering the entire wooden handle consists of two parts: a distal end lashing (35 mm wide) for holding the knife blade firmly in the blade bed formed by the two shaft halves, and a lashing consisting of 5 mm broad, flat baleen string covering the entire shaft except 10 mm of the proximal end. This lashing would have provided a rough surface even if the knife handle was smeared with blubber during use. The large bifacial killiaq blade was resharpened. The original total length of the endblade is estimated at about 90 mm.

As mentioned, the hafting principle is the same for all knives, but nevertheless there is great variation of morphology and size. The following examples illustrate this:

Fig. 3.59b is a hafted knife (total l: 193 mm) with a long and slender endblade of killiaq (l: 90 mm, w: 20 mm). Made of *Larix* sp. with dense year rings, the 124 mm long shaft shows

a.1.

a.2.

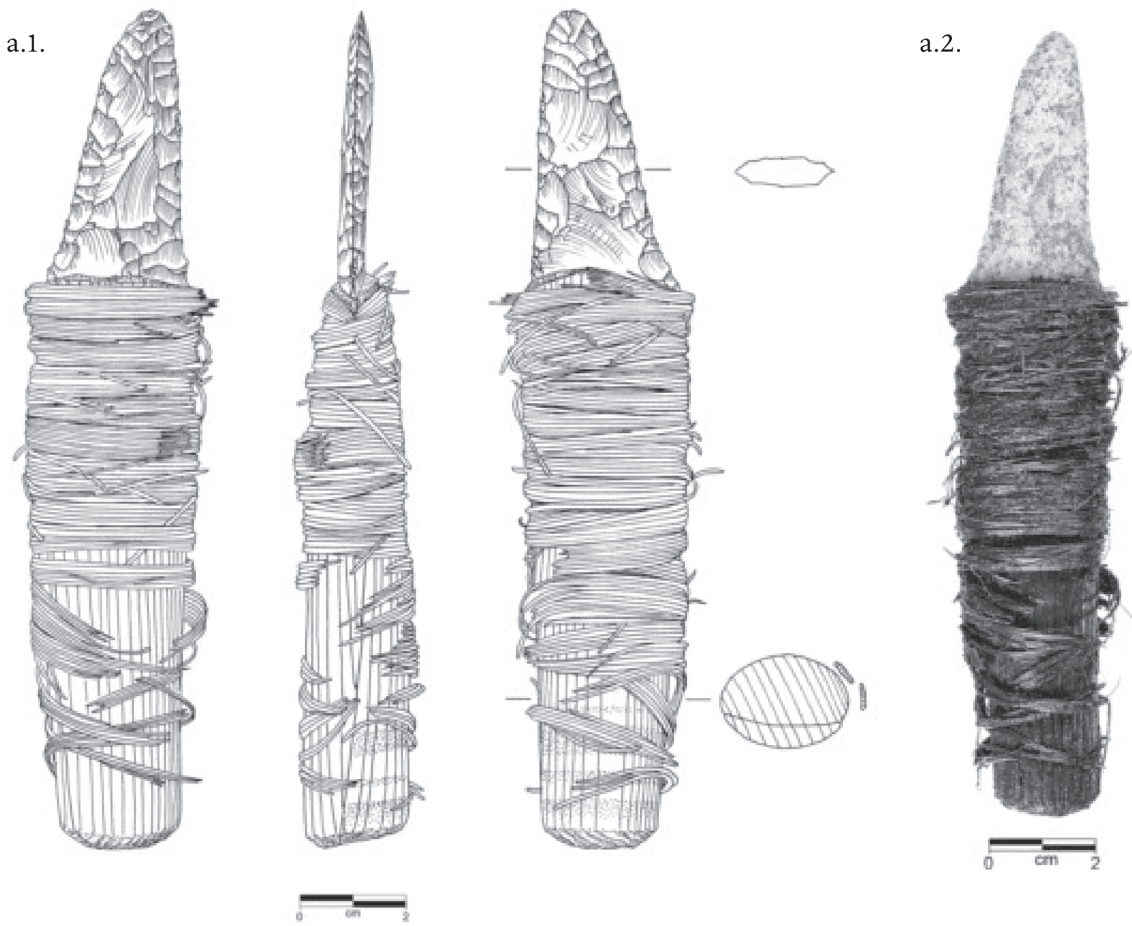


Fig. 3.59
Hafted knives from Qt (a–k; drawings EKN) and Qa (l–p; drawings PB; photos JL).
a: *1: 86,5/249,5: 21; 2: photo of 86,5/249,5: 21 (Photo: JL)*
b: *87,5/252,0: 14*

clear traces of lashing from the distal to the proximal end. Light and dark transverse bands reveal that a thong, probably of baleen, was twisted in a regular spiral pattern around the shaft. The light bands are probably traces of a string about 3 mm wide, whereas the 2 mm wide dark bands represent exposed parts of the haft. There are weak traces of dense lashing on the distal part of the shaft. This would have held the blade firmly in the bed formed by the two shaft halves. The slender endblade shows basal grinding (i.e. the edges of the proximal end of the blade have been made dull in order not to damage the lashing) and traces of use wear along the edges, in particular on the concave distal part.

Fig. 3.59c is a short and robust hafted knife (total l: 140 mm). The shaft is from *Larix* sp. and it is only 96 mm long. Scratching and weak

b.

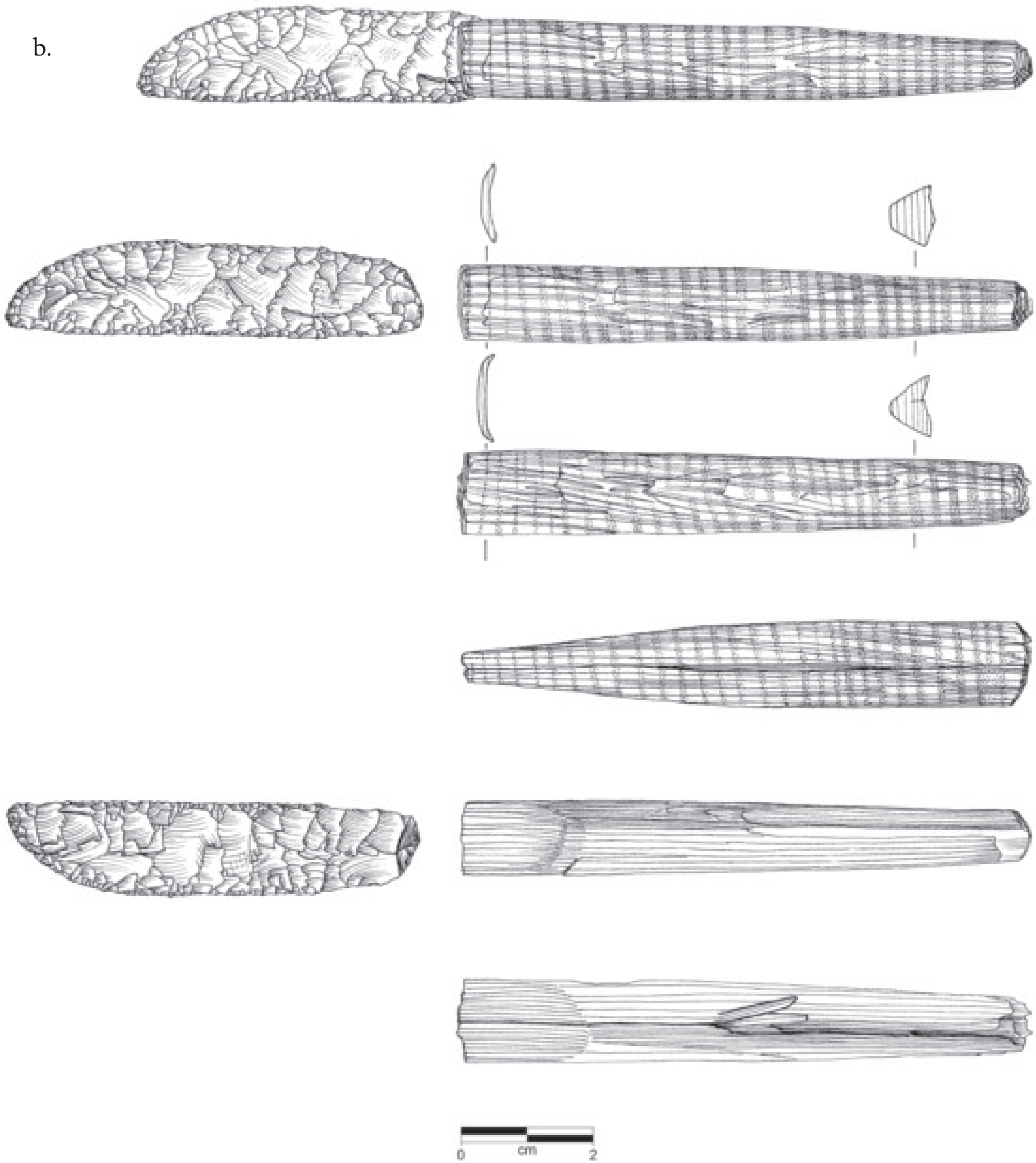
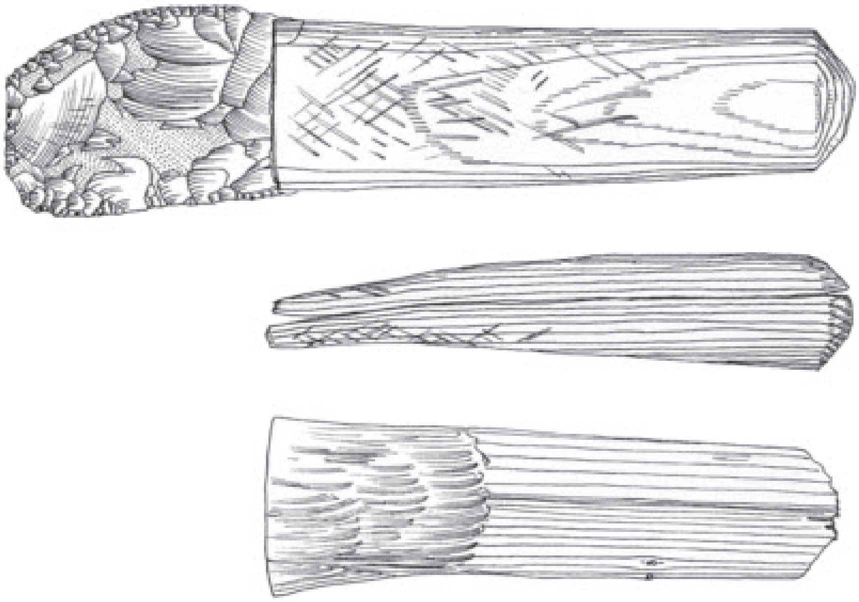
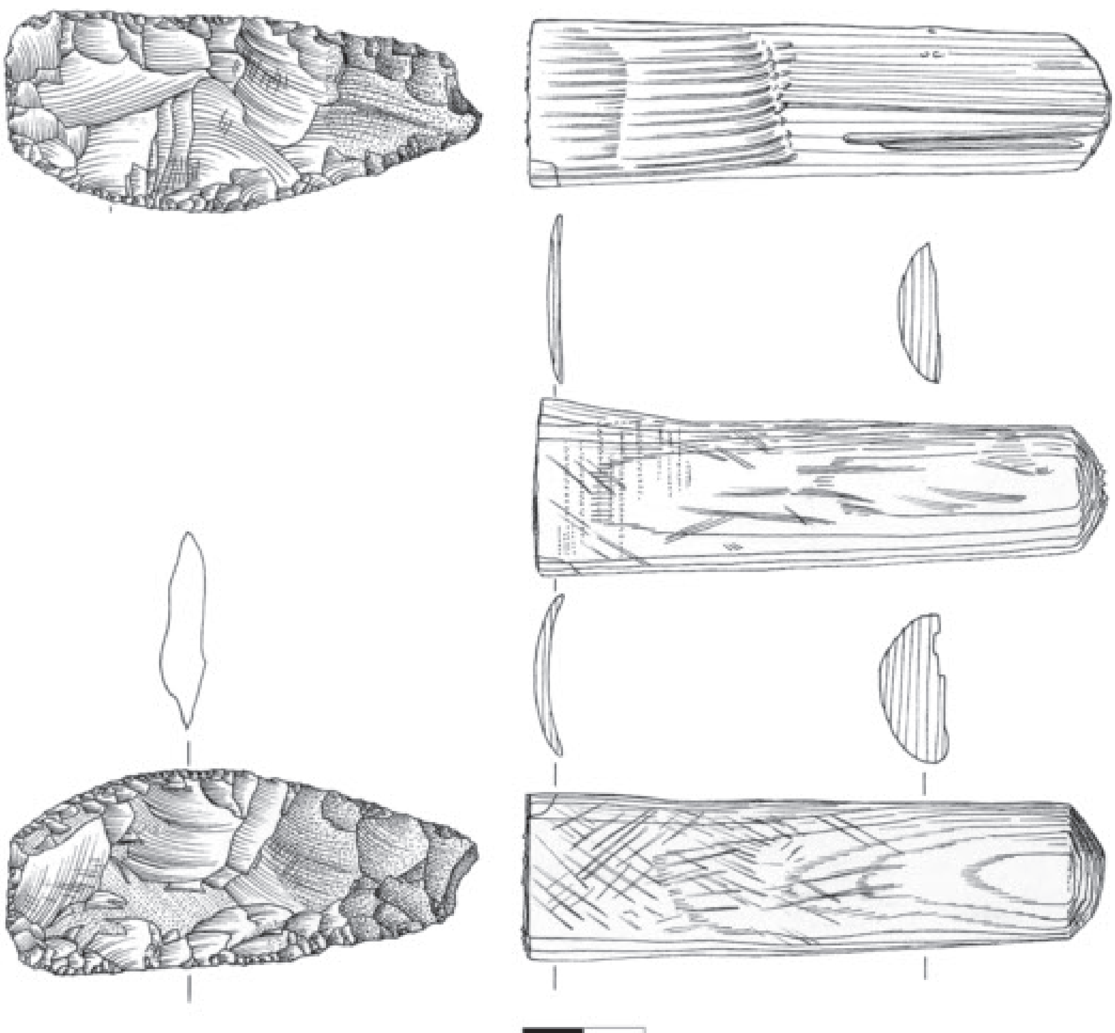


Fig. 3.59
c: *86,5/252,0: 24*
d: *82,5/252,0: 18*



c.

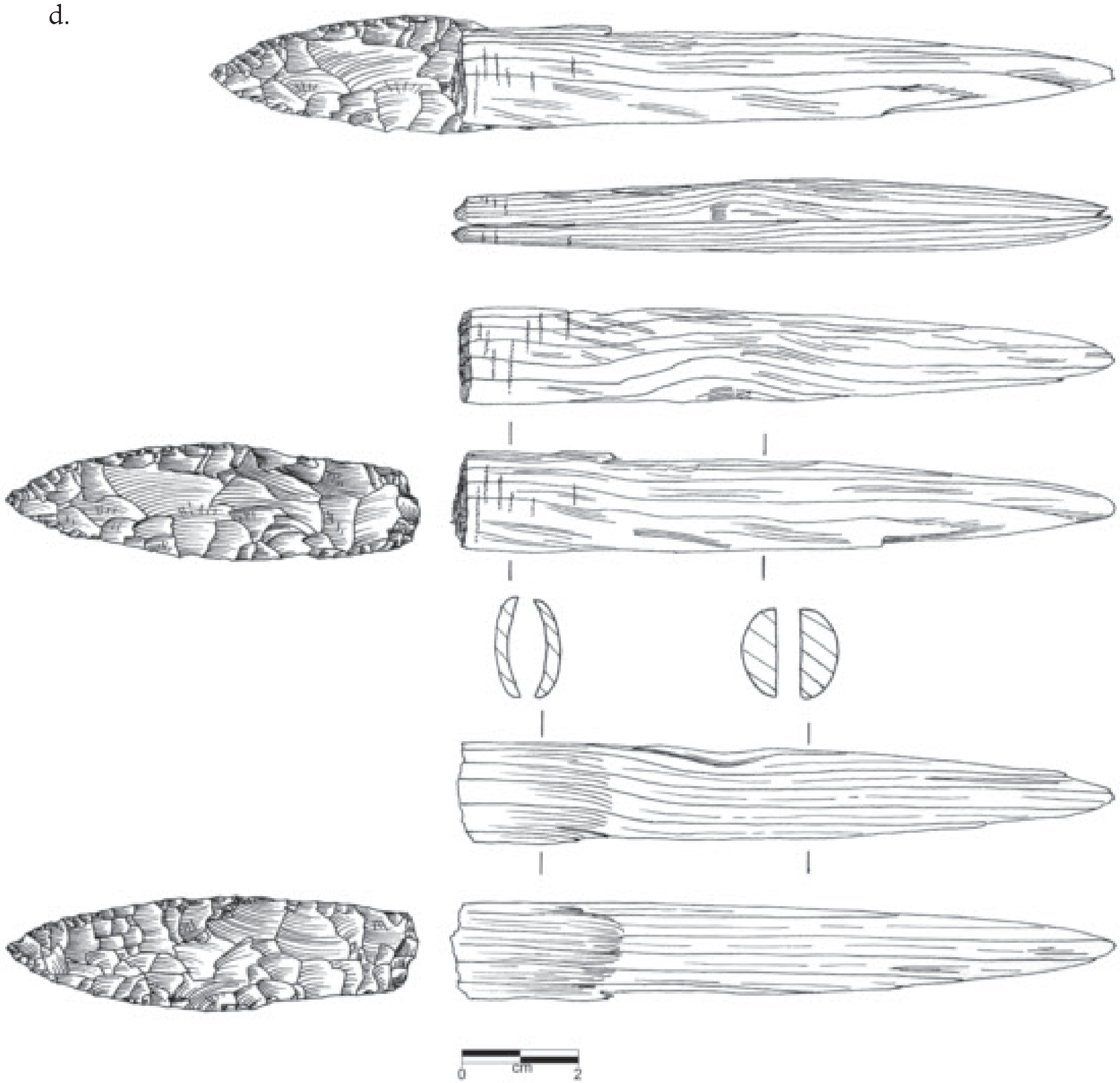


traces of transverse lashing are preserved at the distal end. The bifacial killiaq blade is quite short and wide (l: 77 mm; w: 33 mm), and the proximal end, which was held in the blade bed of the two shaft halves, is dark coloured (due to a kind of blood or blubber glue?). It shows basal grinding. The resharpened (?) flat distal edge and the convex part of the edge show wear (polishing).

Fig. 3.59d is characterized by an almost symmetrical bifacial endblade and a wooden shaft (*Picea* sp.), which tapers towards a pointed proximal end (total length of the knife: 157 mm). The two shaft halves (l: 113 mm) show weak transverse scratches around the distal blade bed. The quite small killiaq blade (l: 71 mm; w: 20 mm) shows basal grinding and the edges of the pointed distal part are heavily worn.

Fig. 3.59e is a knife with a 173 mm long, robust haft of *Picea* sp. Most of the distal part of the shaft is missing, but in the preserved part weak traces of lashing around the blade bed are seen. The

d.



e.

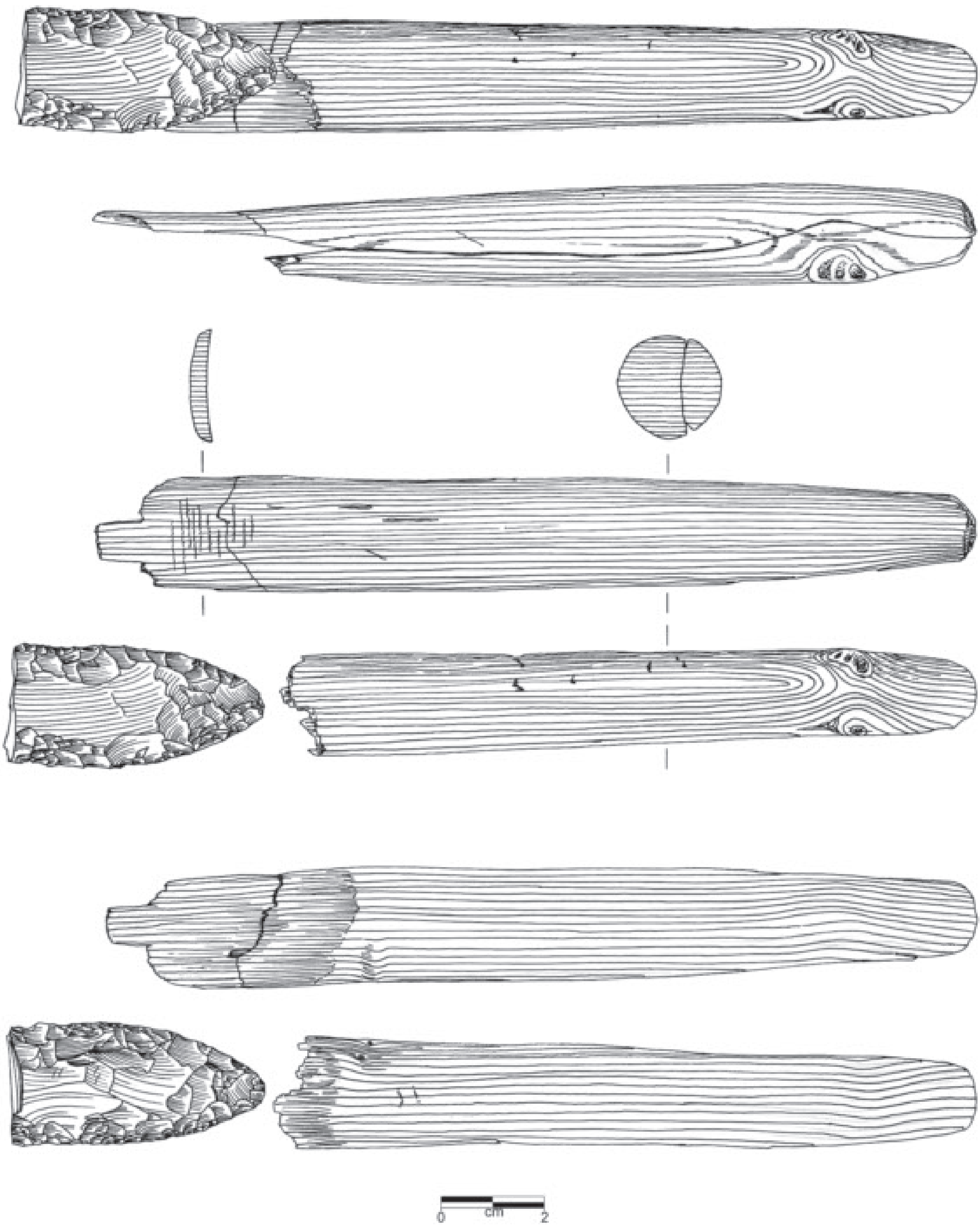


Fig. 3.59
e: *86,0/251,5: 12*
f: *10/23: 14*

bifacial killiaq blade (w: 23 mm) shows a hinged fracture about 10 mm above the end of the haft. This large knife is estimated to have been originally about 220 mm long.

Fig. 3.59f is a small, carefully made knife with a 108 mm long shaft of *Picea* sp. and a bifacial killiaq blade (l: 58 mm; w: 20 mm) with basal grinding, a straight and a convex side, and a rounded distal end. The total length of the knife is 148 mm. On the distal half of the haft traces of transverse lashing appear. The thin distal edges of the blade bed, which were not covered by lashing, are a bit crushed due to use.

The remaining five hafted knives from Qt are:

Fig. 3.59g: Shaft of *Larix* sp. (l: 120 mm); blade of killiaq (l: 82 mm; w: 28 mm). Total l: 177 mm.

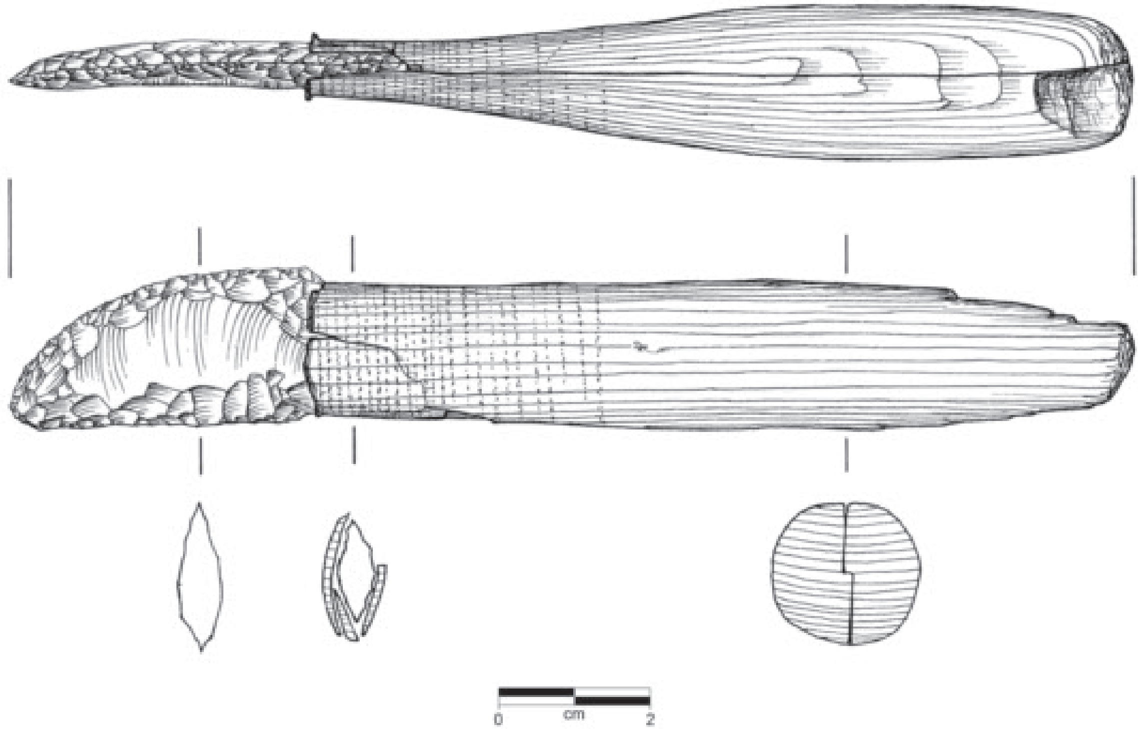
Fig. 3.59h: Shaft of *Salix* sp., fragmented; blade of killiaq (l: 84 mm; w: 25 mm). Total l: estimated at 190 mm.

Fig. 3.59i: Shaft of *Larix* sp. (l: 144 mm); blade of quartzite, heavily resharpened (l: 69 mm; w: 25 mm). Total l: estimated at 190 mm.

Fig. 3.59j: Shaft of *Larix* sp. (l: 115 mm); blade of quartzite, heavily resharpened and reused as seen from hinge fractures at each end (l: 50 mm; w: 20 mm). Total l: estimated at 150 mm.

Fig. 3.59k: Shaft of *Picea* sp., badly preserved (l: estimated at 157 mm); blade of killiaq, resharpened (l: 60 mm; w: 19 mm).

f.



g.

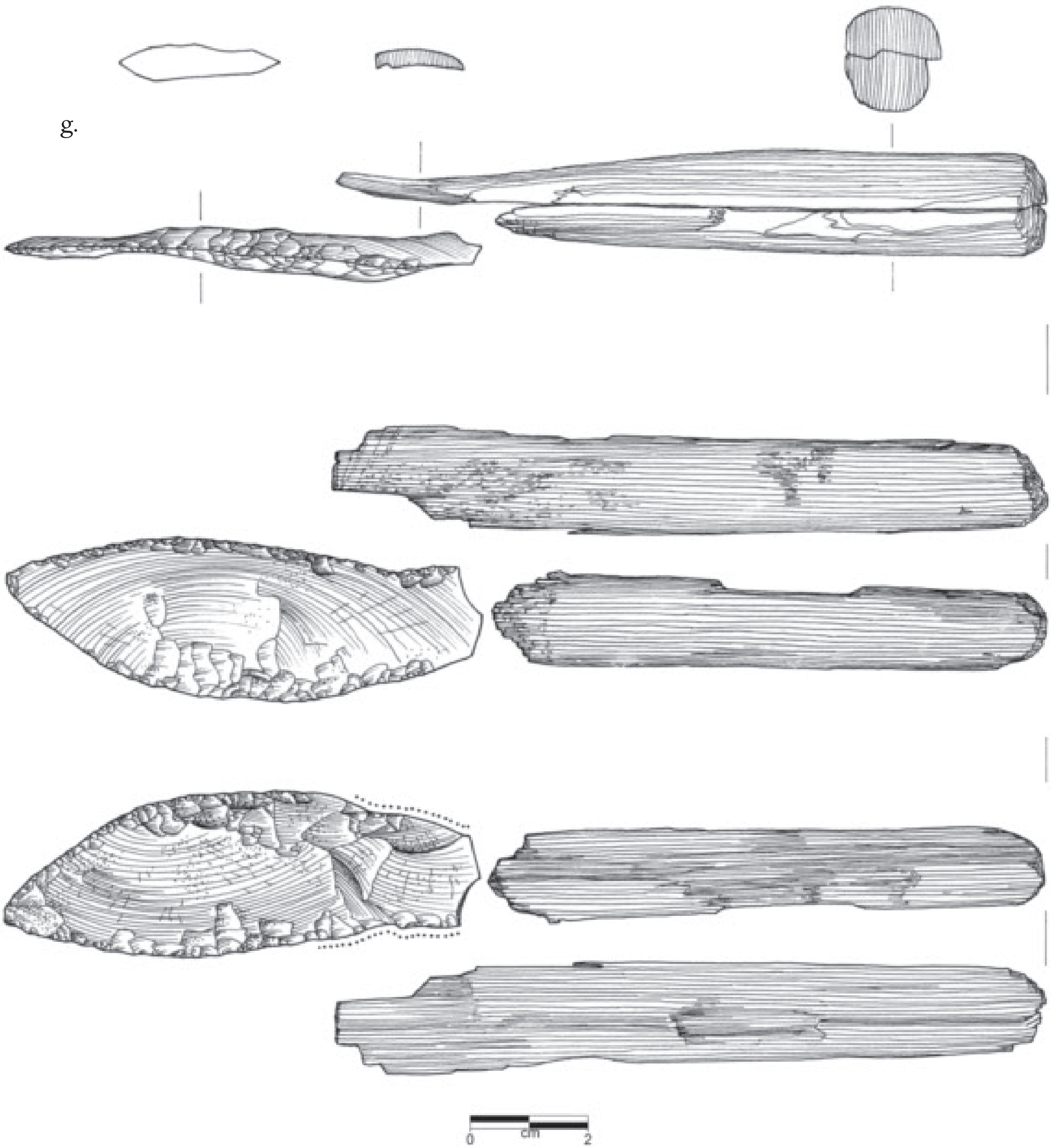
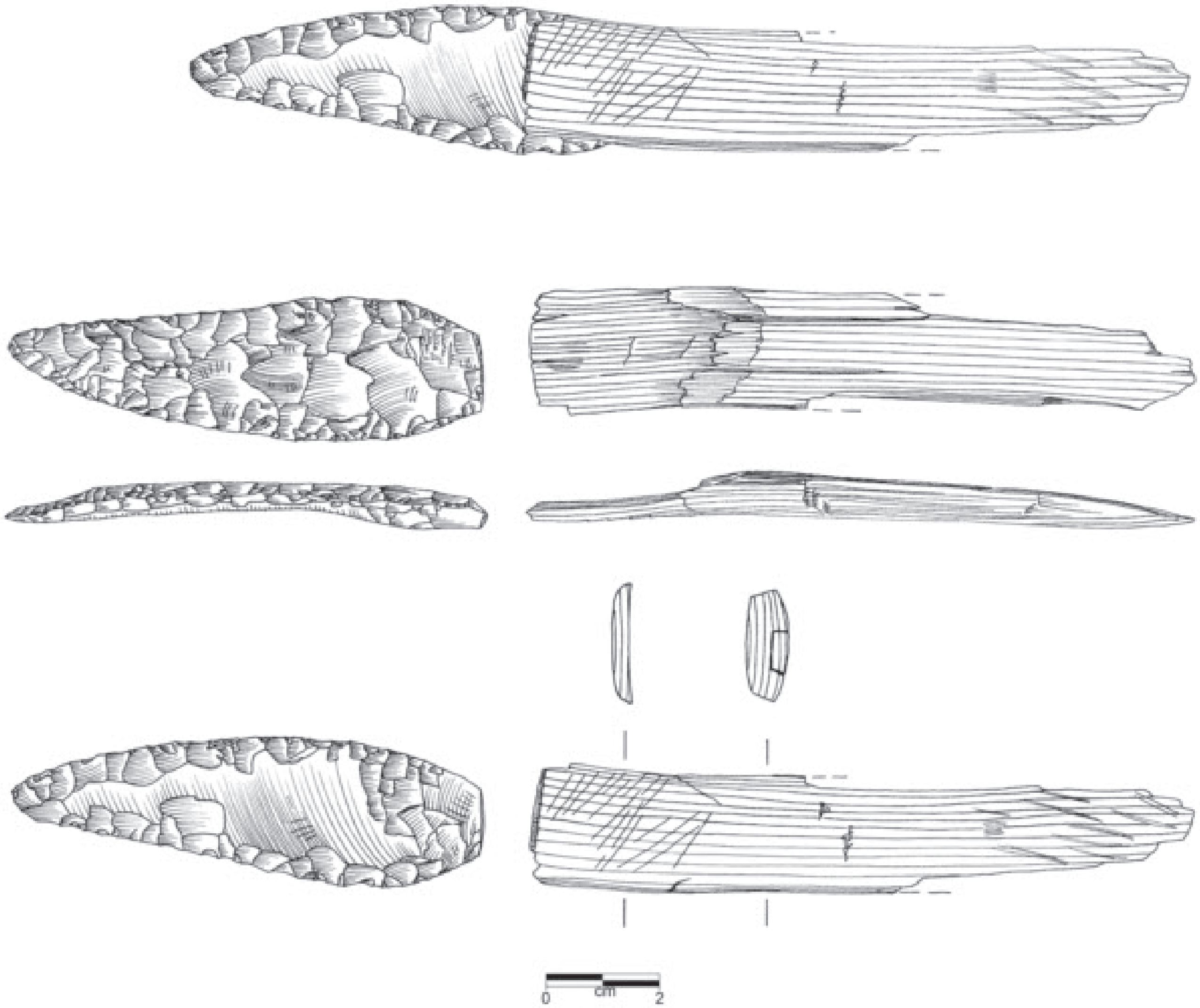


Fig. 3.59
g: *85/266: 9*
h: *87,5/252,0: 13*

h.



i.

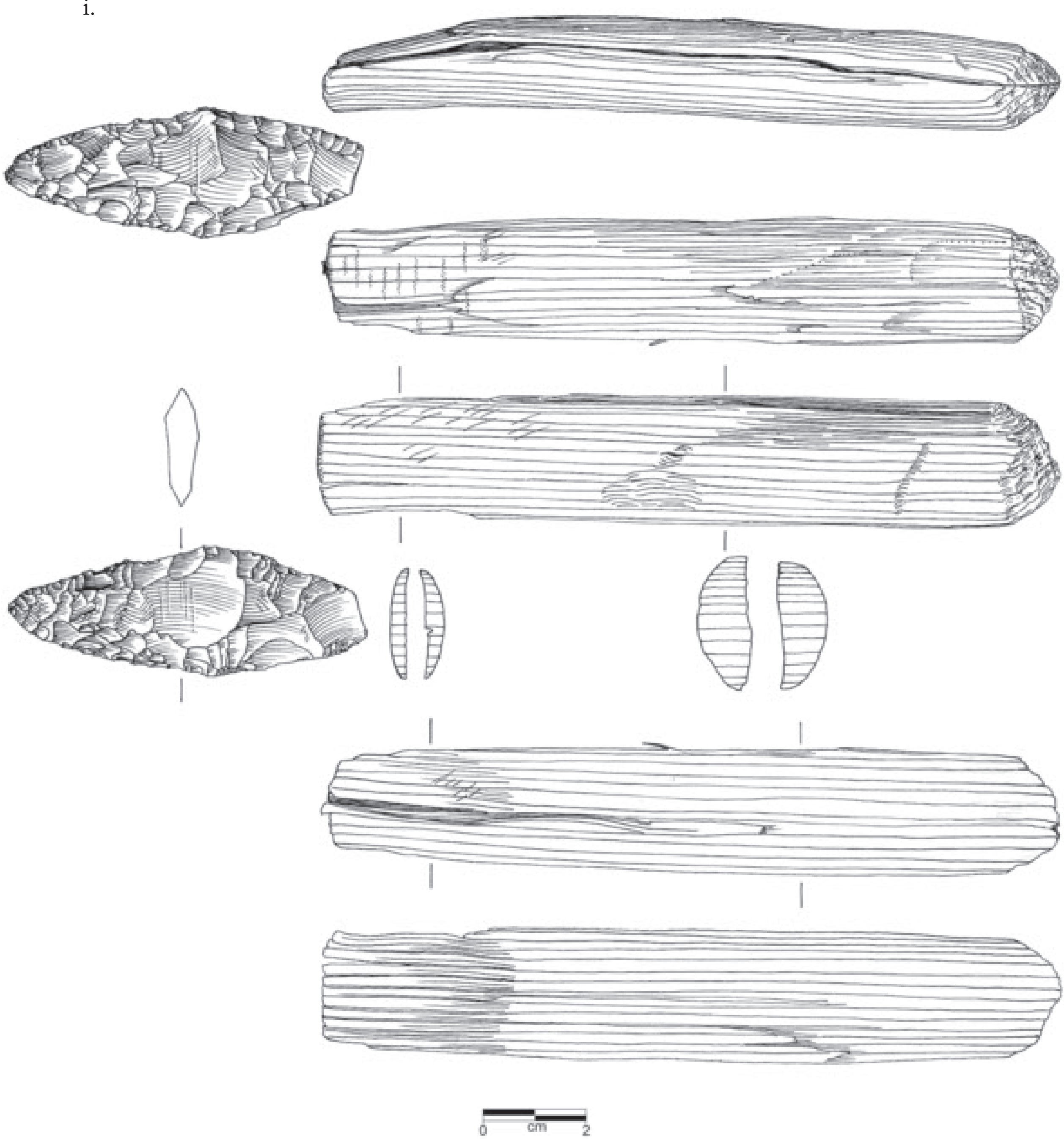
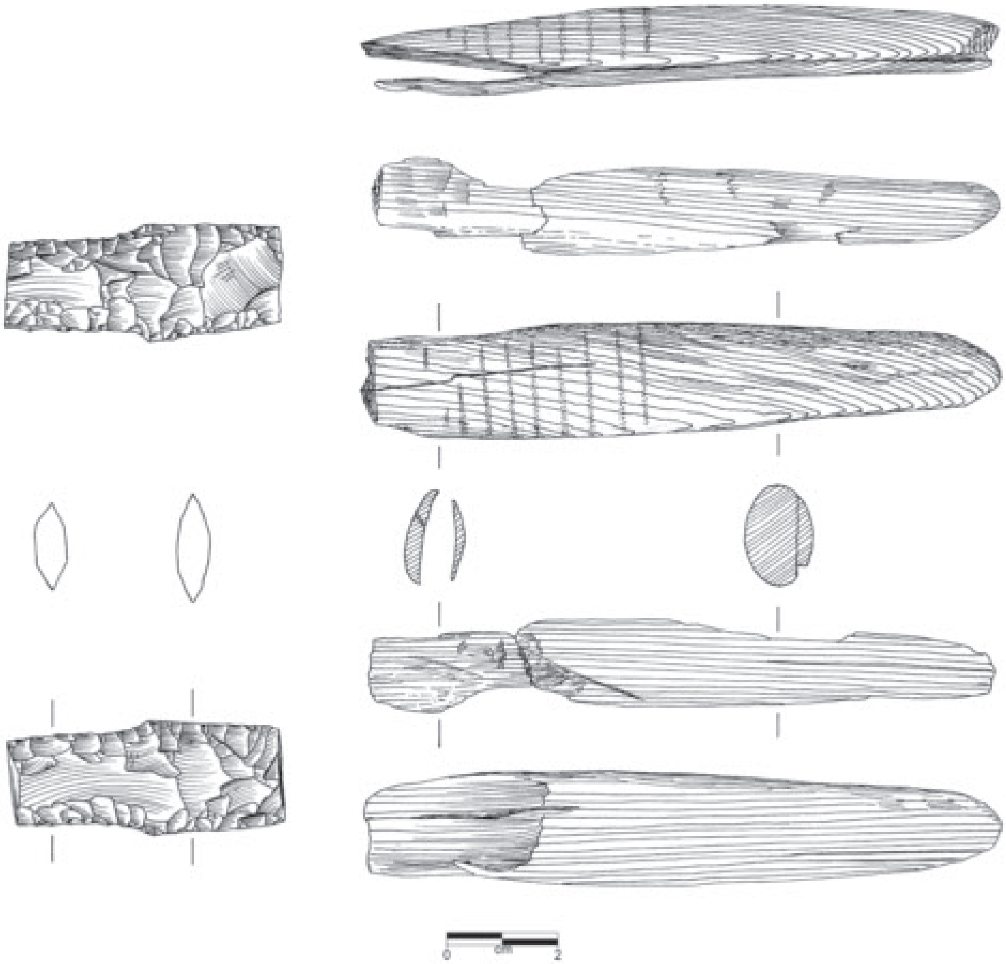
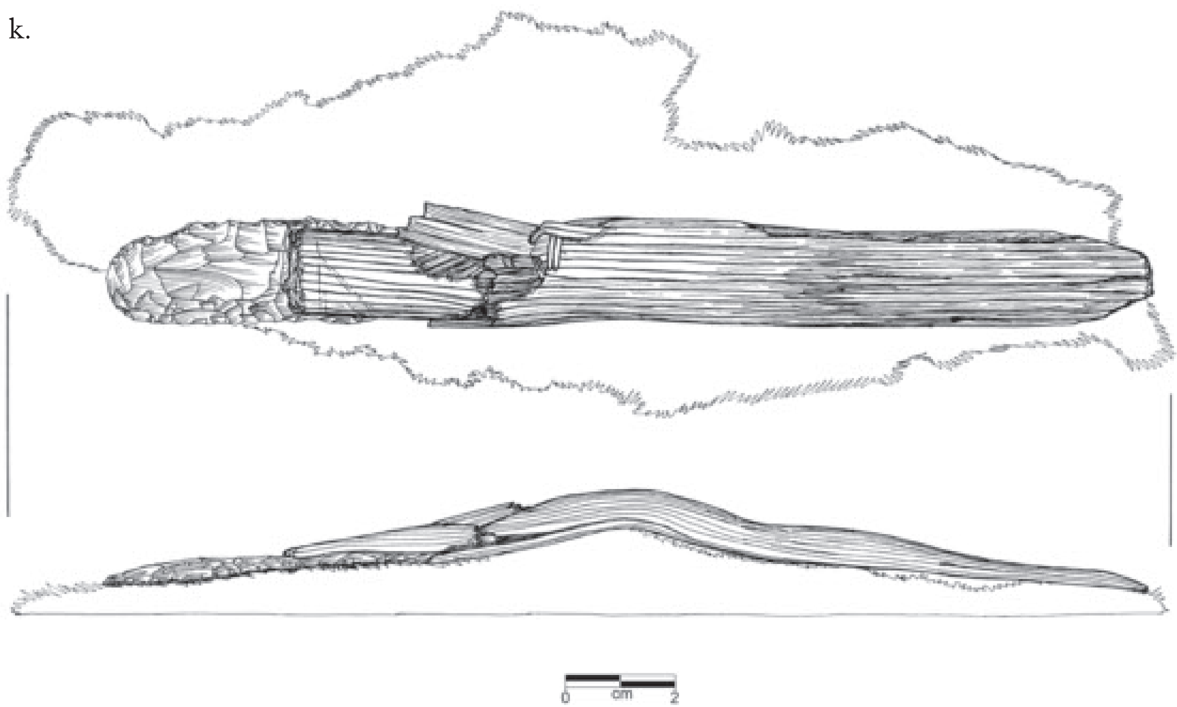


Fig. 3.59
i: *89,0/251,0: 30*
j: *95/256: 5*
k: *85/256: 3*

j.



k.



Finds from Qa:
Five hafted knives were recovered at Qa, making this type the most frequent among the complete tools, as at Qt. Two specimens are provided with complete blades, and three were found with broken blades, but with the proximal end of the blades still *in situ* in the handle. Like the knives from Qt, the handles are oval to sub-rectangular and made from a single piece of wood, which was split into two halves. The proximal ends of the blades were inserted in blade beds carved in the distal end of each handle part. The distal ends of knives E237 and F290 show scratches that would have secured the lashing.

Fig. 3.59l (1 and 2) is a complete hafted knife with a nicely made handle (l: 119 mm; w: 25 mm) with an almost sub-rectangular cross section. The handle tapers towards the distal end with the blade bed, and in the broad proximal end there are scratches for securing the lashing. The bifacial killiaq blade (l: 57 mm; w: 25 mm) is symmetrical and lancet-shaped. Total length of the knife: 160 mm.

Fig. 3.59m is a complete hafted knife with an almost straight-sided wooden handle (l: 125 mm; w: 17.5 mm) with a rounded cross section and slightly pointed or rounded proximal end. The symmetrical bifacial killiaq blade (l: 76 mm;

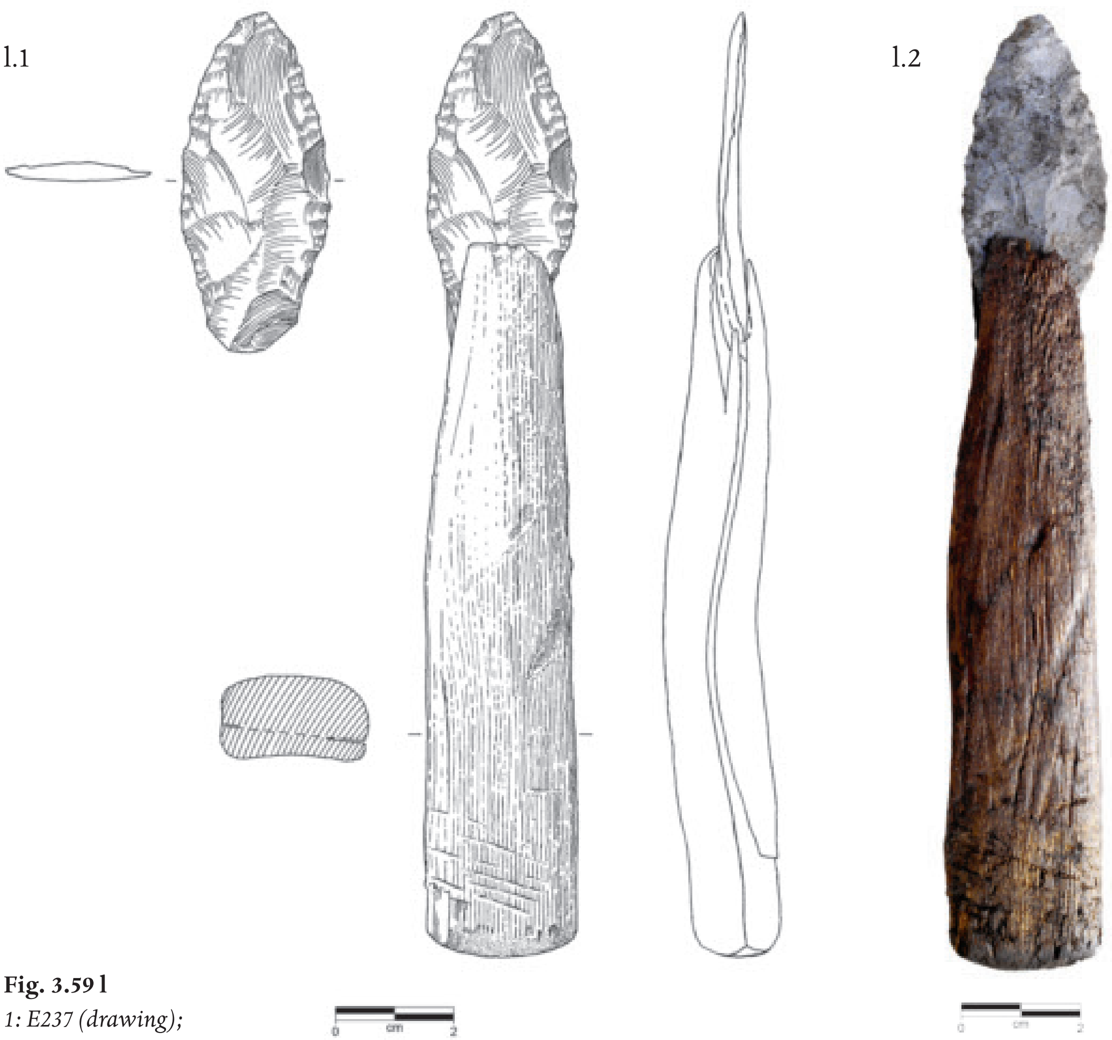


Fig. 3.59 l
1: E237 (drawing);
2: E237 (photo).

w: 22 mm) has a well-defined tang and marked shoulders. Total length of knife is 167 mm.

Fig. 3.59n is a hafted knife, with a wooden handle (l: 105 mm; w: 17 mm). On both haft halves the surface is scratched. The bifacial killiaq blade snapped approximately 8 mm above the distal end of the handle. Judging from the preserved proximal end, the blade appears to have been very similar to the blade of E237 with only vaguely marked shoulders. Total l: 113 mm; estimated length with complete blade: 140 mm.

Fig. 3.59o is a hafted knife with a relatively long, slender straight-sided shaft. The tip of the blade is missing. The wooden shaft is not too well preserved, and the proximal end is broken off. The bifacial killiaq blade is heavily resharpened. Total l: 180 mm; estimated original l: 200–210 mm.

Fig. 3.59p is a hafted knife with a broken bifacial killiaq blade and a relatively short wooden shaft. The shaft (l: 91 mm; w: 17 mm) has a rounded proximal end and tapers slightly towards its distal end, where scratches and cut marks are seen. The bifacial killiaq blade is broken approximately at the middle (l: 39 mm; estimated original l: 70–80 mm, w: 27 mm).

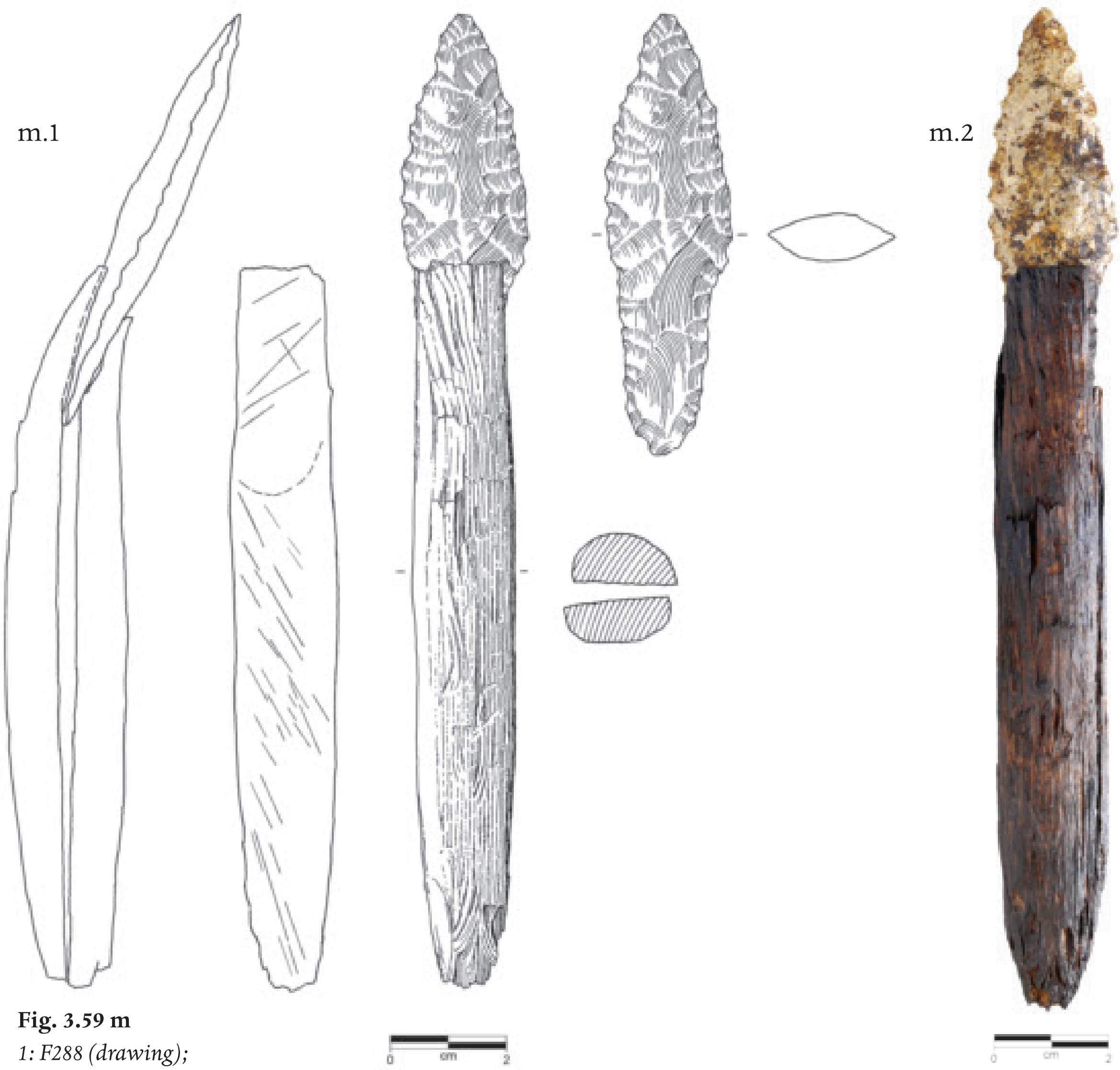


Fig. 3.59 m
1: F288 (drawing);
2: F288 (photo).

n.

o.

p.

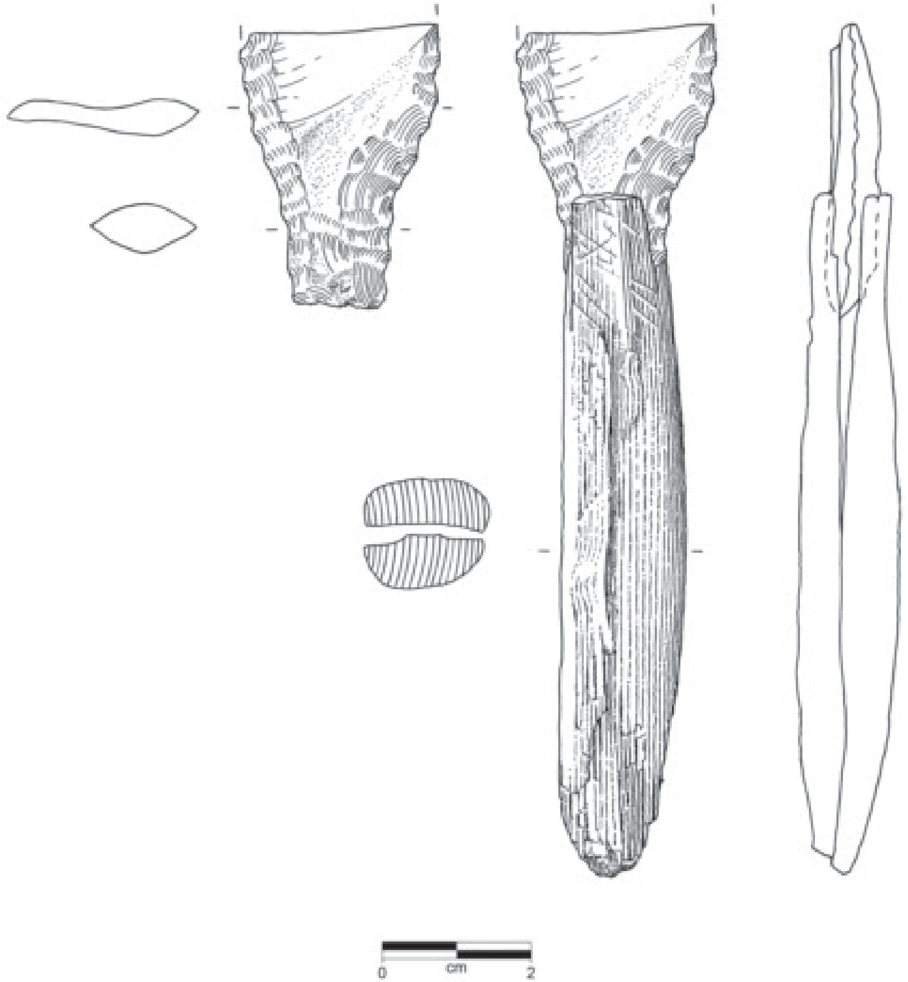


Fig. 3.59
n: *F290*
o: *F291*
p: *F292*

3.3.1.2 Knife hafts and haft parts (Fig. 3.60a and Fig. 3.60b)

This material consists of four complete wooden hafts and eight halves from different knives.

Three of the complete handles are typical knife handles. Fig. 3.60a – 1–2 are of *Picea* sp. and Fig. 3.60b – 1 is of *Salix* sp. The hafts vary in length from 111 to 127 mm. With its distal end about 33 mm wide, the haft in Fig. 3.60a – 2 was made for a remarkably broad endblade.

The fourth haft (Fig. 3.60b – 2) shows an unusual flat oval, even rhombic cross section (maximum 30 mm by 14 mm) and a blade bed turned 90 degrees in relation to the broad sides of the haft. Made from fine grained *Pinus* sp., this haft shows traces of transverse lashing, probably with a broad baleen string, all the way from the distal part to about 12 mm from the proximal end. This haft could have been made for a bifacial blade (a knife blade?) with a scraping rather than a cutting function. The length of the haft is 137 mm.

The eight halves of knife hafts show a morphological and metrical variation that falls within the parameters of the hafts describes above. Their blade bed lengths vary between 107 mm and 132 mm and the widths between 20 mm and 23 mm.

Finds from Qa:
At Qa one complete knife haft (l: 118 mm) and six halves or fragments thereof were recovered. They fall within the range of the knife hafts from Qt, but one of the specimens is unusual. A23,63 is a 144 mm long and slender piece with a remarkably narrow bed (w: 14 mm) for a small knife endblade.

a.

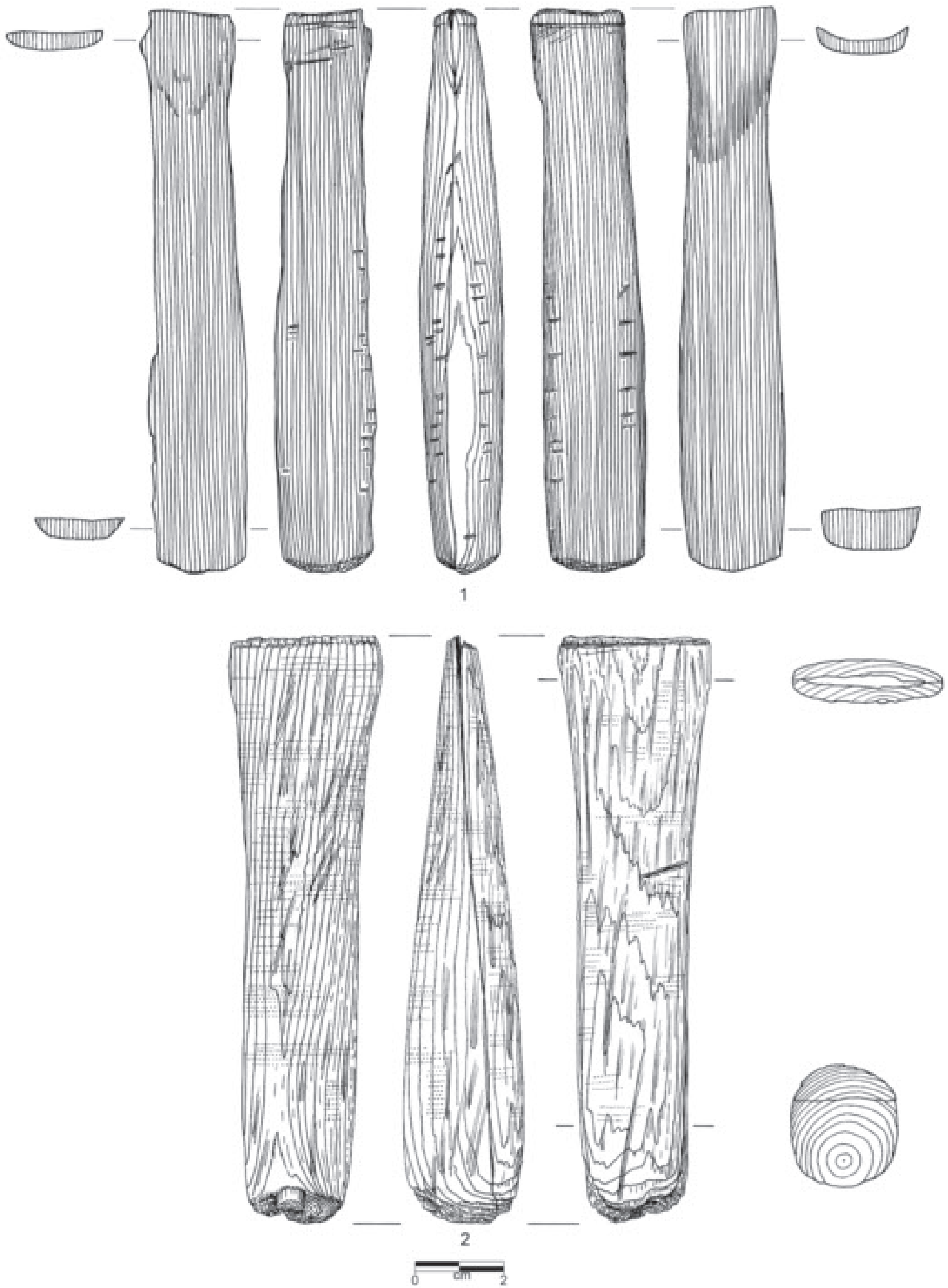
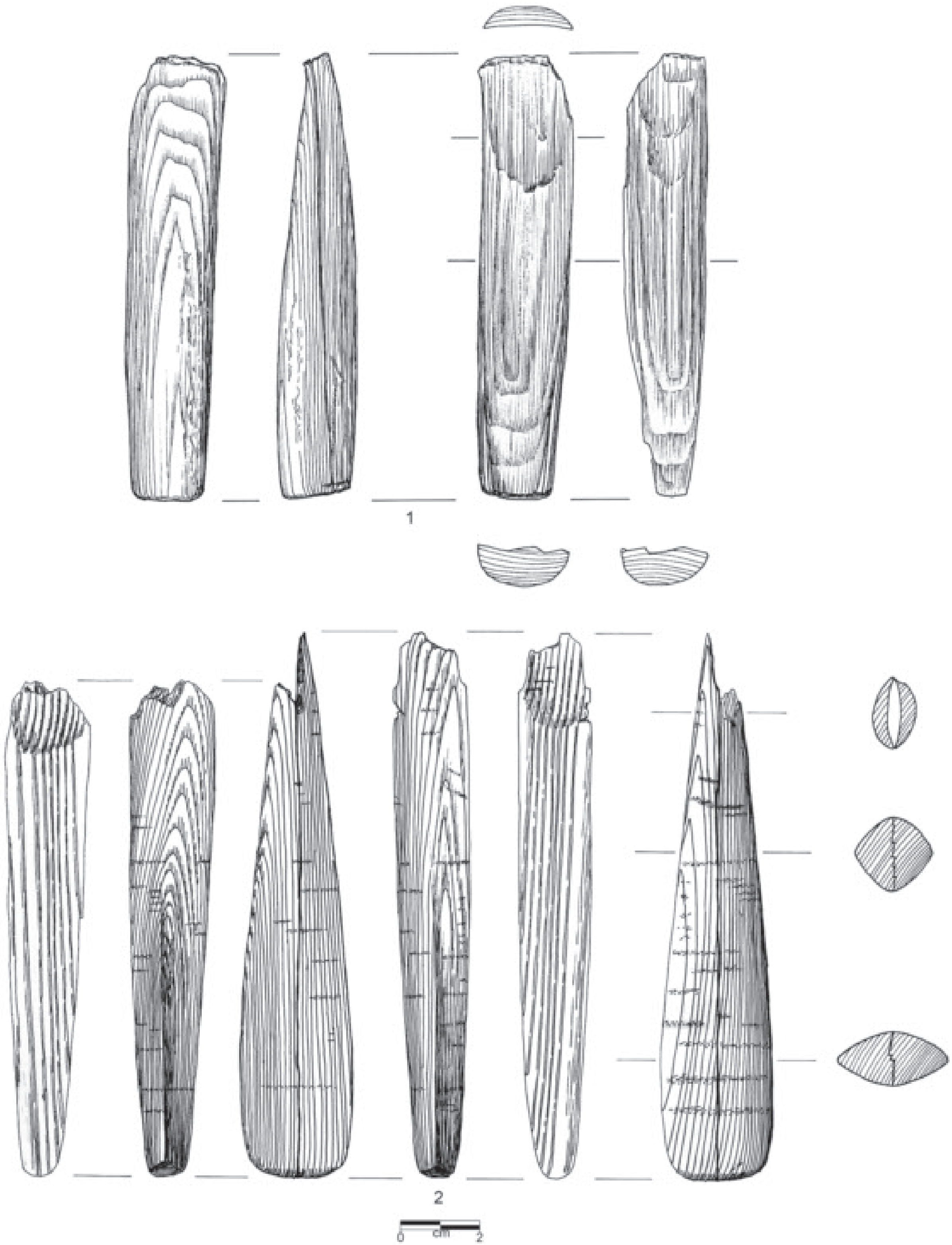


Fig. 3.60
Knife hafts and haft parts.
a: *1: 19/20: 21; 2: 19/19: 146*
b: *1: 10/23: 18; 2: 85/265: 6 and 85/264: 8*

b.



3.3.1.3 Bifacial knife blades

Bifacial knife blades and fragments of these are numerous. Of the 75 specimens, including the hafted knife blades, that form the material from Qt, the vast majority (62, or 83%) were made from grey killiaq, 8 were made from other variants of killiaq, 2 are of translucent mcq, 1 of opaque mcq and 2 of quartzite.

About twenty blades are considered intact in the sense that they have been exposed to no

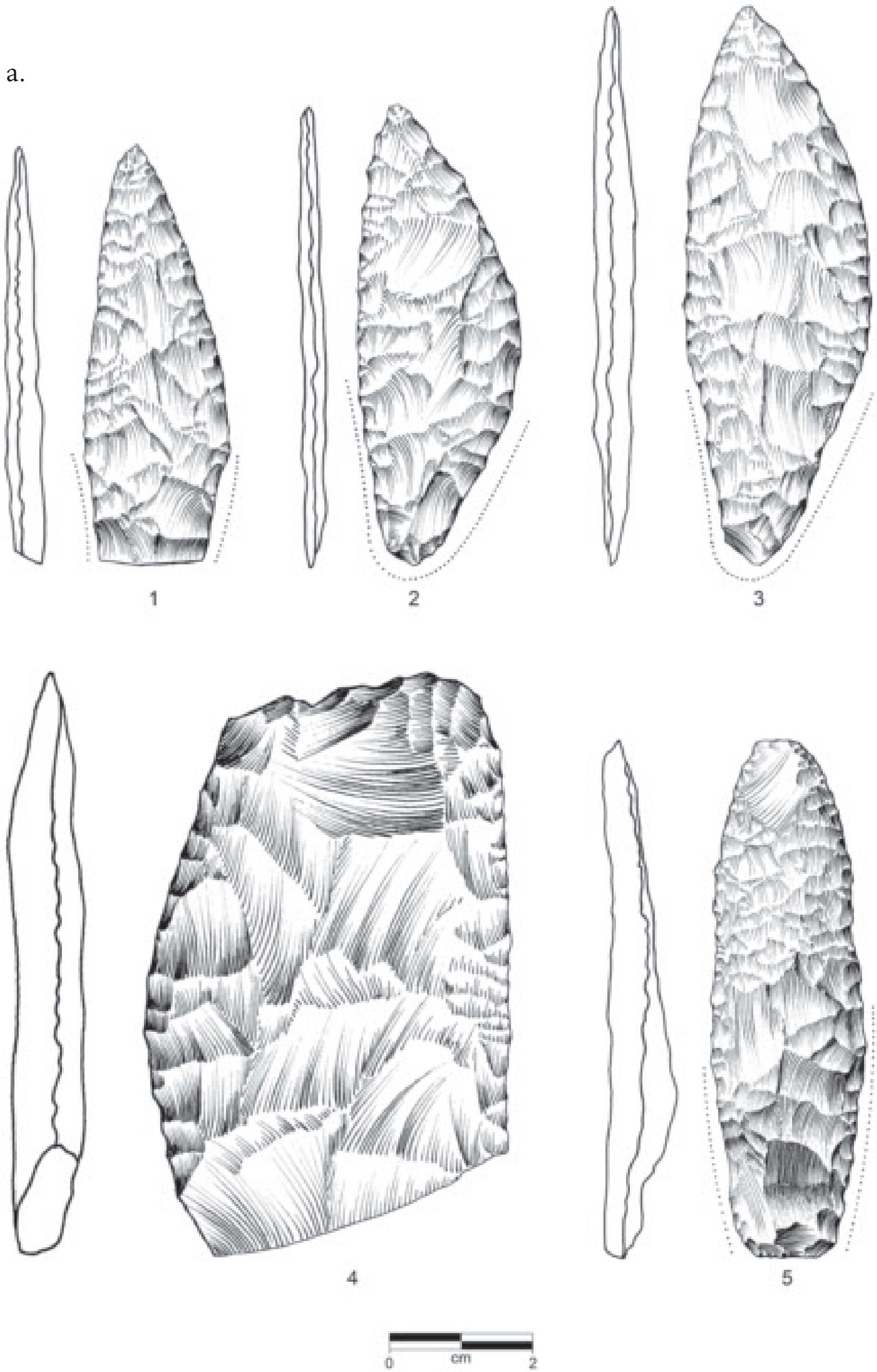


Fig. 3.61
Bifacial endblades, tentatively divided into morphological types.
a: *Type A (1–3)*
Type B (4–5)
b: *Type C (1–2)*
Type D (3)

or only minor resharpening and no fractures. Analysis of basic metric properties (length, width and thickness) of these bifaces shows no significant linear correlations or clusters. Instead the intact bifacial knife blades and a number of almost complete specimens (in total 49 blades) can be divided into four morphological types based on the outline of the blade (Fig. 3.61a and Fig. 3.61b):

Type A: blades with a straight and a convex side and with a pointed distal end.

Type B: like Type A, but with a broad, rounded distal end.

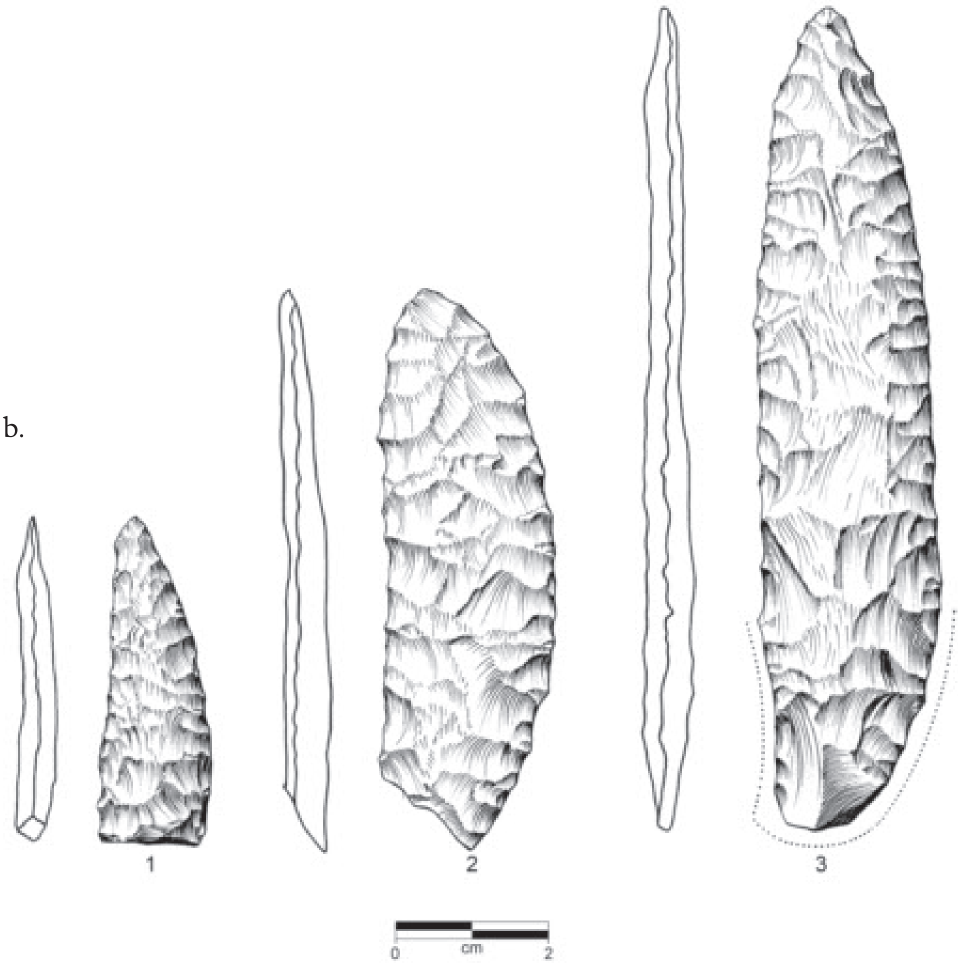
Type C: blades with a curved outline (a convex and a concave side).

Type D: blades with straight, almost parallel sides.

Of these, Type D is the most frequent knife blade type with 30 specimens (61%), 11 specimens are of Type A, 5 specimens are Type C, and finally 3 specimens are Type B.

The majority of preforms of killiaq for large bifacial endblades (59) probably represent the first steps of knife blade production (Fig. 3.62), but it is not possible to quantify this exactly. Likewise, the numerous indeterminate fragments of

b.



bifacial blades (177) must include a considerable number of broken knife blades, but only specialized studies of breaking patterns and use wear can throw further light on these fragments.

Finds from Qa:
Twenty-four bifacial knife blades of Saqqaq origin have been identified at Qa. All of these are of killiaq, and their proportions cluster around lengths between 50 and 80 mm and widths between 20 and 25 mm. The largest outlier is 107.5 mm long and 43.5 mm wide. All of these bifacial knife blades have been identified from their asymmetrical shape (most of them belong to Type D). However, some hafted specimens (like some from Qt) are provided with symmetrical blades, showing that there is a 'grey zone' where it is not possible to distinguish knife blades from projectile points if they are not found in their original position in a shaft.

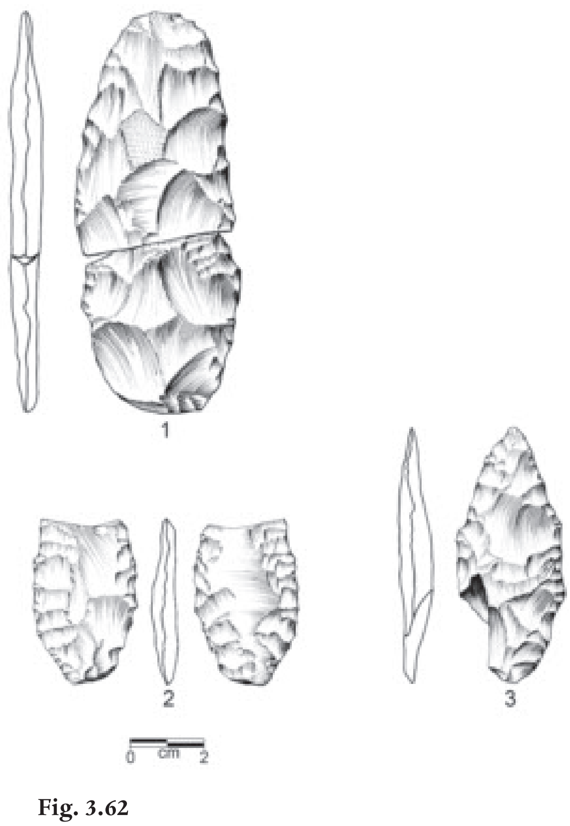


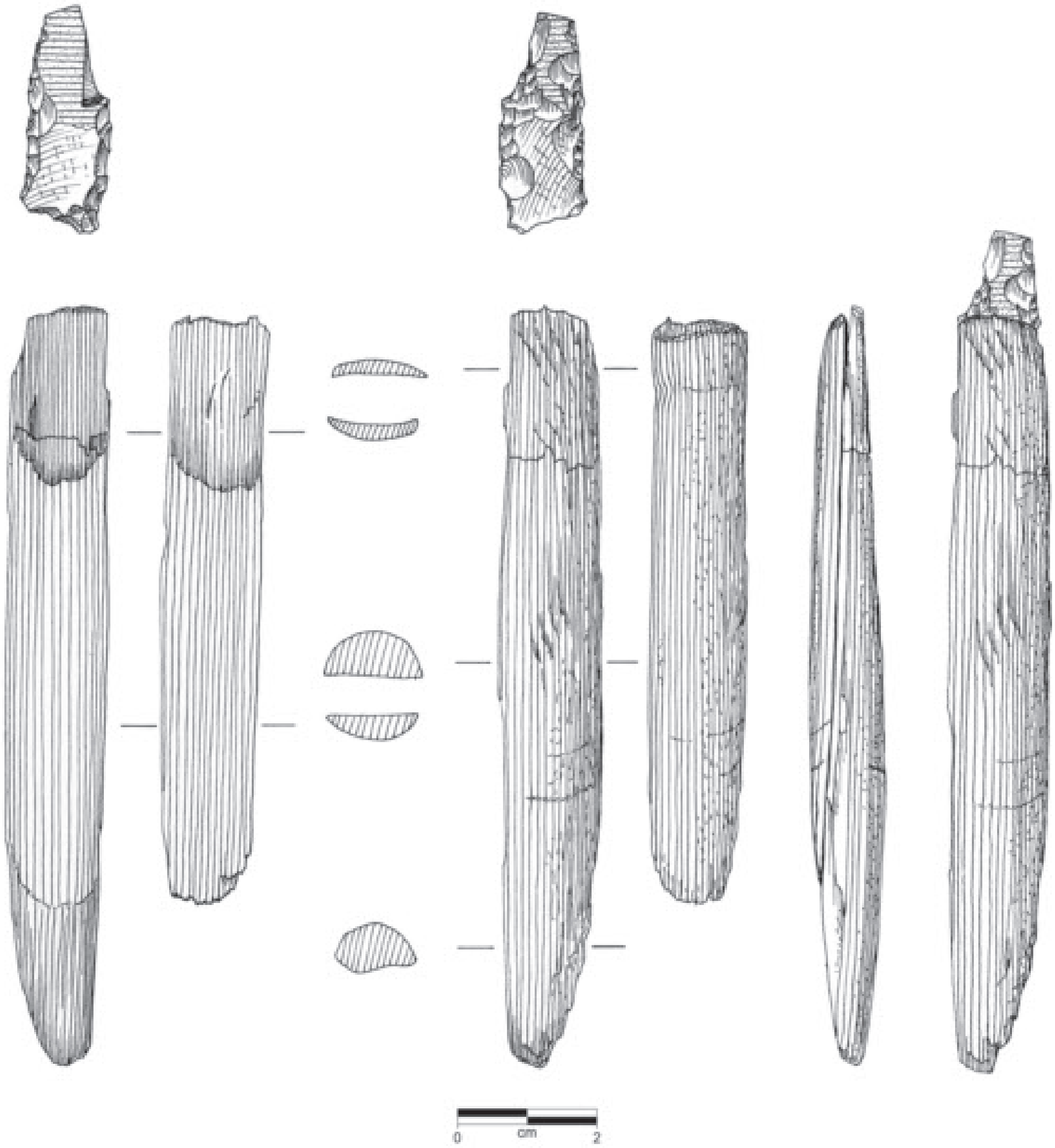
Fig. 3.62
Preforms for bifacial knife blades.

3.3.2 Burins
Burins form the second most frequent lithic tool class at Qt. No fewer than 402 burins (18% of the total number of lithic tools) have been recovered. Only five of these lithic tools have been found in their original position in wooden hafts, but eight characteristic wooden hafts and haft fragments add information, even if they lack the active part of the tool itself.

3.3.2.1 Hafted burins (Fig. 3.63)
Fig. 3.63a is an excellently preserved burin. Made of fine grained *Larix* sp., the haft shows the characteristics of a Saqqaq burin haft: it is a quite slender and simple haft, 111 mm long and 16 mm wide, with an oval cross section and a chamfered proximal end. The flat and thin distal end was split a little more than half way down the haft and a shallow blade bed was cut on the inner side of the small split-off piece as well as on the inner side of the main haft part. When assembled and lashed these two haft parts hold the proximal end of the killiaq burin. Faint transverse traces of lashing are seen all along the split part of the haft, and oblique, fine scratches on the distal end made a firm basis for the part of the lashing that squeezed the two shaft parts around the burin base. The killiaq burin shows a 12 mm wide, quite square base which was originally completely encapsulated in the two-sided blade bed of the haft. The burin has – typically for the Saqqaq – finely ground broad sides and has been resharpened several times. The last rejuvenation 'went wrong' as the burin spall twisted and removed part of one of the broad sides. The distal end – 11 mm of the 33 mm long burin – protruded from the haft, making the complete tool 122 mm long in total.

The burin in Fig. 3.63b is almost complete, but the proximal part of the somewhat collapsed wooden (*Populus* sp.) haft is not preserved. Only a small piece was split off the distal part in order to form the two-sided blade bed, but both the main part and the split part show clear transverse lashing traces for holding the burin in position. The burin has ground sides

a.



b.

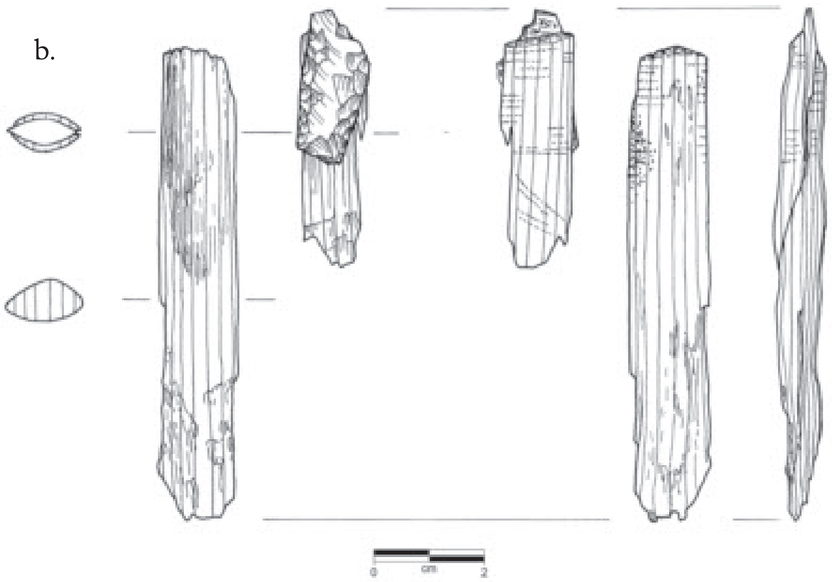


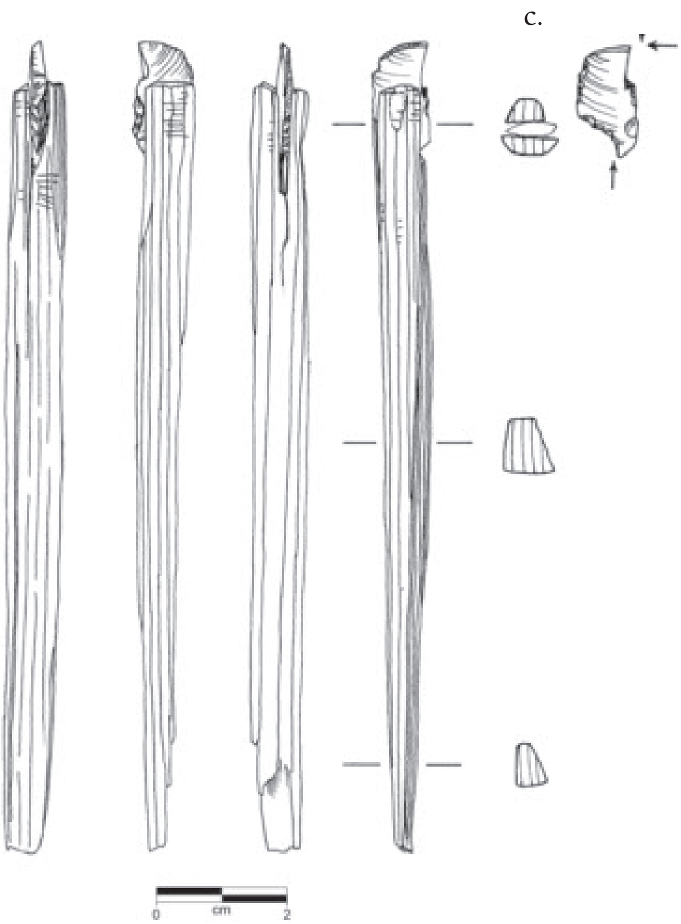
Fig. 3.63
Hafted burins from Qt.
a: *88,0/249,0: 16*
b: *88,5/248,0: 11*

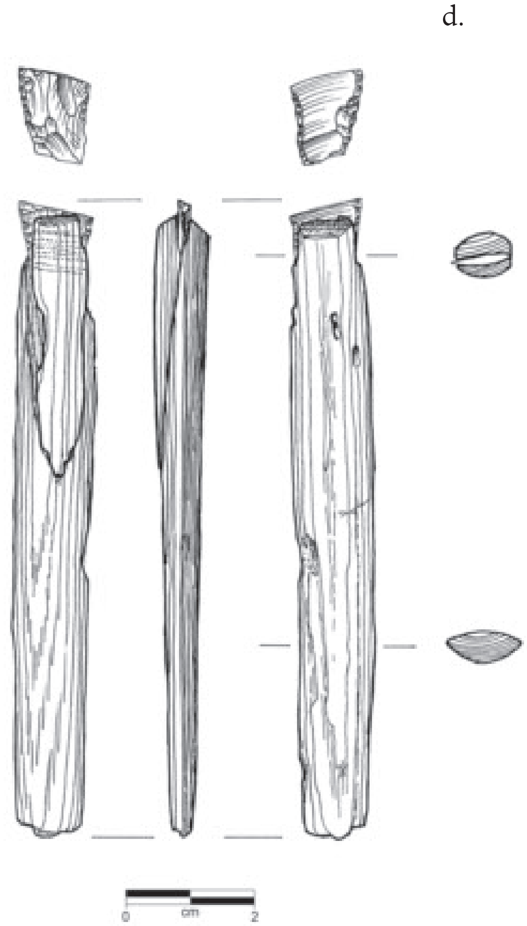
and is of killiaq. It is a little displaced in the blade bed due to secondary impact. The burin is completely exhausted. Several burin flakes have been removed in resharpening and the intensely polished distal end is partly broken off. The width of the burin base, which was hidden in the haft during the entire life circle of the burin, is 13 mm. The surface of the tool is partly scorched.

Fig. 3.63c represents one of the burins which was hafted in makeshift fashion. The haft is an irregular four-sided slender wooden list (*Larix* sp.) split on all sides (cross section maximum: 8 × 6 mm). The haft was split open at the distal end, but remained one piece. Thus no blade bed was cut into the inner sides of the distal haft end. Accordingly, the tiny and exhausted killiaq burin blade was simply wedged into the haft and fastened by a lashing which, judging from the faint traces, covered 25 mm of the distal haft end. The burin protrudes 6 mm from the haft end, making the complete tool 114 mm long. The burin itself (8 × 11 mm) is completely resharpened at both ends, meaning that it was pulled out of the haft, reworked and turned 'upside down' during its life. The final resharpening included the flaking of a tiny burin spall at an oblique angle to the longitudinal axis of the burin.

Fig. 3.63d consists of a complete haft (*Picea*

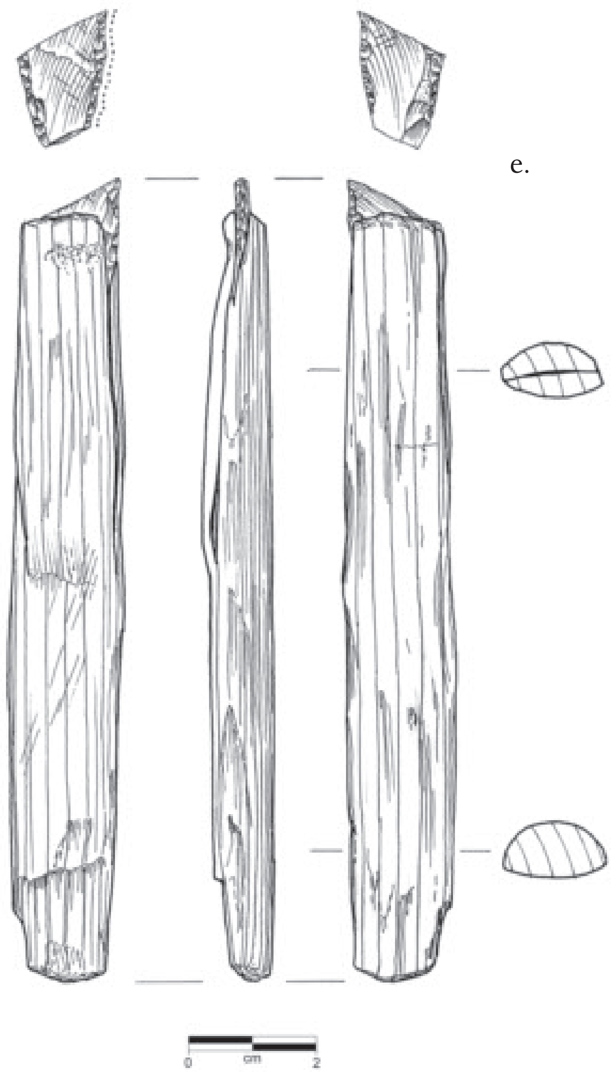
Fig. 3.63
c: *19/20: 123*
d: *19/20: 19*
e: *20/20: 61*





sp.) with a broken killiaq burin sitting in its distal two-sided blade bed. Weak traces of lashing, which originally held the burin base firmly between the two haft parts, are still seen. The slender haft has a flat oval cross section (13 × 6 mm) and it is 96 mm long.

Fig. 3.63e represents a quite large burin. Only the base of the burin blade is left (w: 14 mm), wedged into the split distal end of the haft (*Picea* sp.). No traces of lashing are preserved. The cross section of the 120 mm long shaft shows a convex and a more flattened side (17 × 9 mm), reminiscent in its shape and size of a reused fragment of a rib.



3.3.2.2 Burin hafts (Fig. 3.64)

Fig. 3.64a and Fig. 3.64b represent two meticulously made burin hafts of *Juniperus* sp., which might have originated in one person's tool kit. Both hafts are a little curved, the distal split piece runs about half way down the main haft part, and shallow blade beds are cut on the inner side of the distal shaft components. The proximal end of Fig. 3.64b (total l: 114 mm) is bluntly pointed, whereas it is broad in Fig. 3.64a (total l: 116 mm). They both show fine oblique scratching on the surface of the distal ends, revealing that the lashing covered at least 20–40 mm of the distal end of the hafts. According to the width of the distal haft end Fig. 3.64b could have held burin with a 14–15 mm wide base. The burin of Fig. 3.64a would have been 16 mm wide.

Likewise carefully made is the specimen in Fig. 3.64c. Made from *Picea* sp., it is straight (l: 116 mm), has a rounded proximal end, and a pointed oval cross section (21 × 13 mm). The haft shows a very shallow two-sided distal blade bed. The distal split haft component is quite short, only about one third of the haft length. The distal half of the haft is provided with fine oblique and transversal scratches for the lashing.

19/20: 66 is a quite short haft (l: 111 mm) with a round cross section (diameter: 10 mm). It is deeply split almost in two halves. Imprints of the burin base are seen on both inner sides of the distal split end. The burin was embedded 12 mm in the haft. Traces of lashing are seen on the distal end of the haft in a zone 32 mm broad.

14/23: 90 is a split-off distal component of a carefully made burin haft. Its shape reveals that the main shaft must have been bent just like the hafts of Fig. 3.64a and b described above.

The remaining five burin shafts seem to represent the category of 'expedient tools'. 19/19: 118, 86,5/252,0: 12, and 81,5/261: nn are slender, split pieces (l: 136 mm, 84 mm and 104 mm respectively), where the burin blade was wedged into the distal end, which was subsequently lashed. The last two hafts are possible burin hafts and represent a fragment of a main shaft and a split piece respectively.

a.

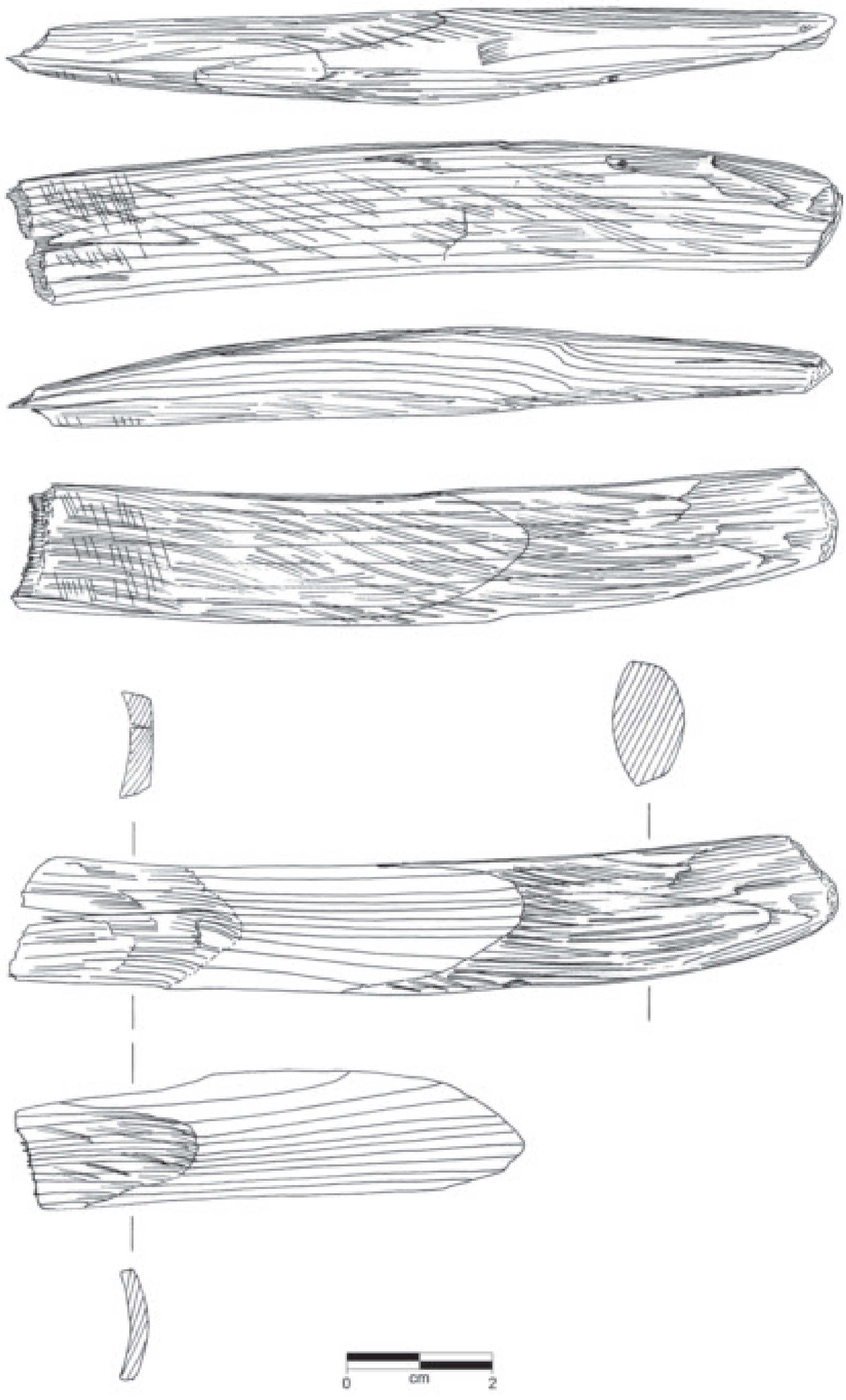
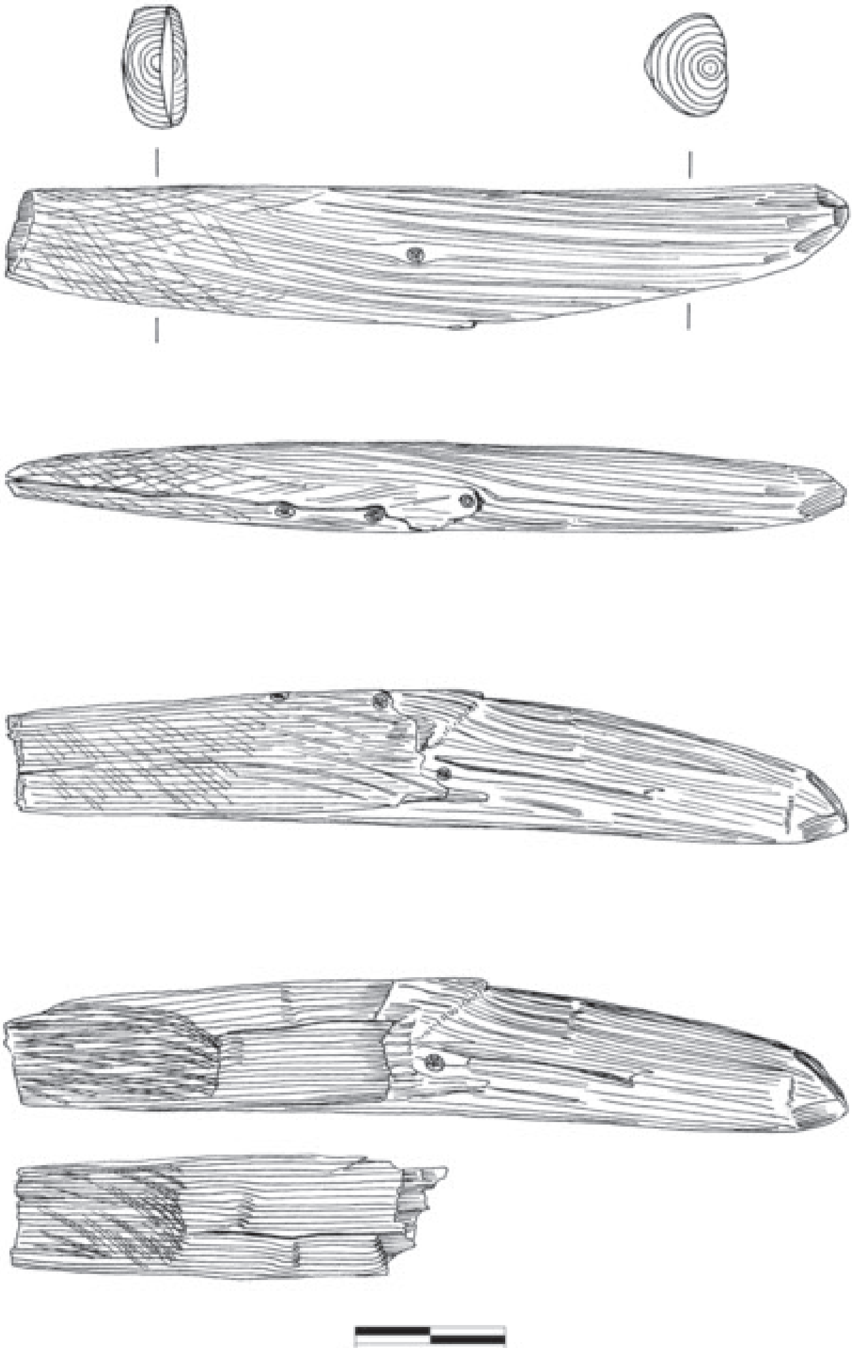


Fig. 3.64
Burin hafts from Qt.
a: *89,0/250,0: 27*
b: *89,0/250,0: 28*

b.



c.

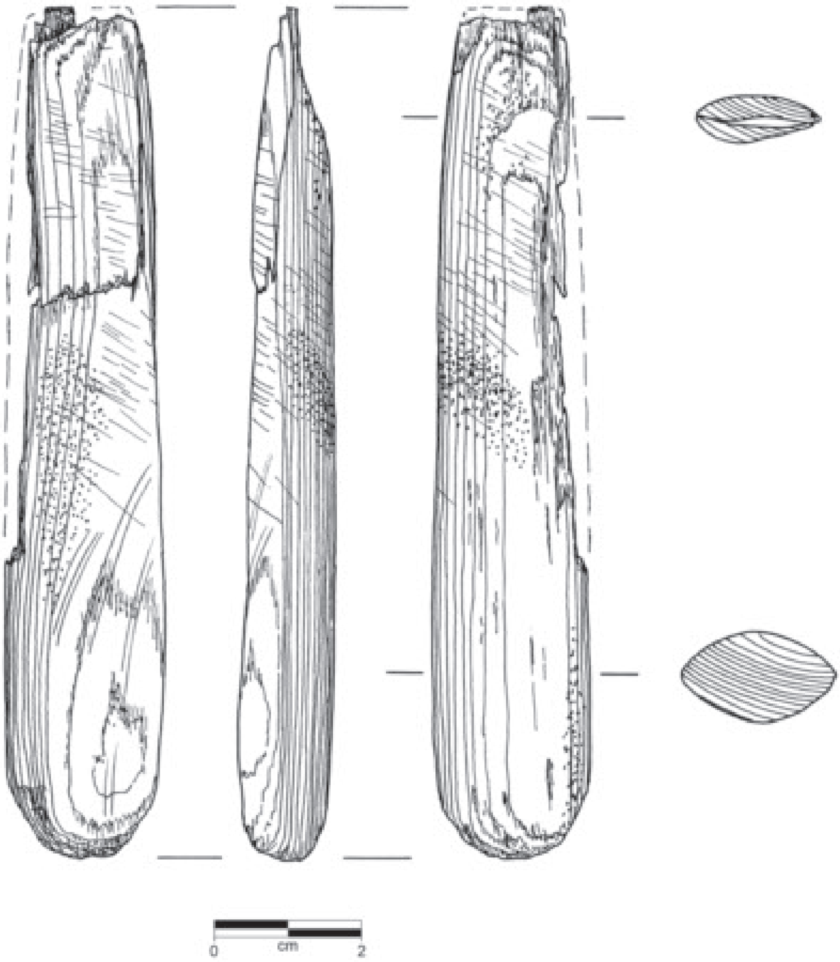


Fig. 3.64
c: *88,5/247,5: 8*

3.3.2.3 Burins and burin spalls (Fig. 3.65)

The comprehensive material of lithic burins holds the potential for typological, metrical and chronological analyses. However, the precondition for making meaningful analyses is an insight into the Saqqaq burin *chaîne opératoire*. Here I will touch upon this and the implications for the typology and metric properties of the burins, whereas the chronological dimensions of the burin will be treated later.

The following analysis is based on detailed investigations of 244 burins found in well-defined stratigraphic contexts in Area C:

Raw material choices: The vast majority of burins are made from killiaq (229 = 94% of all burins), and among these killiaq burins, the homogeneous grey variant is the greatly preferred raw material (77% of all burins). Twelve (= 5%) of the burins are made from different varieties of mcq, and the remainder are made from fine-grained quartz and quartz crystal (3 = 1%).

Steps of the *chaîne opératoire*: The process of making a typical Saqqaq burin began with a regular killiaq flake, which by bifacial pressure-flaking was thinned and shaped into a triangle with two long sides and one short one. The base of the triangle is often concave, and the edges of the long sides were often dulled by light grinding (e.g. Fig. 3.65a – 1 and Fig. 3.65a – 8).

a.

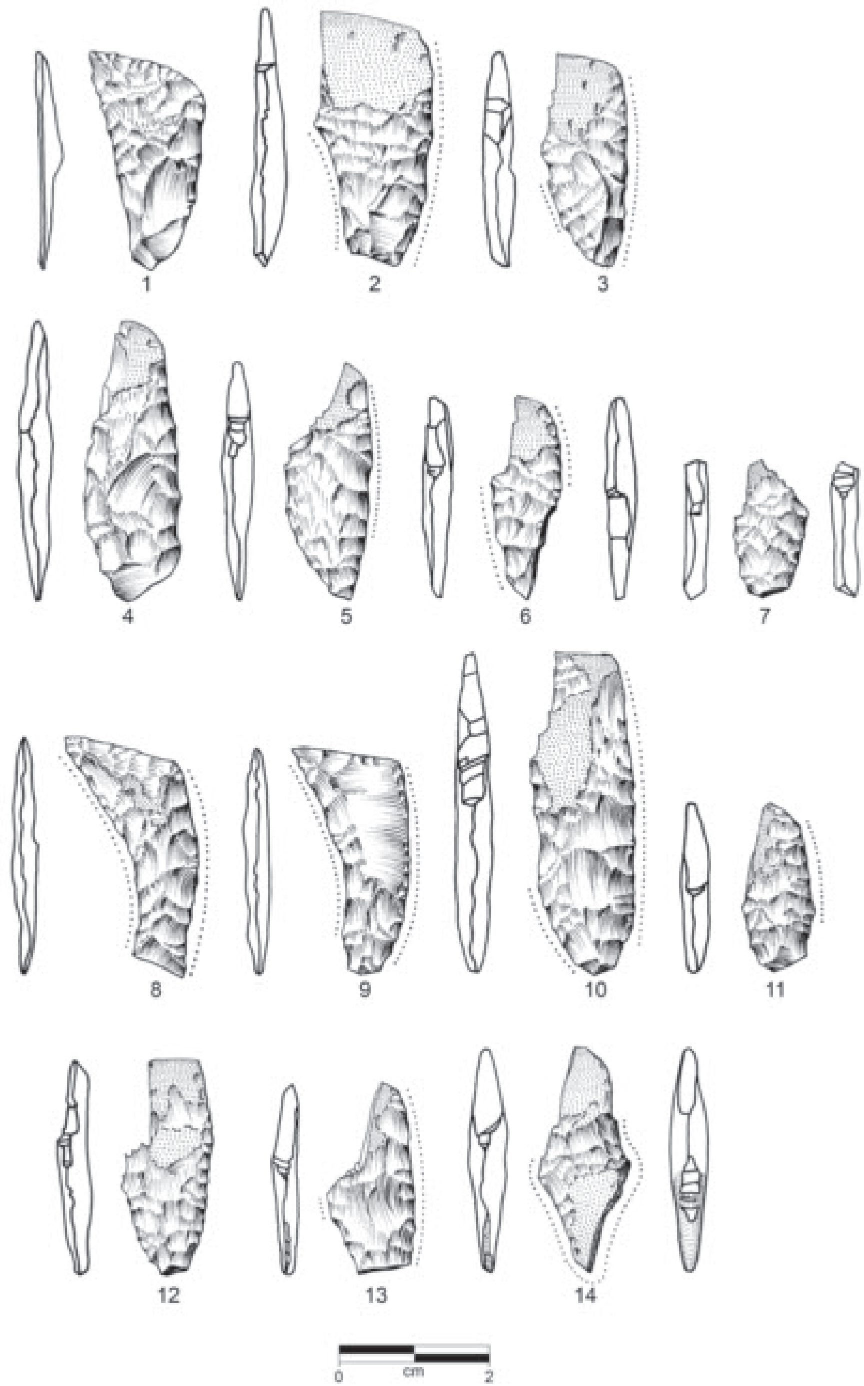


Fig. 3.65
Burins.
a: *1–7: Burins from Horizon 1. 8–11: Burins from Horizon 2. 12–14: Burins from Horizon 3.*

This preform was then further thinned by grinding/polishing of the sides. Pressure-flaking then removed a primary burin spall from the distal corner, and after hafting in a short wooden handle, as described above, the burin was ready for use.

Almost all burins found are the final, discarded result of a long cycle of use and reuse. When the distal corner and the almost square-angled edges along the side resulting from the flaking of a burin spall were worn, a new, millimetre-thin burin spall was pressed off the burin and often the sides were re-polished resulting in a thinning of the entire distal end of the burin (e.g. Fig 3.65a – 2 and Fig. 3.65c – 1). As this process of resharpening was repeated, more and more negatives of hinge fractures formed on the working side of the burin (e.g. Fig. 3.65a – 10 and Fig. 3.65c – 4). The changing angle of the burin spall and the reduced thickness of the body of the burin due to polishing of the sides resulted in ever-shorter burin spalls which left a series of 'steps' (negative imprints of hinge fractures) on a lateral side of the burin. As part of the resharpening process these steps were often removed by bifacial thinning (Fig. 3.65b – 4 and Fig. 3.65b – 6). In combination with frequent polishing of the sides, this resulted in a progressive thinning of the distal burin end during use. Generally five to ten hinge fractures are seen on the burins, indicating that typically the burins were resharpened at least this number of times before being discarded.

The number of burin spalls recovered from activity Area C, a mere 81, in well-defined stratigraphic contexts falls far short of the expected number (1,200–2,400) based on the frequency of burin spall scars. This could of course reflect the fact that only some layers in Area C reflect actual working spaces, and thus that burin work and resharpening took place at a distance from where the exhausted burins were finally discarded. But the main factor is probably that only selected soil samples were sieved in 4 mm mesh sieves during excavation and very few in 1 and 2 mm mesh sieves during the post-treatment.

However, an interesting piece of information can be gathered from the excavated burin spalls from Area C: 18% of the ground burin spalls are primary spalls (triangular cross section) and 82% are secondary resharpening spalls (rectangular cross section). Assuming that the chances of finding primary and secondary spalls in the activity areas of the site are even, this ratio – six secondary spalls for each primary spall – shows an average of six resharpening episodes of each burin. This order of magnitude fits the count of negative hinge fractures from burin spalls on the burin bodies, as mentioned above.

A completely exhausted burin like Fig. 3.65a – 7 is characterized by a very short and thin distal end, sometimes showing resharpening sequences along both edges. The proximal part, originally covered by the haft, is still intact. Such a worn-down lithic burin was pulled out of the blade bed of the haft, discarded and replaced by a new burin. However, in a few cases burins went through a final stage: like one of the hafted specimens described above, some lithic burins were pulled out and turned around, and the former proximal end reworked by pressure-flaking and polishing into an active distal part. Following re-hafting, a new cycle of use, resharpening and side polishing took place before the burin was finally discarded (e.g. Fig. 3.65a – 6).

In conclusion, typological and metric analyses only make sense if this 'life cycle' is taken into consideration (see also Sørensen 2012a: 134). Generally, the only consistent part of the burin is the proximal part 'protected' by the hafting, and accordingly the metric/chronological analyses presented later in this monograph are based on the properties of this part of the tool.

As seen above, a fraction of the Saqqaq burins (15 out of 244 = 6%) were made from mcq and quartz/quartz crystal. They are quite big, irregular and do not show polished sides. A couple of them were made from bifacial 'blanks' but most of them were from large flakes shaped by pressure-flaking of the edges. The resharpening (pressing off burin spalls) was generally done in quite a coarse manner (Fig. 3.65b – 10–12).

b.

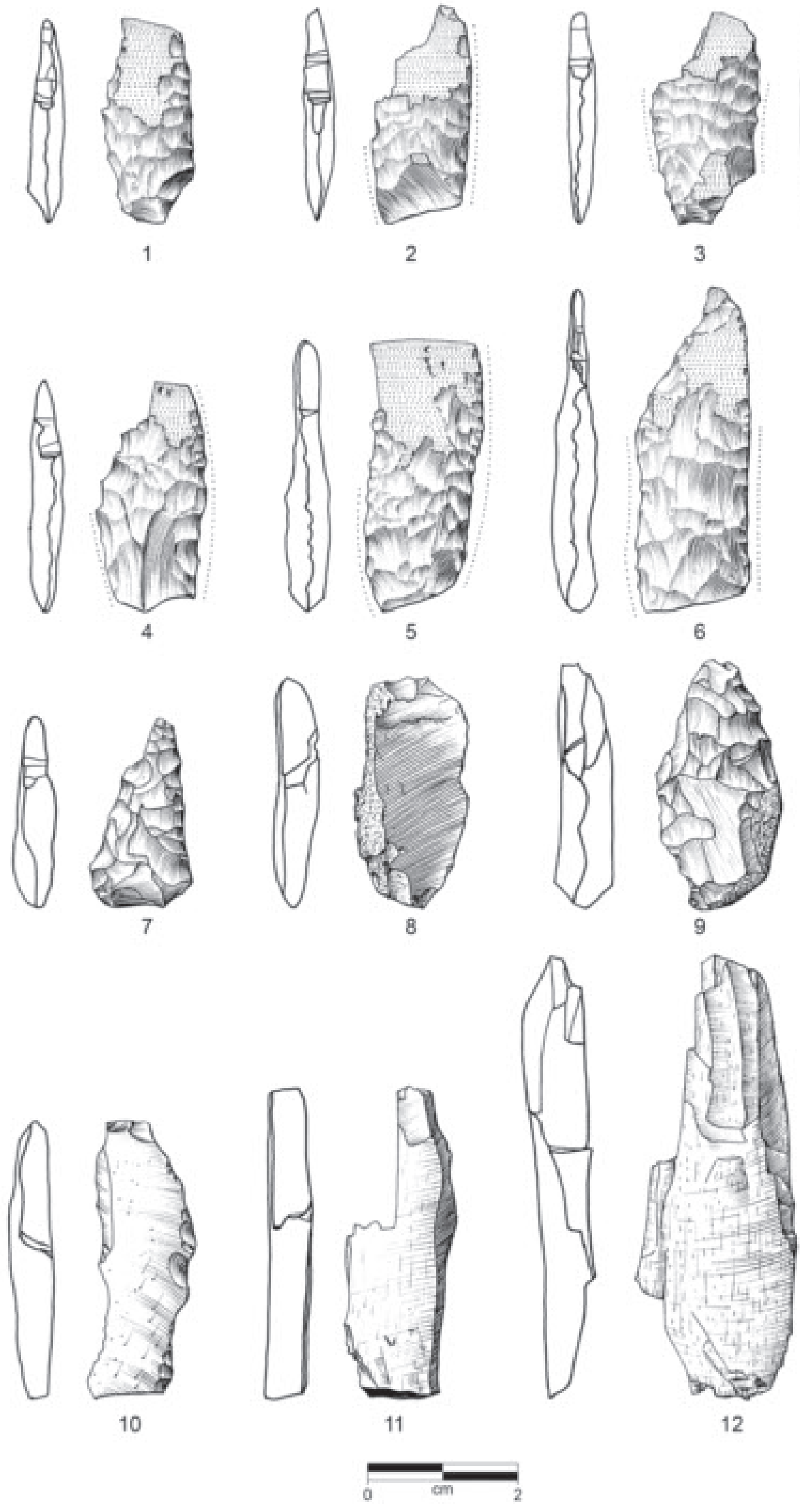


Fig. 3.65
b: *1–12: Burins from Horizon 4.*

c.

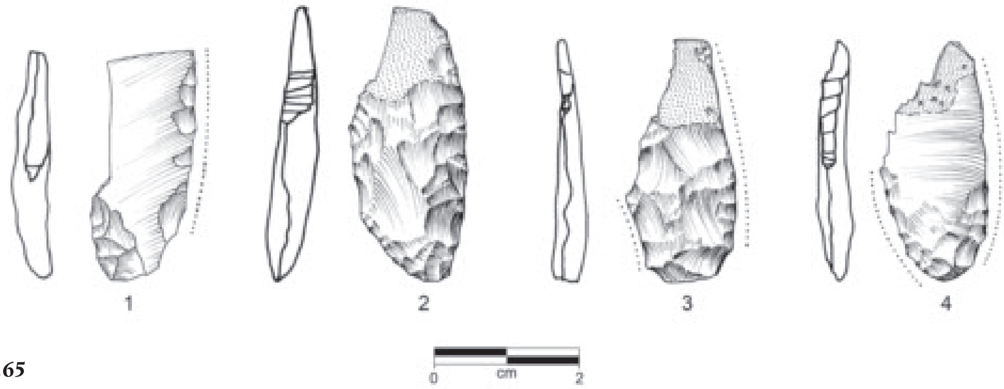


Fig. 3.65
c: *1–4: Burins from Horizon 5.*

The burin was a most important hand tool for working hard, organic materials like antler, whalebone and ivory. In section 3.9.3, the various working traces of burins, and the work processes of organic raw materials where burins were involved, are described.

Finds from Qajaa:
A single, complete hafted burin (Fig. 3.66) from Qa was recovered with the killiaq burin blade still *in situ*. The wooden haft (l: 110 *mm*; w: 14 *mm*) was made from a reused foreshaft or shaft piece from a dart. In the proximal end there are remnants of a scarf originating from this former use. In the distal end the haft is split, but it remains in one piece, and the almost completely exhausted killiaq burin was inserted into the split end of the haft, using a technique quite similar to that seen in the expediently hafted burins at Qt. In the proximal haft end some transverse scratches are seen.

Burins and burin spalls: 26 burin spalls have been collected at Qa; 25 are made of killiaq, one of mcq. One of the burin spalls is a primary spall. Burins are, as at Qt, one of the most frequent tool categories, with a total of 87 specimens. The vast majority were made of grey killiaq (mostly the light grey variety) and just 3% are of mcq. Eight burins are double burins and two are mid-burins

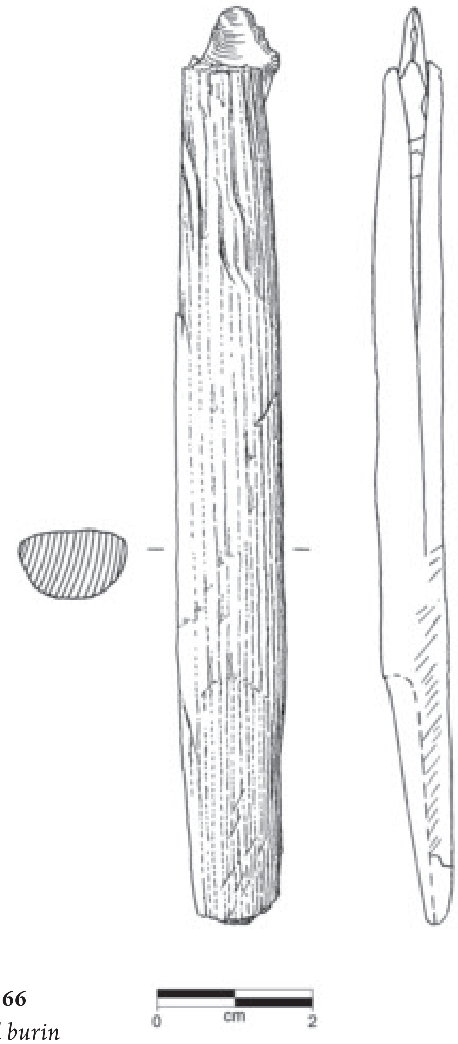


Fig. 3.66
Hafted burin from Qa (F287). (Drawing: PB).

where spalls have been detached from both sides of the flattened polished point. The number of burin spall hinge fractures was counted on 49 burins from Qa. The burins have between zero and 13 burin spall hinge fractures. Four hinges are most common (n = 15), and there is a clear peak of burins with three to five hinge fractures.

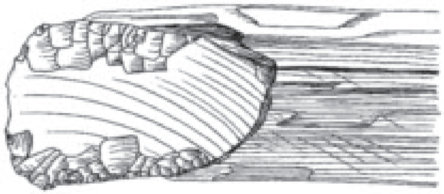
3.3.3 End scrapers

Eighty-two lithic endblades – or 5% of the total number of formal lithic tools at Qt – are classified as end scrapers. In two cases wooden end scraper handles have been recovered, revealing a quite spectacular hafting method. According to a combination of analyses of metric properties and resharpening sequences, it is possible to divide the end scraper blades into five types that probably reflect differences of function.

3.3.3.1 Hafted end scrapers and end scraper hafts (Fig. 3.67)

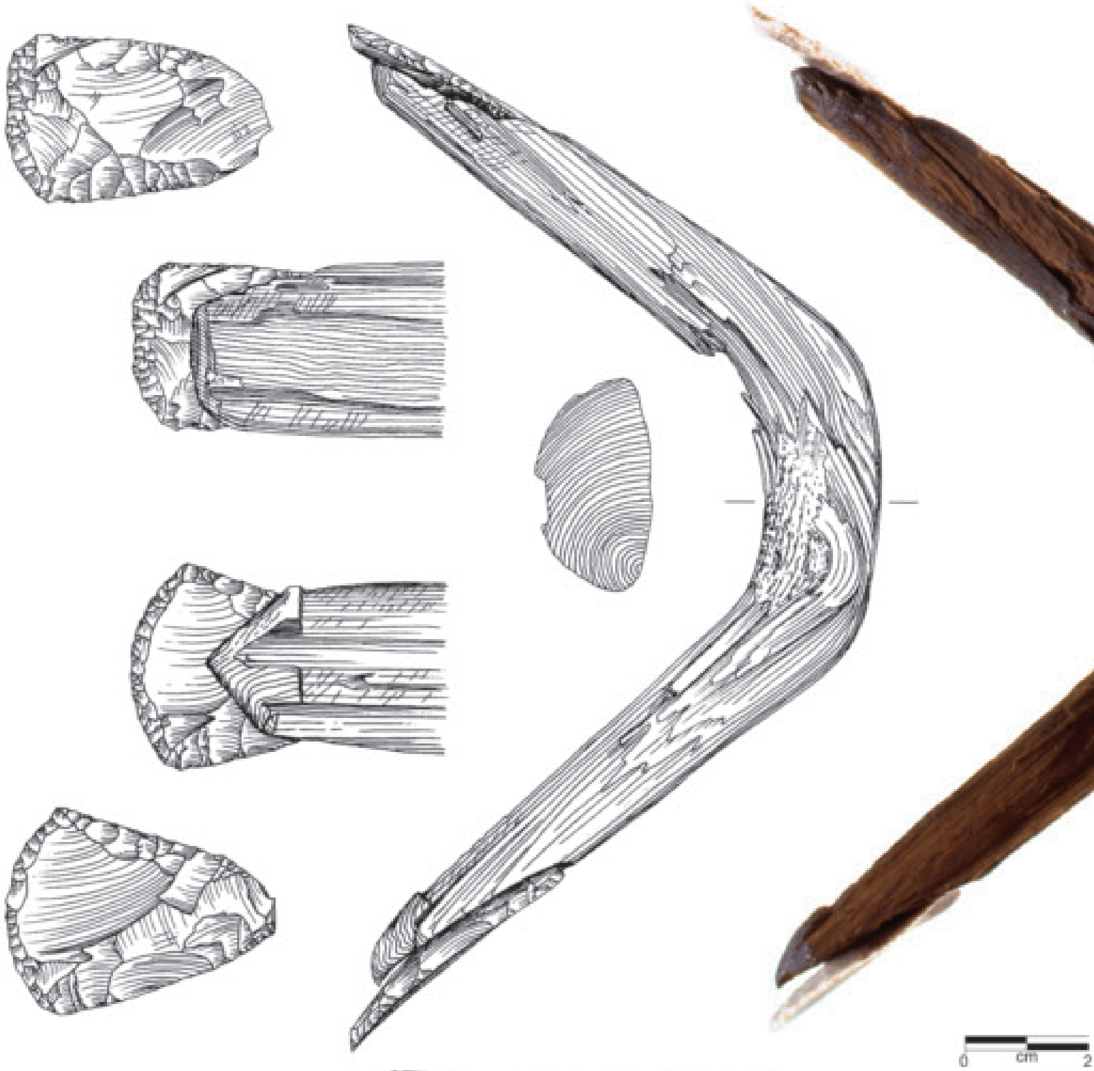
Fig. 3.67a and Fig. 3.67b show a U-shaped haft of *Juniperus* sp. It was made from a root and side-root with dense growth rings – about 50 rings in a cross section of 30 mm. The maker of the haft exploited the original bent shape of the root – as is evident from the natural fine transverse wave pattern on the inner side of the base of the U–handle – in order to design a bent handle with a blade bed on the outer side of the distal end of each 'leg'. The total width of the haft is 150 mm. Dense oblique scratches in a 20–35 mm broad zone around the blade beds made a firm basis for the lashings holding the proximal ends of the scraper blades. One of the distal leg ends is carefully shaped with a flat pointed end and a lowered zone for a countersunk lashing around the blade bed. At each end of the handle a scraper blade was recovered *in situ* (88,5/250,0: 16 and 17) – just fallen out of the blade beds due to the decay of the lashings. Hafted with the ventral side pointing outwards at each end of the handle, these endblades are from opaque mcq and belong to two different types of end scraper (see below). Number 16 is a wide, fan-shaped scraper, 43 mm long and 34 mm wide. Number 17 shows almost parallel side edges and an only slightly convex edge (l: 42 mm; w: 27 mm). The endblades are not exhausted: when mounted in original position, they still protrude 10–15 mm from the blade bed ends, and thus they could have been resharpened by distal edge retouch several more times before they had to be replaced. This complete tool was still functional when deposited at the site. The peculiar shape of the haft shows that a person could easily shift between the two different scraper blades just by turning the haft 180 degrees. Its shape facilitated a firm grip in the palm of a hand with three/four fingers holding the central part of the handle and a thumb supporting the outer side of a 'leg'. Both scraper blades show light basal grinding of the side edges, and they both show macro wear traces on their convex working edges – small fractures seen on the ventral side of the edge – and the working edge on each scraper is dulled by wear. Thus the complete scraper was left in a state where the endblades needed resharpening by retouch in order to be fit for further work. The differing morphology and angles between the side edges of the paired end scraper blades (they belong to types B1 and C, see below) might reflect that they were meant for different tasks during the processing of skin, wood or other organic material.

Fig. 3.67c represents an open U-shaped 'double-end scraper haft' like the one described above. Moreover, it is carved in the same way from a root and a side-root of *Juniperus* sp. with dense growth rings, and it is of about the same size (148 mm wide, and the cross section is 34 mm wide). The distal ends of the two 'legs' are not intact and they are slightly deformed by pressure from the culture layer in which it was embedded. Nevertheless, the ends with the blade beds on the outer side, one of them in particular, seem to have been reworked and reduced on each side to a size which would fit a pair of very small end scraper blades (Type A, see below). The surface of the haft is carefully worked with a fine, serrated edge. Fine oblique scratches mark the lashing zones at the blade beds, and, as the scratches cover the entire length of both legs, it is possible that the haft was originally almost completely



a.

b.



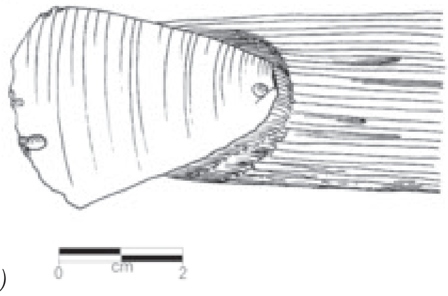
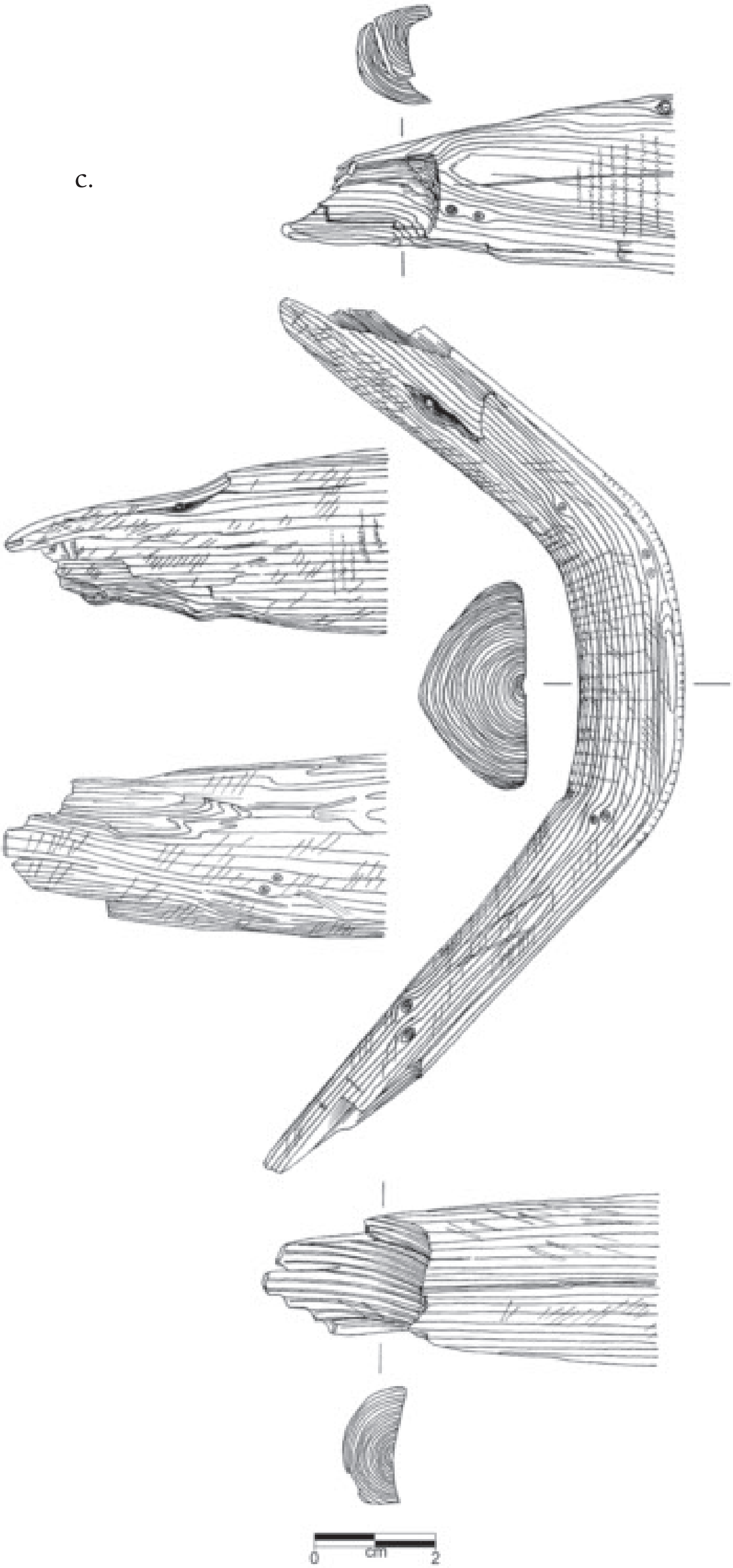


Fig. 3.67
Hafted end scrapers and end scraper hafts.
a: *88,5/250,0: 15 (drawing)*
b: *88,5/250,0: 15 (photo)*
c: *86,5/250,5: 9*

c.



covered by lashing in order to provide a firm grip even when soaked in blubber. At a distance of about a metre from the haft, two small (Type A) end scraper blades of green, opaque mcq were found close by each other (Fig. 3.68a – 1–2). They fit the narrow blade beds, and this 'end scraper pair' could originally have been mounted in the wooden double haft.

3.3.3.2 End scrapers (Fig. 3.68)

The 'typical' end scraper blade is fan shaped and made by means of one-sided pressure-flaking from the ventral side to the dorsal side of a large flake. The proximal (bulb) end of the flake makes up the proximal end of the scraper, whereas the slightly convex working edge is at the distal end of the original flake. This edge is a fine, often steeply retouched edge from the ventral to the dorsal side. The side edges, which show basal grinding, are straight and symmetrically tapering towards the proximal end.

Analysis of raw material preferences shows that 67% of the total number (82) of end scrapers are from killiaq and the remaining 33% from different kinds of mcq. However, these overall percentages cover quite marked variations in raw material preference for the different types of end scrapers. This will be described below.

The typological division into the types A–C (and groups A1, A2, B1, B2) is based on analysis of metric properties and resharpening sequences for end scrapers. To judge by the hafting technology described above, the only edge that was resharpened during the 'lifetime' of an end scraper was the distal, convex working edge. Thus the length of the scraper was reduced during work until the blade became so short that it did not protrude enough from the blade bed to be functional any more. In that exhausted state the scraper blade was discarded and replaced it with a new, longer one. The huge majority of end scrapers found at the site consist of such short, discarded specimens – most of them in their final stage. A few were lost or discarded at earlier stages on their progress from long, fresh specimens, via 'used', to exhausted specimens. As the angle between the two side edges is unchanged, the l/w relation of scrapers at different stages is linear. A simple l/maximum w plot of 50 scrapers is shown in Fig. 3.69. Arrows mark how the measurements of the different types would change if the working edge was further resharpened.

The measurements make it possible to distinguish between three end scraper types. They are characterized by the fact that shortening the scraper (resharpening its edge by retouch) does not change one type into another. There is reason to assume that the functionality of these types differed. However, this cannot be confirmed by the limited amount of analysis of micro wear traces in a pilot project carried out under this study (see below).

Type A represents the smallest end scrapers (12 mm $< w <$ 21 mm and 20 mm $< l <$ 28 mm) (Fig. 3.68a). These nine specimens were clearly made for hafting in very short and narrow blade beds, like that of the wooden scraper handle, Fig. 3.67c, described above. Even if a few of the Group B2 end scrapers could theoretically be reduced to a Type A, it is not likely due to the thickness of the bulb end of the B2 scrapers and the clear gap between the Type A and Type B clusters in the l/w plot. The nine Type A specimens divide into a cluster of three very short but wide, 'fan-shaped' scrapers (Group A1) (Fig. 3.68a – 1–2) and a cluster of six which are a little longer, but the narrowest in the assemblage (Group A2) (Fig. 3.68a – 3–4). The preferred raw material for these, the smallest end scrapers, is mcq (80%) of many colours – red-brown, grey, green. Only 20% are from killiaq.

Type B: The end product of a Type B end scraper is a medium-sized scraper blade (18 mm $< w <$ 31 mm and 25 mm $< l <$ 40 mm) (Fig. 3.68b). *Unreduced* specimens of Type B reach lengths of 52 mm. They divide into two clusters: Groups B1 and B2.

With 26 specimens (52% of the total number of analysed scrapers), Group B1 is the most common end scraper at Qt (Fig. 3.68b – 1–6). It is a broad, often fan-shaped scraper. The reduction lines show that the marked cluster of about 15 B1 scrapers represents the end product of specimens that probably started out as

a.

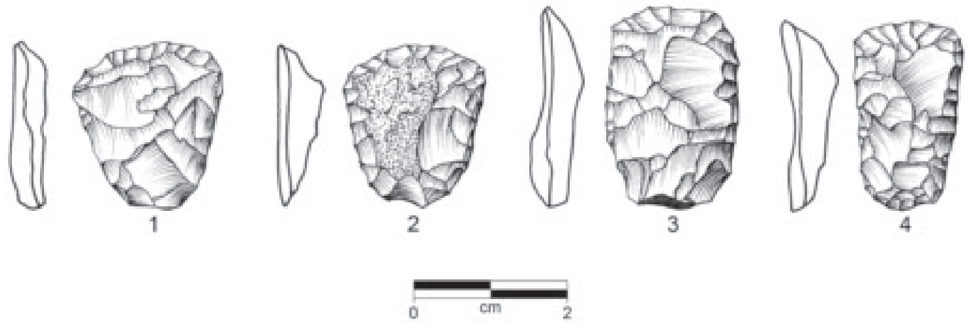


Fig. 3.68
End scrapers.
a: *Type A (Group A1 (1–2); Group A2 (3–4)).*

very long ones (42–52 mm). Nine are preserved at these earlier stages of use. Group B1 scrapers fit nicely into the blade beds of the scraper handle illustrated in Fig. 3.67a and described above. The specimen found at the one blade bed of this handle (# 17) is in fact an only moderately resharpened B1 scraper. Obviously, most of the B1 scrapers had reached the minimum length to be held in a blade bed like this, 25–35 mm, when they were pulled out of the blade bed and subsequently discarded.

The cluster of nine Group B2 scrapers represents characteristic long, quite narrow, mid-sized end scrapers (Fig. 3.68b – 7–9). They were probably reduced to their present state from a length of about 46 mm, as the longest of the B2 scrapers indicate.

The angles between the side edges of the B1 and B2 scrapers are different. The fan-shaped B1 scrapers show an average angle of 30°, whereas the side angle of the narrow B2 scrapers is only 15° on average. In contrast to the Type A scrapers, about 70% of the Type B scrapers are made from killiaq and 30% of different sorts of mcq.

Type C represents large – long and very broad – end scrapers (31 mm < w and 28 mm < l < 55 mm) (Fig. 3.68c). Even if they were reduced in length through resharpening they would not end up in the cluster of exhausted Type B scrapers. Type C comprises seven large scrapers of which two are of mcq and the remaining five of killiaq. Generally, the Type C scrapers show quite steeply retouched and almost straight working edges, but the hafted specimen (88,5/250,0: 16) with its regular convex edge is an exception to the rule.

A pilot project (Skriver 2002) aimed at identifying use wear of the edges of six end scrapers of killiaq and nine of mcq showed that killiaq was not well suited for analysis by means of the HPA method (microscopy of cleaned edges by reflective light and magnifications of 100X and 200X), whereas identifiable traces – based on experiments with scrapers of flint – were found on three of the end scrapers of mcq.

The end scrapers 85/250: 47 (Type C) and 85/254: 6 (not classified) show heavy polish at the distal convex edge resembling polish from skin working. End scraper 82/250: 114 (Group B1) shows polish which is identical to traces on scrapers of flint that have been used for working bone. It must be added that all organic matter that was mechanically cleaned off each of the end scrapers was kept separately for future analysis.

b.

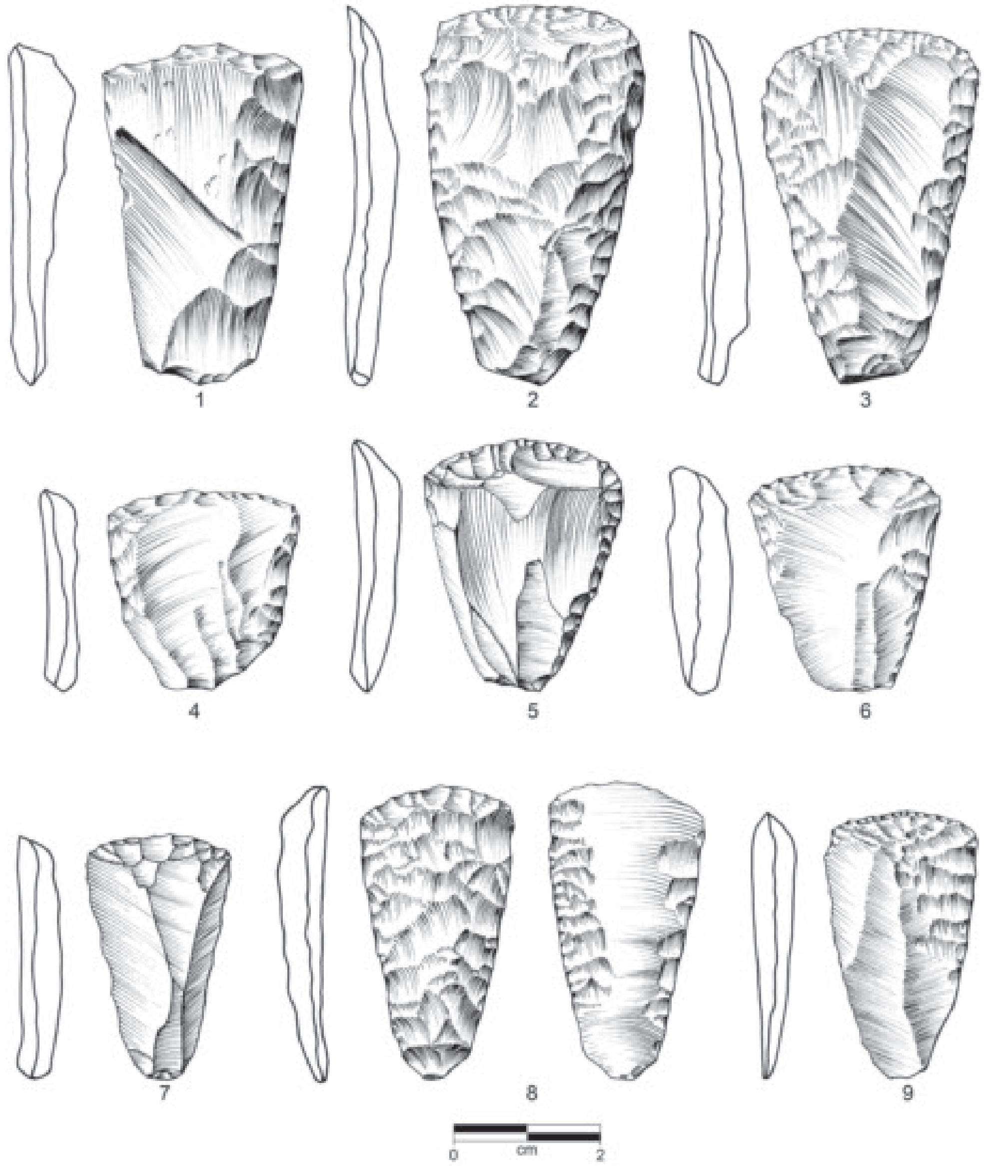
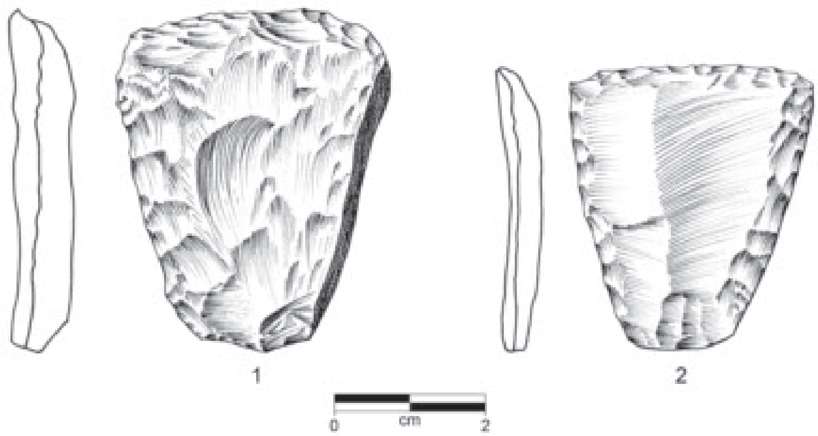


Fig. 3.68
End scrapers.
b: *Type B (Group B1 (1–6); Group B2 (7–9)).*
c: *Type C (1–2).*

c.



Finds from Qajaa:

Twenty-five scrapers are from a Saqqaq context or of well-defined Saqqaq type. Eleven of these (32%) are of mcq, the remainder of killiaq. As seen from the scatter plot, Fig. 3.69, the l/w measurements of the end scrapers from Qa fall in the same clusters as the ones from Qt.

3.3.4 Side scrapers

Side scrapers at Qt number 113 specimens, i.e. 5% of the formal lithic tool collection. This makes side scrapers the fourth most common hand tool at the site. Only one typical specimen has been recovered along with its original wooden haft, which shows a quite characteristic haft design.

3.3.4.1 Hafted side scraper (Fig. 3.70)

Fig. 3.70 shows a complete side scraper. The haft is made from *Picea* sp. with relatively dense year rings (26 in a cross section of 24 mm at the mid point of the haft). The haft is quite short (99 mm) and has a characteristic flat oval cross section. The proximal end is flat and rounded. The distal end shows an oblique blade bed with fine scratches on the slightly concave inner side. Fine oblique scratches were made on the outside of the distal blade bed, as well as a basis for a now decayed lashing covering a 25 mm long lowered zone. In the blade bed there is a clear imprint of the dorsal side of the tapering base of the side scraper blade. The surface of the haft is smooth – probably as a result of use.

The side scraper blade is made from very high quality killiaq. Its concave working edge is only slightly resharpened if at all. The total length of the scraper blade is 52 mm and the maximum width of the base is 22 mm. This is a Type B side scraper (see below). It shows basal grinding on both side edges to avoid cutting of the lashing. Moreover, clear macro use wear traces are seen at the ventral side of the concave working edge as light striations perpendicular to the direction of the edge. Probably light coloured transverse striations on both the dorsal and ventral broad sides of the distal end represent use wear as well. These are clear indications of scraping or planing in a perpendicular direction to the sides of the tool. The total length of the tool with the side scraper blade in its original position is 126 mm. This side scraper was left at the site in a complete and functional state. The scraper blade's distal working edges (both the concave and the convex) could have been resharpened several times before it was exhausted.

3.3.4.2 Side scrapers (Fig. 3.71)
Like end scrapers, side scrapers were made from long flakes, which were shaped by one-sided retouch from ventral to dorsal side along the distal side edges and bifacial flaking of the proximal end, which most often is the bulb end of the flake. Basal grinding of the edges of the proximal end is typical and often the light grinding continues all along the edge opposite the concave working edge. Most of the larger side scrapers are made from killiaq, but, as seen below, different raw materials are preferred for different (functional) types.

Fresh side scrapers, of which there are few in the assemblage, show a broad distal end and only a slightly concave or even straight working edge along the right side (dorsal side up, basal end down) (Fig. 3.71a–4, 8 and 9). On a few pieces the working edge is placed on the left side. During use the side scraper is resharpened by retouch along the working edge, and this makes the edge increasingly more concave and steep and the distal end a bit shorter step by step. In its last stage the side scraper shows a thin, almost pointed distal 'beak' on its left distal side. In rare cases the scraper blade was turned upside down in the haft

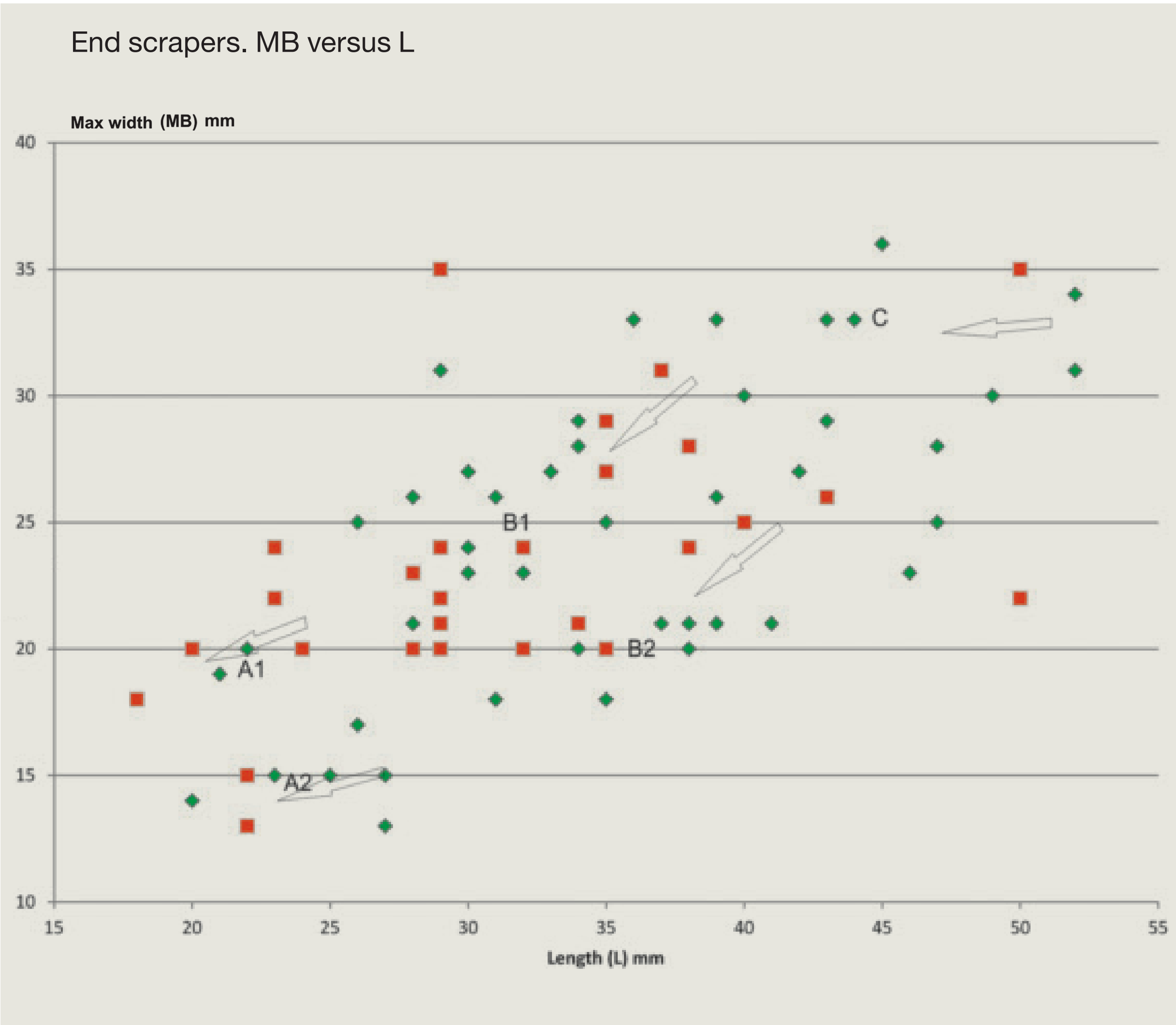


Fig. 3.69 *Maximum width/length relations of end scrapers from Qt (green) and Qa (red). Arrows indicate the lines along which the different types of end scrapers would move as a result of further resharpening of their distal edge.*

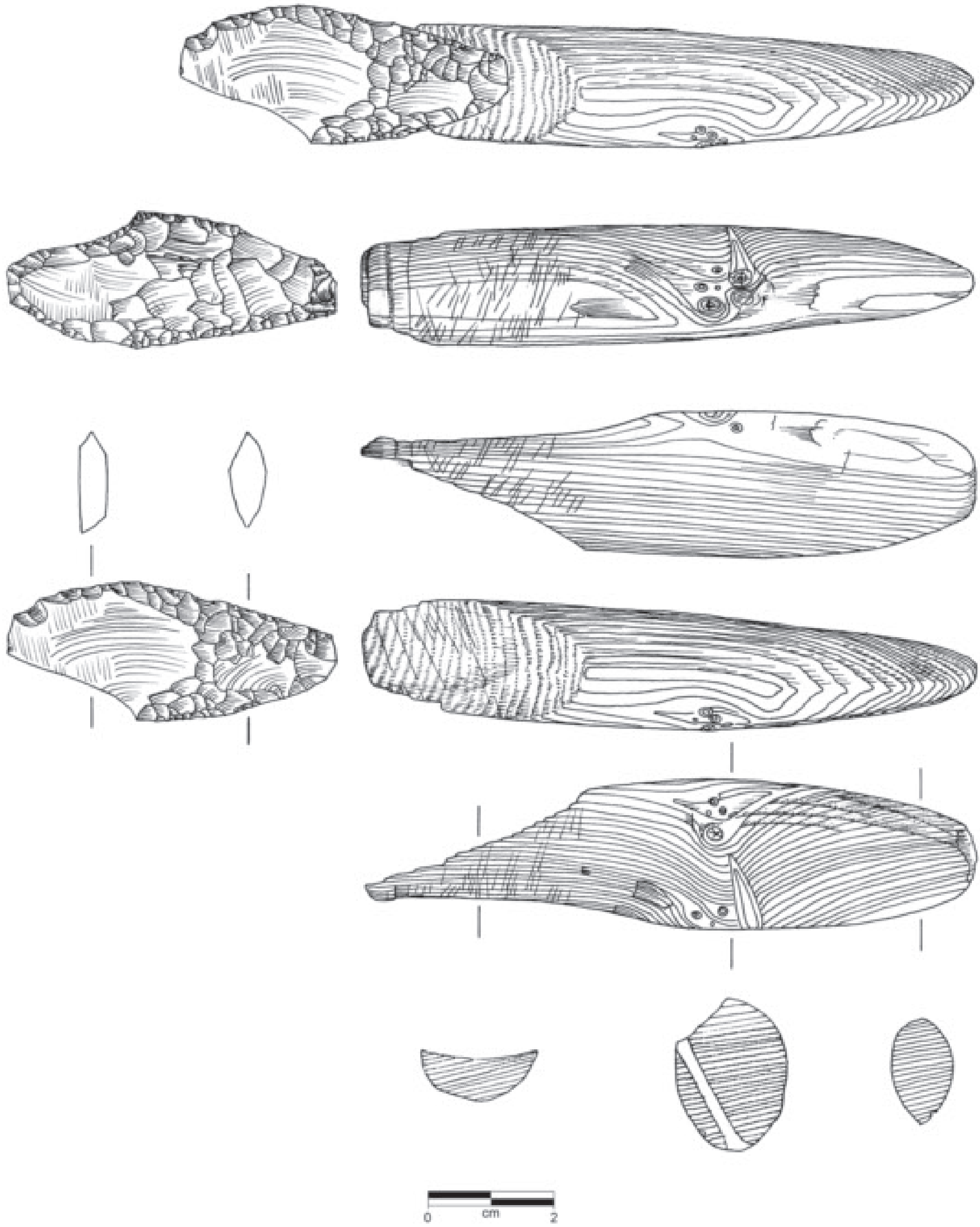


Fig. 3.70
Hafted side scraper (19/20: 131).

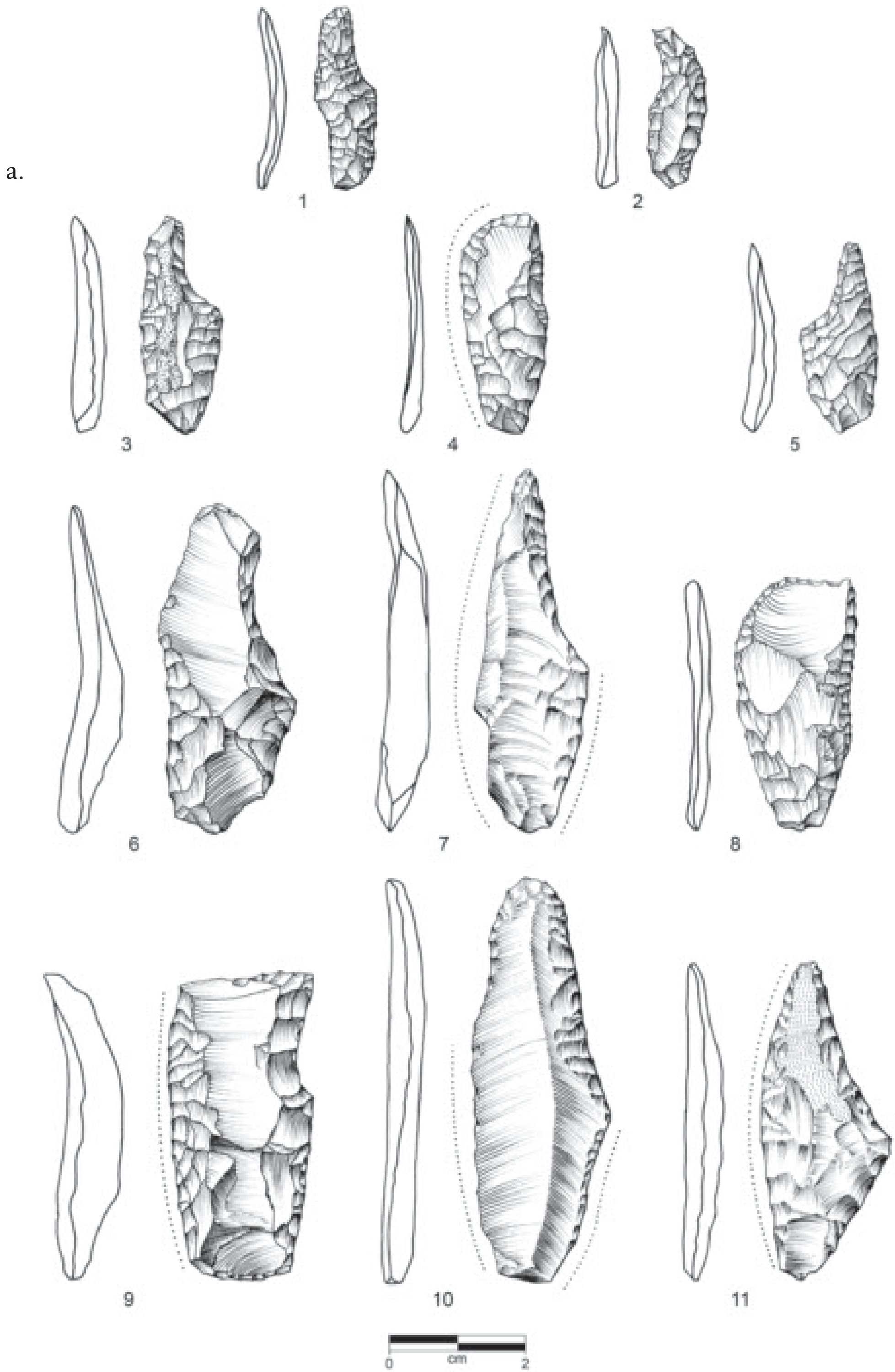


Fig. 3.71
Side scrapers.
a: *Type A (1–5); Type B (6–11).*
b: *Type C.*

so that the former basal end was reworked and provided with a concave working edge, resulting in an almost S-shaped side scraper.

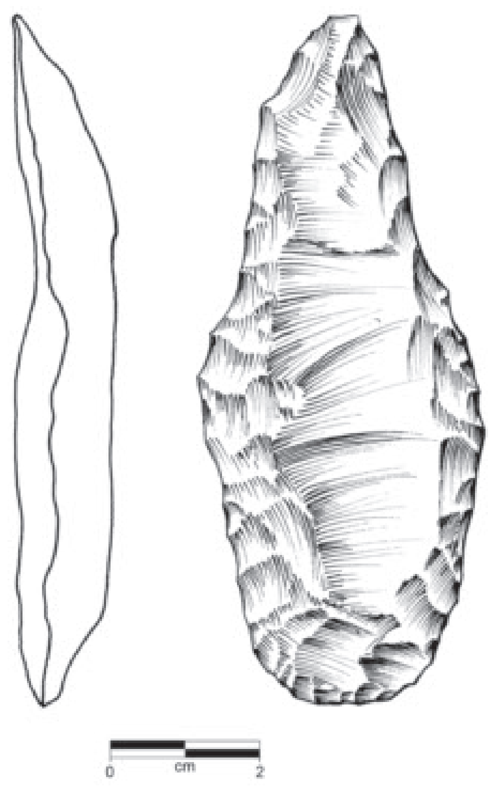
As seen above, the only part of the side scraper that was generally not influenced by the resharpening process is the proximal end, as it was covered by the lashing and the blade bed of the haft. Metric analysis of 81 side scrapers with intact basal ends, combined with data on raw material preferences, provides the starting point for a division into three types of side scraper that might reflect different functions. The types are primarily defined by the maximum width of the basal end (Fig. 3.72a and Fig. 3.72b):

Type A represents the smallest side scrapers (Fig. 3.71a – 1–5). Their maximum basal end width (wb) is 9 mm < wb < 14 mm. Their basal end length (lb) is 11 mm < lb < 19 mm. On a simple plot of lb/wb the A scrapers clearly cluster at the lower values of both axes. Twenty Type A side scrapers (90%) are of mcq of every available colour and extremely carefully made, and only two (9%) are of killiaq.

Type B, comprising 56 specimens, represents the common 'medium-sized' side scrapers (Fig. 3.71a – 6–11). The cluster of Type B scrapers shows the following properties in the lb/wb plot: 15 mm < wb < 23 mm and 15 mm < lb < 31 mm. Thus, for wb there is no overlap with the Type A side scrapers, whereas lb shows overlap in the zone 15 mm < lb < 19 mm. A cluster of four Type B scrapers with very long basal ends represents the largest side scrapers on the site. In contrast to Type A, the preferred raw material for Type B is killiaq (50 specimens or 89%). Mcq was only used in six cases (11%).

Type C: Three outliers of very large, quite coarsely made side scrapers are seen on the lb/wb plot (Figs. 3.71b, 3.72a and 3.72b). They are so large that they could have been held in the hand and used as expedient tools without any hafting. One of them is of grey, opaque mcq while the other two are of killiaq.

b.



Finds from Qajaa:
Twenty-seven side scrapers are from the Saqqaq layers at Qa: 12 are made of mcq, 2 of crystal quartz and 13 of killiaq. Measurements of basal widths of the side scrapers from Qa show that they tend to group like the side scrapers from Qt except that there is no 'peak' around 16 mm in the Qa material (Fig. 3.72b). The dominating raw material among the smaller specimens is mcq, whereas the larger (wider) ones are most often made of killiaq.

3.3.5 Saws (Fig. 3.73)

Whereas several flakes with finely serrated edges (see 3.3.9 below) are included in the Qt collection, few formal tools for sawing have been found: ten specimens or 0.5% of the formal lithic tool inventory. All except one is of killiaq. Five are totally or partially polished on both broad sides and with ground regular sawing teeth along one edge. One of them seems to be a rare case of reuse: a bifacial knife blade was turned into a saw blade

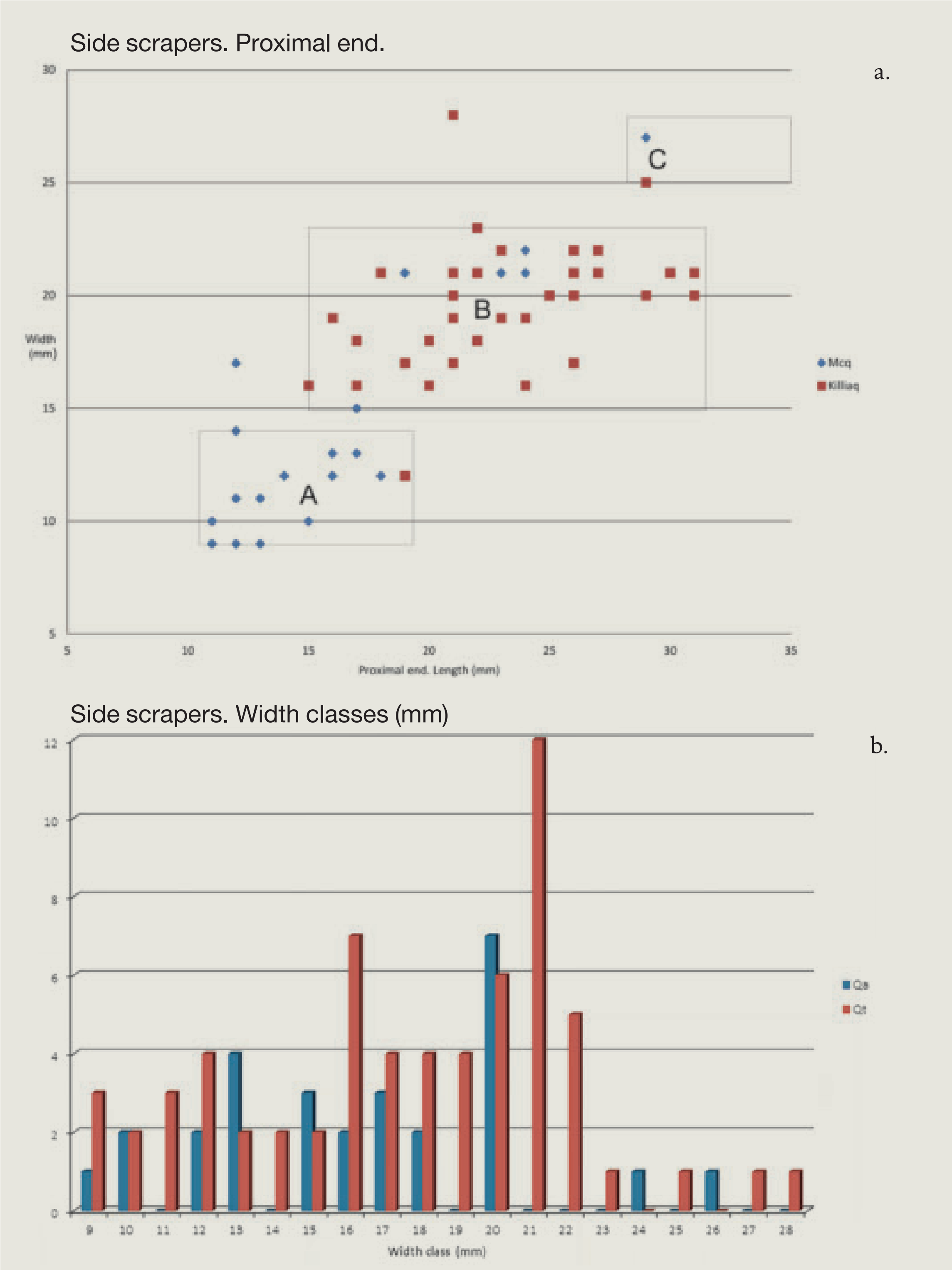
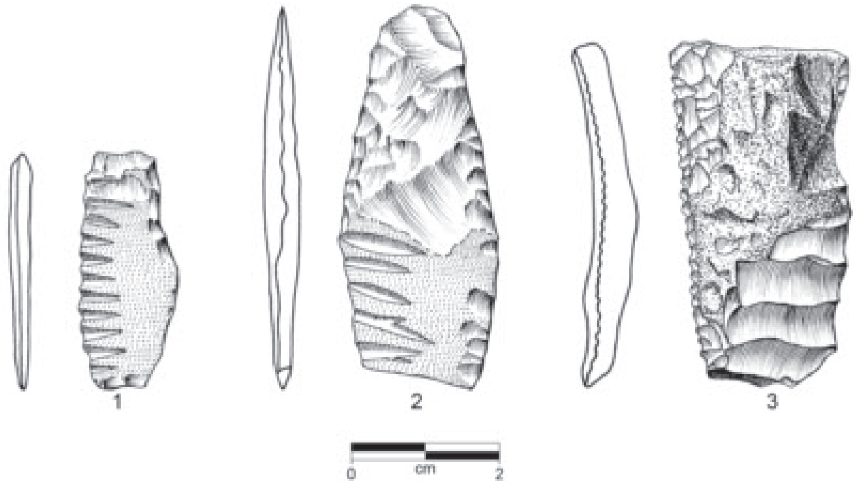


Fig. 3.72
Metric properties of the proximal end of side scrapers.
a: *Width plotted against length of 81 side scrapers from Qt. The division into Types A–C is shown by frames around clusters. Blue: side scrapers of mcq. Red: side scrapers of killiaq.*
b: *Width classes of proximal end of 121 side scrapers from Qt (red) and Qa (blue).*

Fig 3.73
Saws. 1 and 2 are of killiaq; 3 is of mcq.



showing total polishing of the distal part (Fig. 3.73 – 2). Four formal saws show regular serration along one edge made by retouching with a pointed flint flaker from one side. Fig. 3.73 – 3, which was made from a large flake of transparent, glass-like mcq, is an example of this. A single specimen shows saw teeth made by two-sided retouching. Sawing could also be carried out by means of simple flakes with serrated edges. This will be discussed later.

Finds from Qajaa:
Just two saws are identified among the lithic artefacts from Qa. Both are fragmentary and of grey killiaq. One is a distal fragment 23 mm long, polished on both sides with sawing teeth of very fine parallel grooves. The other specimen is a proximal fragment of a biface produced on a reworked saw blade.

3.3.6 Drills

3.3.6.1 Drill points (Fig. 3.74)

Twelve specimens (0.6%) are classified as drills. Of these, five are characteristic fully polished 'bodkin-like' drill points of killiaq with round, oval or angular cross sections (Fig. 3.74 – 2–4). The proximal end is preserved on two of these drill points. The cross section of this end is almost rectangular, probably in order to prevent turning in the shaft. These drills are tiny and very carefully made with cross sections of only 3–4 mm. The two intact ones are probably exhausted. They are both 40 mm long.

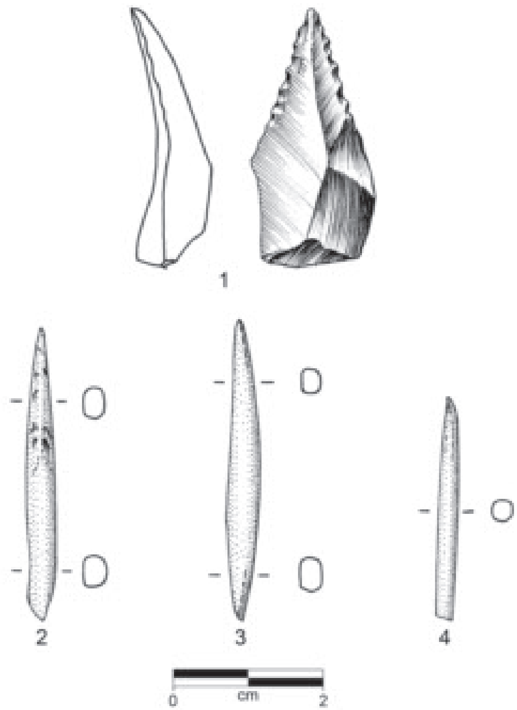


Fig. 3.74
Drills. 1: Flake drill. 2–4: 'bodkin-like' drills of killiaq.

Four drills consist of points made on flakes. Fig. 3.74 – 1 is an example of these, probably hand-held, expedient tools. One is made from a former adze. Finally, two specimens are fragments of atypical drills.

Finds from Qajaa:
Only a single drill point of polished killiaq was found at Qa.

3.3.6.2 Drill shafts (?) (Fig. 3.75)

Four specimens are probably distal end fragments of shafts for the characteristic slender, polished drill 'bits' described above. Fig. 3.75 – 1–3 are slender, well-made shafts with round cross sections (diameter: 7–10 mm). All except the last are provided with a tiny hole (diameter: 1–2 mm) in the centre of a flat end and show a 6–15 mm broad scratched zone for a lashing around the distal end. The flat ends have clearly been exposed to wear and heavy blows and they have formed a sort of tiny 'rim' at the edge in front of the distal end of the lashing. The proximal end of a drill bit would fit nicely into the hole at the end of these round shafts. Fig. 3.75 – 3 shows an alternative hafting. Here the point would have been mounted in a slot cut into the tapering distal end of the shaft. Two of these shafts, which indicate the use of bow drills, have been determined as being made from *Picea* sp. and one from *Larix* sp.

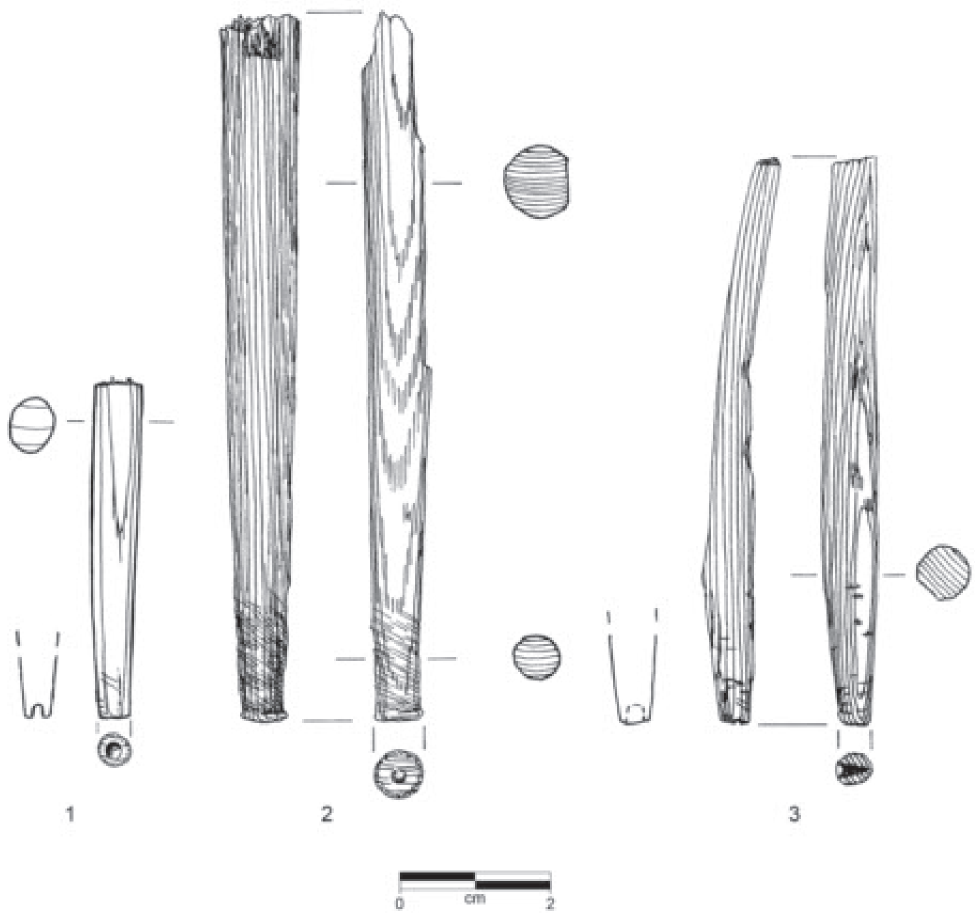


Fig. 3.75
Drill shafts (?).
1: 13/24: 39
2: 14/24: 69
3: 11/23: 60

3.3.7 Microblades and cores

With 156 specimens (7.2% of total number of lithic artefacts) microblades and microblade fragments form quite a large part of the assemblage. Three hafted specimens show that microblades served a number of different purposes, and analysis of raw material preferences and metric properties reveals significant patterns.

3.3.7.1 Hafted microblades (Fig. 3.76)

Fig. 3.76a is a small, irregular microblade mounted in a blade bed at the end of a wooden haft. The lashing holding the blade is preserved. The haft consists of a thin and short piece of driftwood (*Picea* sp.) (l: 58 mm; w: 5 mm) with an irregular, four-sided cross section. It shows split facets on three sides, whereas a single side is a longitudinal cut facet. The distal end of the haft is polished, probably through wear. The lashing consists of a thin, flat string of baleen, which is wound three or four times around the blade bed and the end of the microblade. The ends of the lashing string have loosened, but the knot holding the blade seems to be a clove hitch with extra turns. The quartz crystal microblade (l: 15 mm; w: 5 mm) is turned 'upside down', so that its distal end is placed in the blade bed. The bulb end of the microblade protrudes about 9 mm from the haft, making the total length of the tool 67 mm. The bulb is snapped off, and three tiny 'burin blows' have removed one of the lateral edges, thereby making an almost perpendicular corner.

a.

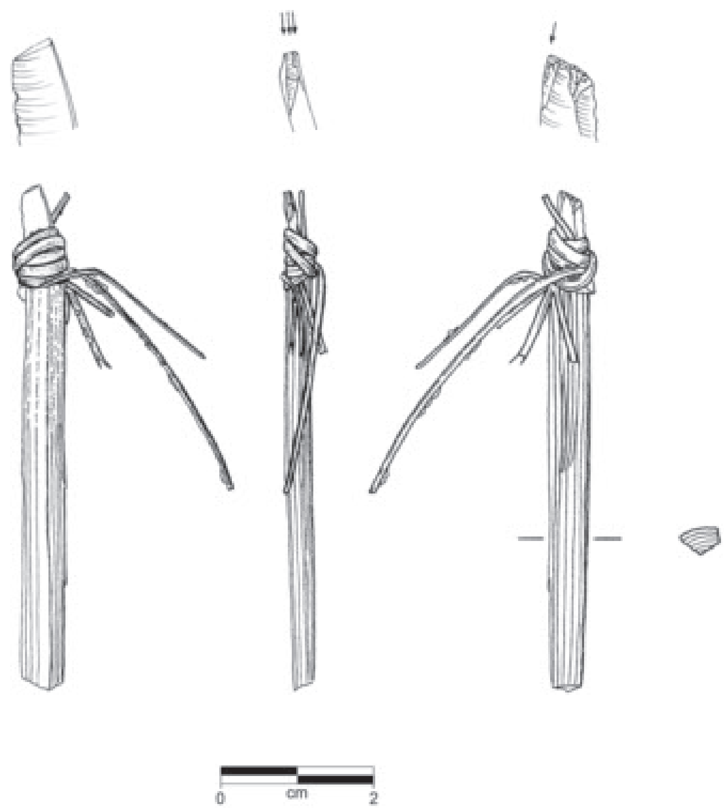


Fig. 3.76
Hafted microblades.
a: *19/19: 79*

The opposite edge is sharp. Tiny crushing marks at the broken end are probably usage wear, and the function of the tool might have been that of a tiny burin rather than a cutting tool. The haft is certainly not curated and the tool as a whole seems quite expediently made.

Fig. 3.76b is a mid-section of a microblade hafted in a small, well-made wooden haft (*Picea* sp.). The haft (l: 101 mm) has a flat cross section (10 mm × 5 mm), except for the 35 mm long proximal end with a rounded cross section. The mid-part of the haft has a light coloured surface and the entire haft is worn (polished). The distal blade bed show imprints of the ventral side of the blade and faint traces of scratching or lashing on the outer side. The beige-coloured quartzite microblade is a short mid-section of a blade (l: 11 mm; w: 9 mm), which show hinge fractures at both ends and characteristic retouched edges (retouched from opposite sides). The small preserved part of the microblade is the part that was left under the lashing when the distal end of the blade snapped during its use as a scraper or hone.

The haft and microblade in Fig. 3.76c (19/19: 32 (haft) and 33 (microblade)) were found a few centimetres from each other. They probably

b.

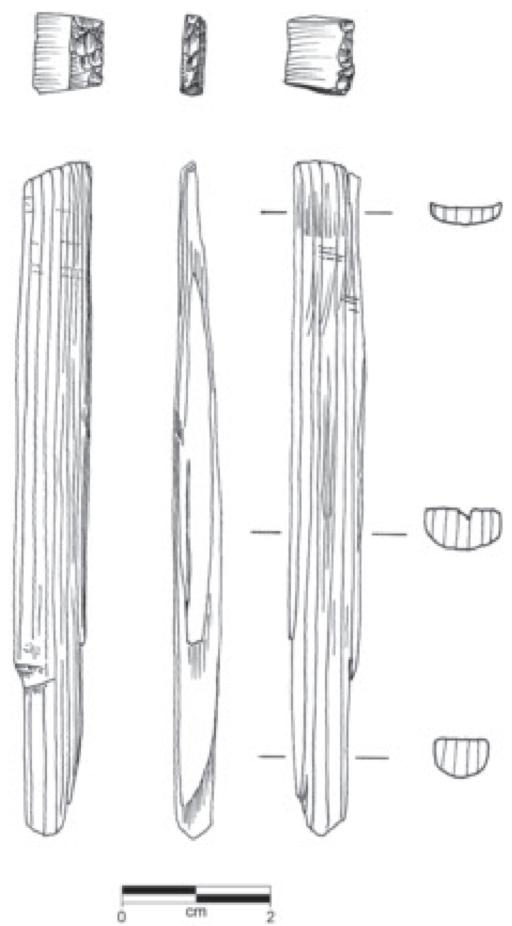
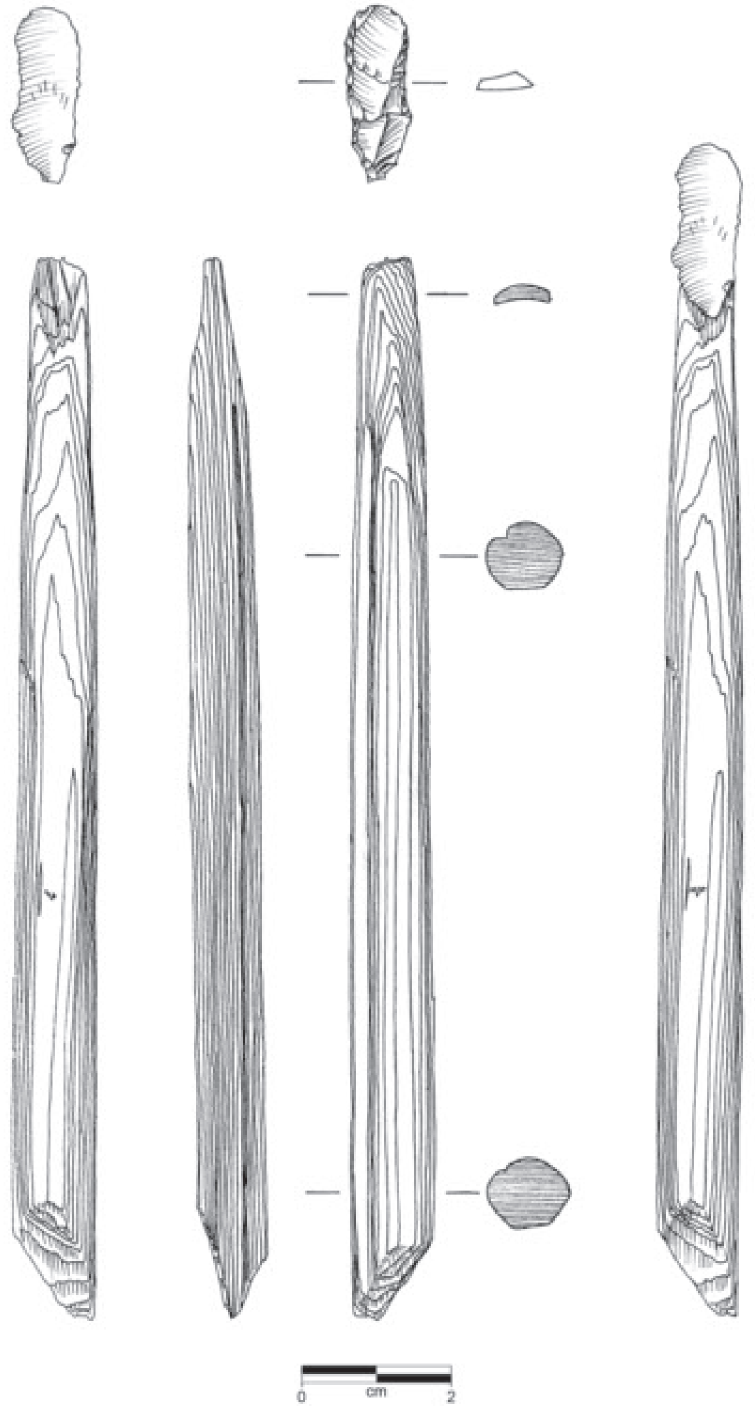


Fig. 3.76
b: *88,0/248,0: 34*
c: *19/19: 32 and 33*

c.



belonged together as the microblade fits the blade bed perfectly (even if imprints of it were not preserved). The shaft (l: 143 mm) is made from *Larix* sp. with dense growth rings. It is roughly cut off at the proximal end and shows an irregular six-sided cross section (w: 11 mm). It tapers towards the more regularly fashioned distal end, which has a 6 mm wide blade bed. The microblade of milky quartzite (l: 23 mm; w: 8 mm) shows a steep retouch along one edge and a flat retouch forming a concave edge on the opposite side, reminiscent of the edge of a tiny side scraper. With the microblade mounted in the blade bed protruding about 15 mm from the haft end, the total length of the tool is 156 mm. It seems quite expediently made.

3.3.7.2 Microblade hafts (Fig. 3.77)

Judging by their size and blade beds, four hafts are probably for microblades. 85,5/252,0: 3 is 136 mm long and its cross section is flat/oval (9 × 5 mm). It has a distal blade bed (l: 20 mm; w: 8 mm) which fits a large microblade and fine oblique scratches on the outer side of the blade bed for the lashing. The haft is from *Picea* sp. Two small side notches on the proximal end indicate that the tool was suspended in a string. 20/19: nn is almost identical to the complete specimen 19/19: 32 described above. 82,5/252,5: nn is a short (l: 113 mm) haft made from a branch/root of probably *Juniperus* sp. Finally a tiny haft (l: 48 mm) with circular cross section (diameter: 6 mm) could have held a narrow microblade in its distal blade bed, which is only 4 mm wide. This haft, 86,5/248: 5, was made from *Picea* sp.

3.3.7.3 Microblades and microblade cores (Fig. 3.78a and Fig. 3.78b)

As seen, all three hafted microblades show traces of use and/or retouch. This is unusual among the 156 microblades in the assemblage. Only twelve are retouched in different ways, most frequently along part of the side edges. This is probably an indication of a process during which a lot of microblades were produced, but only a few of them were selected for further use. However, future analyses of micro wear might shed light on this odd relation between 'used' and 'unused' microblades.

The material from Qt forms a starting point of a thorough technological study of Saqqaq microblade production (Sørensen 2012a: 135 ff.). In order not to repeat this study, the following analysis focuses on significant patterns in relation to raw material preferences and metric properties.

Microblades were made from all available flint-like raw materials, but quartz crystal and different kinds of mcq were much preferred. 38% of all microblades are of quartz crystal and 54% are of mcq, leaving only 3% killiaq and 5% quartzite. Among the mcq, translucent green, brown and grey sorts were preferred, but yellow, beige and white and milky variants were used as well.

Metric analyses were carried out on five variables on the intact microblades (max. w, thickness, and l; platform width and thickness). Among these the simple properties, max. w and l show significant trends.

A histogram showing the lengths of 52 intact microblades (Fig. 3.79) demonstrates a significant difference between mcq and quartz crystal microblades: the ones of mcq are generally longer (average l: 22.2 mm) than the quartz crystal ones (average l: 17.7 mm). As can be seen, the mcq microblades show great length variation and tend to form a twin-peaked distribution pattern (a peak at 17 mm and one about 27 mm), whereas the crystal microblades only form one peak at about 17 mm. The maximum width of the microblades (average: 6.9 mm) follow the same trends as the length distribution.

A simple scatter plot (Fig. 3.80) showing the l/w relation of the 52 microblades reveals a cluster of small blades, *Type A* (l < 20 mm and w < 6.5 mm), and of large blades, *Type B*, which exceed these dimensions. Significantly, the vast majority of Type B are from mcq (22 of mcq compared to 11 from quartz crystal), whereas there is an almost equal number of mcq and crystal flakes within Type A.

The proportions of the microblades are closely related to the size of the raw material nodules. Mcq nodules are found in all sizes in the region, whereas the crystals which form the starting point of the microblade production of quartz crystal are generally quite small (Sørensen 2012a: 54 ff.).

The 93 microblade cores from Qt (Fig. 3.78b) are generally quite irregular, often showing more than one platform, which is either the broken end of a crystal, a roughly prepared platform, or a former core front. Most of the cores are completely exhausted and in their final stage

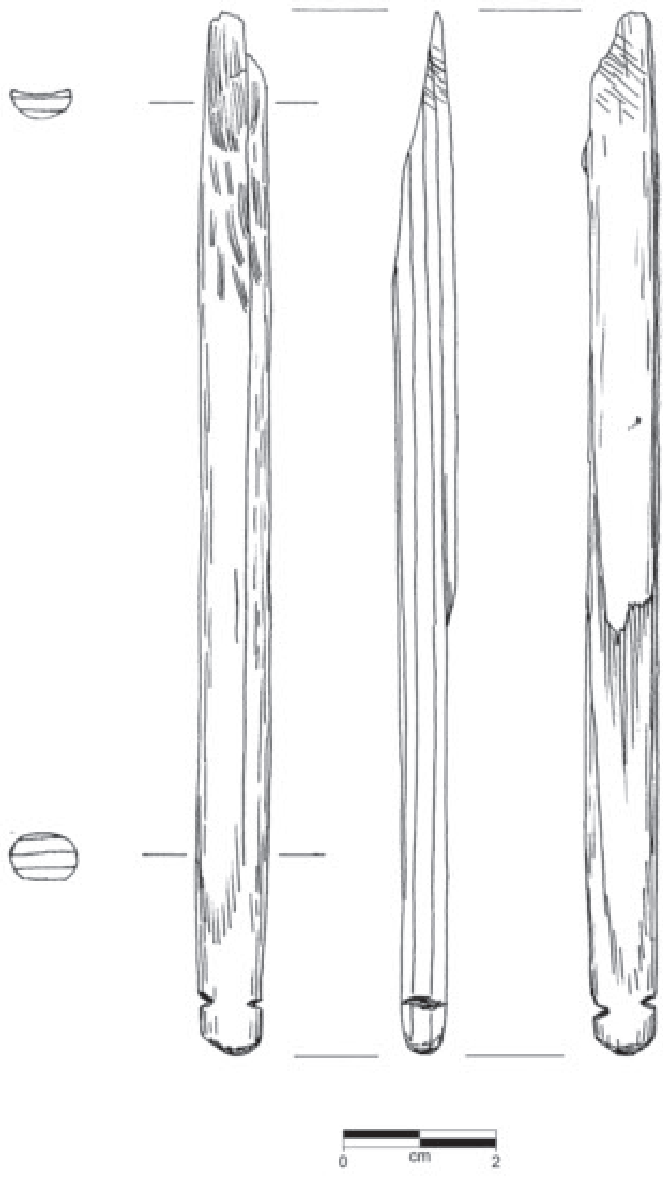
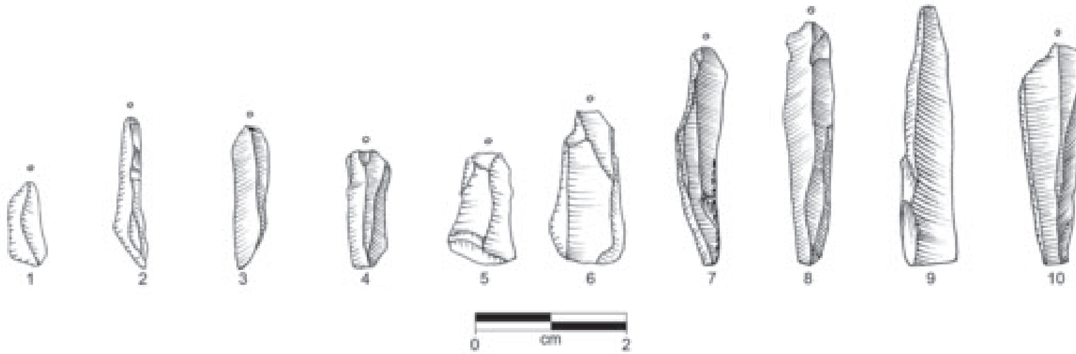


Fig. 3.77
Microblade haft (85,5/252,0: 3).

a.



b.

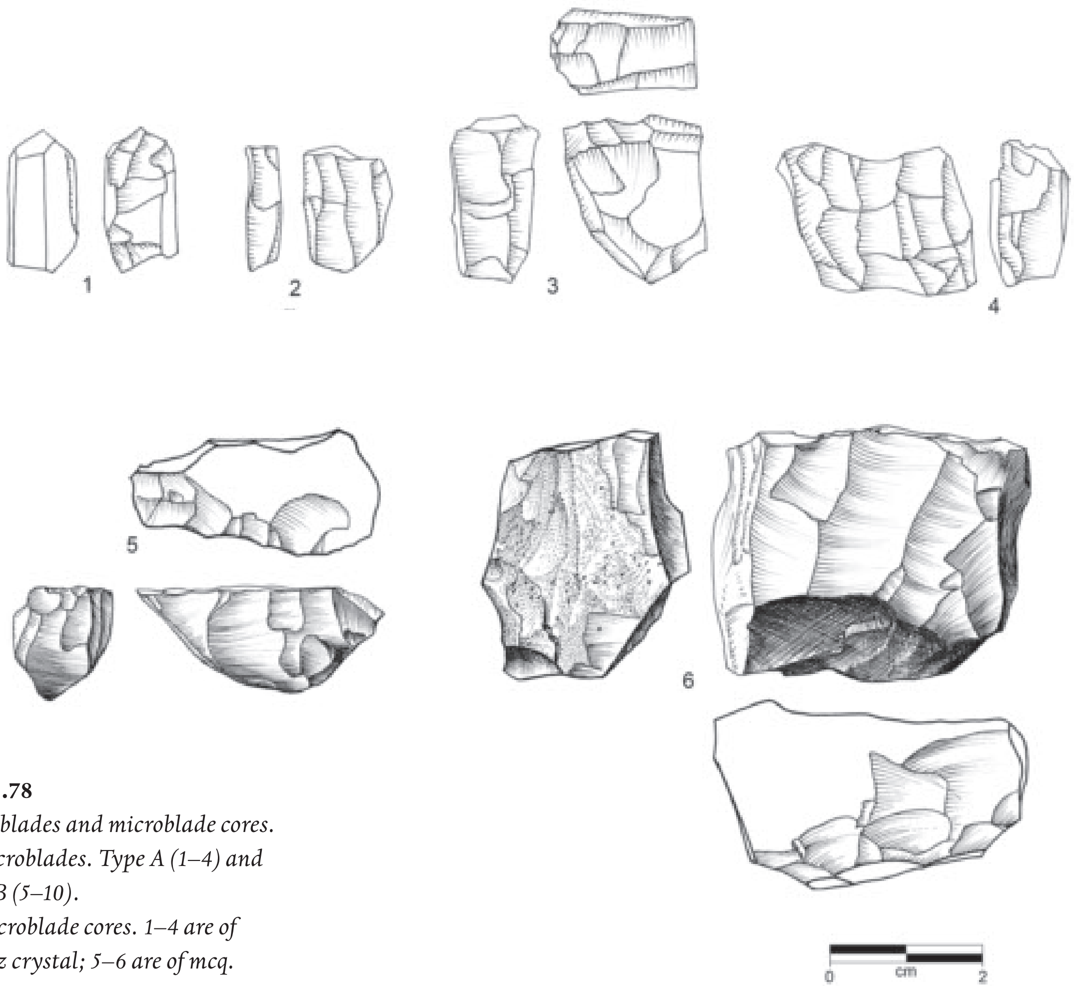


Fig. 3.78
Microblades and microblade cores.
a: *Microblades. Type A (1–4) and Type B (5–10).*
b: *Microblade cores. 1–4 are of quartz crystal; 5–6 are of mcq.*

they show negatives of irregular, short and broad flakes. The majority of cores, 68%, are from clear quartz crystal/quartz, 14% are from different kinds of mcq and 18% are from killiaq. This distribution runs counter to the raw material preferences as reflected in the microblades themselves. As will be recalled, the majority of these were of mcq (54%) – a fact which probably reflects both that the larger nodules of mcq each produced significantly more blades than the crystal ones and that a significant number of mcq microblades were imported to the site.

There is a chronological trend in the size and raw material distributions of the microblades and cores. This will be demonstrated in Chapter 4.3.1.2 below.

A couple of the microblades and two mcq cores are reddish/grey, show a 'greasy' surface and some cracking. They indicate that some cores were close to a heat source, and were probably heat treated (Sørensen 2012a: 350–52).

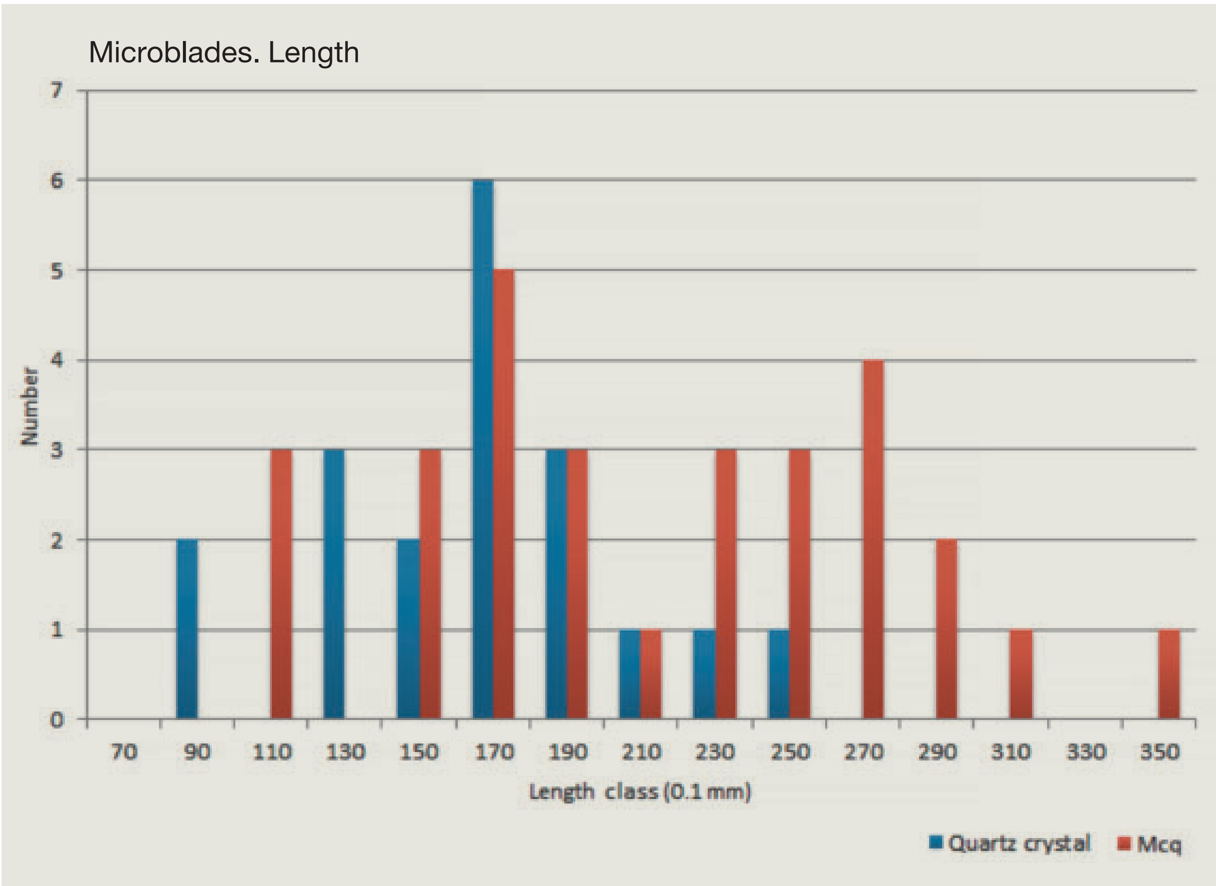


Fig. 3.79 *Length classes of microblades. Blue: quartz crystal. Red: mcq.*

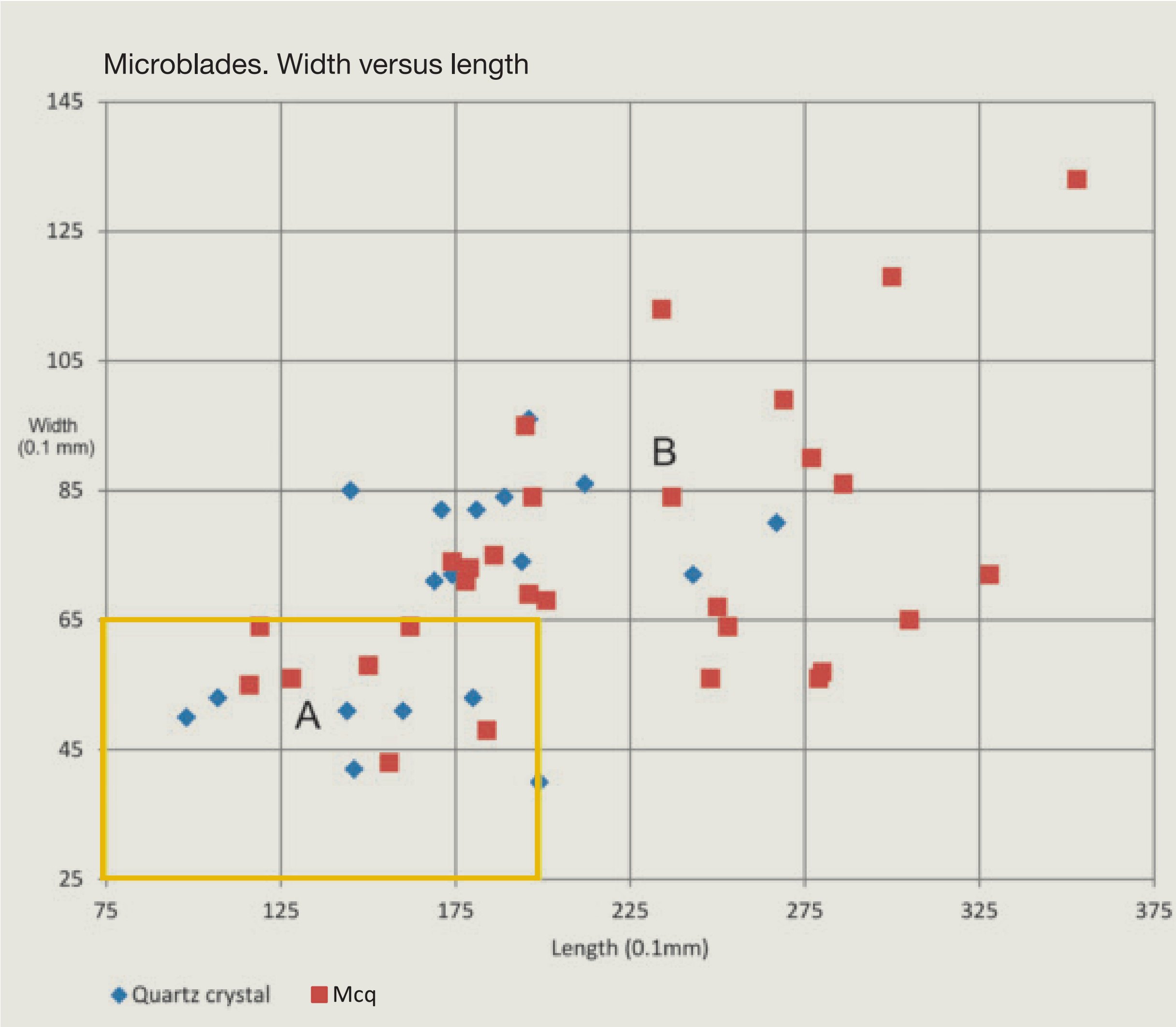


Fig. 3.80 *Width plotted against length of 52 microblades. Blue: quartz crystal. Red: mcq. Yellow frame marks the dimensions of Type A.*

Finds from Qajaa:
Only six microblades were found in the Saqqaq layers at Qa, as well as a single microblade core.

3.3.8 Various hand tools and hafts

Among the wooden hafts for hand tools seven specimens cannot be functionally determined. Only one of these was found with the endblade still in its original position:

Fig 3.81 is a quite short and slender (l: 113 mm; d: 15 mm) haft of *Larix* sp. It has a deeply cut blade bed in the distal end and fine oblique scratches on the outer side of the blade bed. The quartzite endblade is provided with a tang in the bulb end of the quite broad flake (l: 38 mm; w: 20 mm), which fits the blade bed. The flake shows retouching from the ventral side along the lateral edges. One is steeply retouched and shows clear usage wear (polishing). Thus the tool might be an atypical side scraper.

Six specimens are fragments of hafts with blade beds which have been provided with quite wide blades like various end or side scrapers, whereas three 'indeterminable' hafts were for various small endblades. Moreover, one

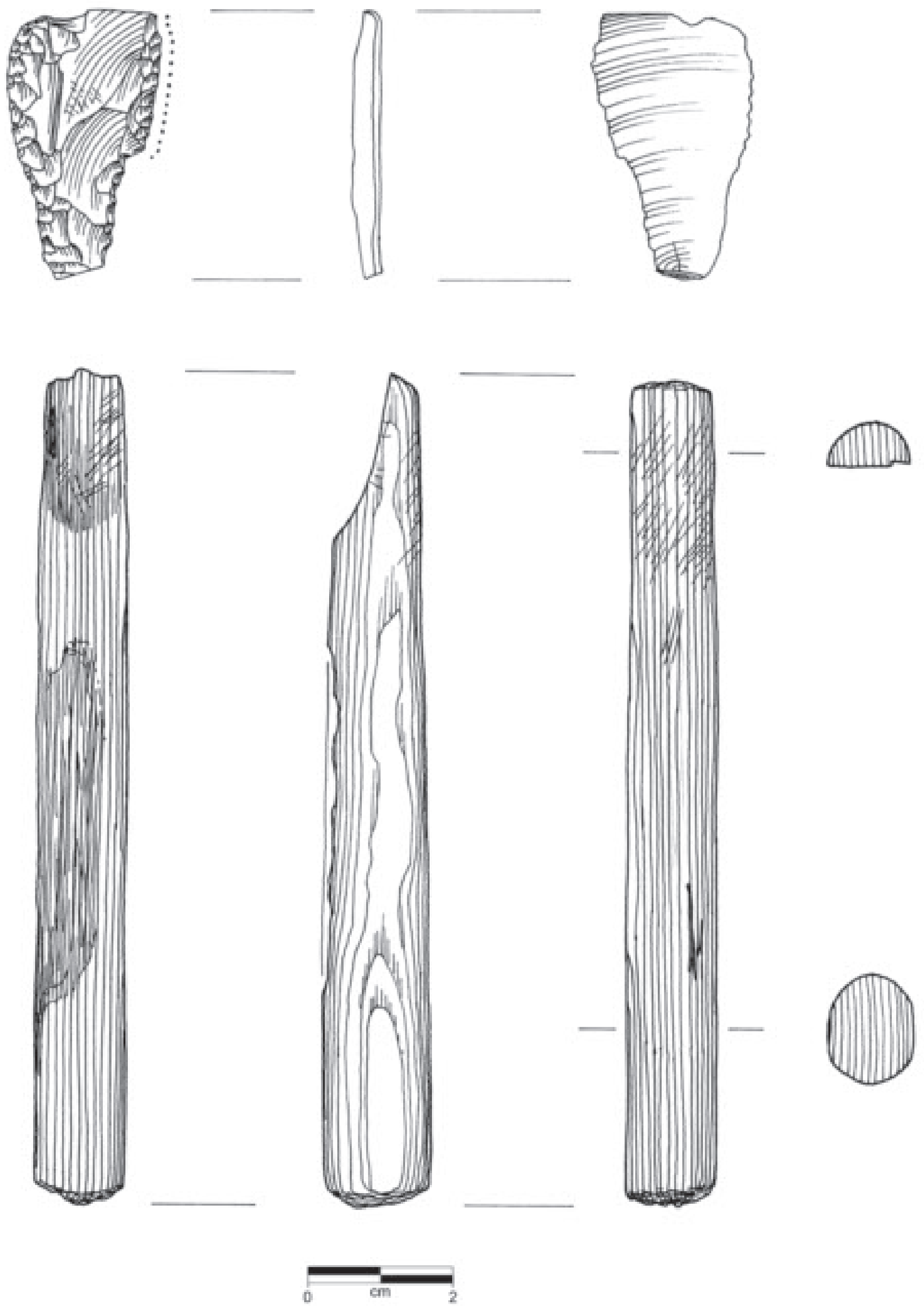


Fig 3.81
Hafted, tanged endblade (86,5/247,0: 6).

specimen of wood is short and broad (l: 116 mm; w: 32 mm), and could have been made for a type of wide endblade (the blade bed is 28 mm wide).

Finally, two characteristic hafts for small tools were made from other organic matter: Fig 3.82 – 1 is a short whalebone handle with an almost round cross section (l: 109 mm; cross section: 12 × 15 mm), a scarfed end and a carefully cut, bent end. Fig. 3.82 – 2 is a haft cut from antler (l: 85 mm). It is fragmented and collapsed, but it has the same significant bent end as the first-mentioned haft. It is suggested that these handles are for pressure flakers (see 3.3.12 below).

Finds from Qajaa:
Five specimens from Qa were classified as wooden hafts for small hand tools of indeterminable types. An irregular flake mounted with a baleen lashing still sits at the distal end of one of these shafts (Fig. 3.83). Another shaft has a small hole in the centre of its flat distal end as if a needle or similar thin, hard point was inserted or pressed into the end. It is a shaft for an instrument used for delicate work.

3.3.9 Expedient hand tools

490 specimens or 22.5% of the total number of lithic tools are classified as flakes and blades with simple retouching or serrated edges. The retouching and edge serration on these flakes and blades were probably intentional and not a result of trampling or fragmentation during use. In contrast to the other tool types, these flakes and blades were not hafted. They were made expediently and used as hand-held cutting and sawing tools.

The vast majority, 391 or 80%, are simple flakes with partially retouched edges. There are 45 (9%) equally simple flakes but with fine edge serration. Some regular blades, 33 or 7%, show partially retouched edges or fine edge serration (7 or 1%). A few retouched flakes and blades show grinding on the sides. They probably originated from broken adzes reused as flake cores.

Concerning raw material choices, killiaq is – as expected – the preferred raw material: 446 or 91% are of killiaq, while only 39 or 8% are of mcq. The remainder of the retouched flakes are

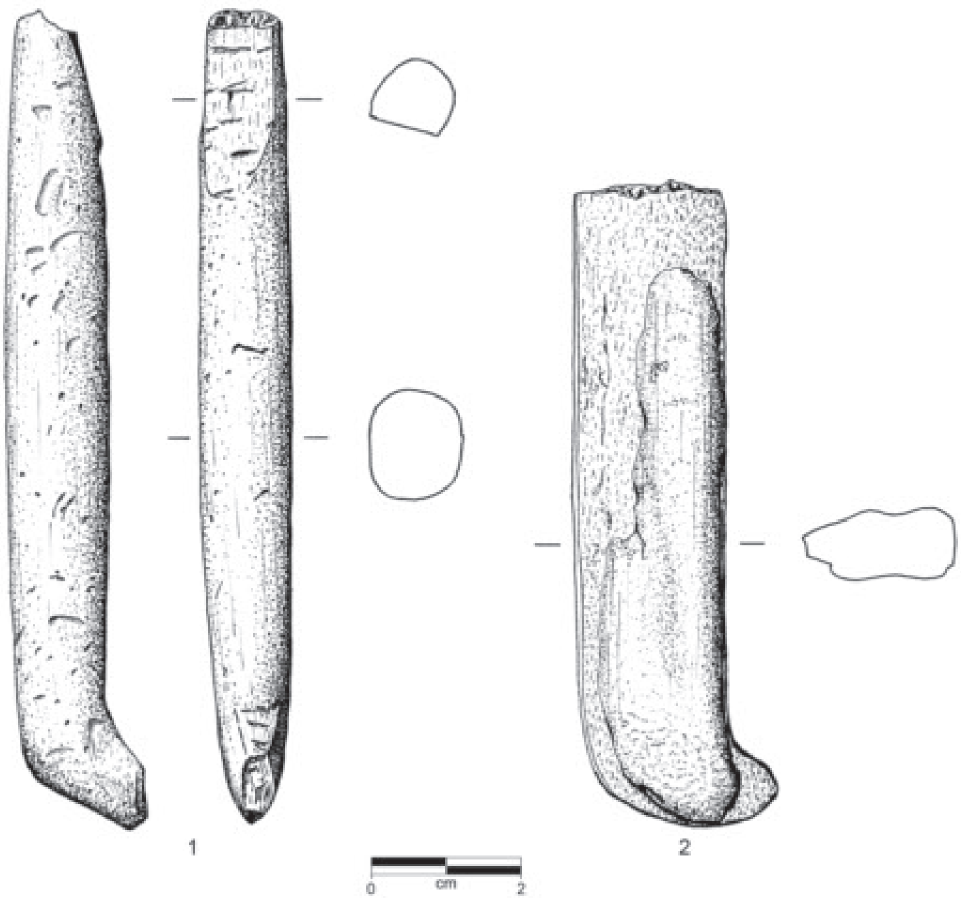


Fig 3.82 *Handles for various tools. 1: Handle of whalebone (19/20: 28). 2: Handle of antler (91/250: 10).*

of quartz crystal and quartz. During all phases, the site surface was littered with quite broad, thin and sharp flakes of killiaq – waste from production of bifacial tools and resharpening – and many of them show edge damage and fractures that could have been caused by use as expedient cutting tools, but without back-up from systematic experiments with killiaq flakes, it is difficult to distinguish such traces from trampling damage.

Finds from Qajaa:
At Qa 35 retouched flakes have been recorded in a Saqqaq context: 34 are of killiaq, the last one of mcq.

3.3.10 Wedges and chisels (Fig. 3.84)

Wedges of antler and whalebone used in the first steps of the processing of driftwood are quite numerous: 18 specimens. The typical wedge has a robust, rounded distal edge and several perpendicular or oblique notches on the sides to reinforce its 'grip' when hammered into the driftwood trunk. The proximal end shows traces of heavy hammering, being frayed at the edge.

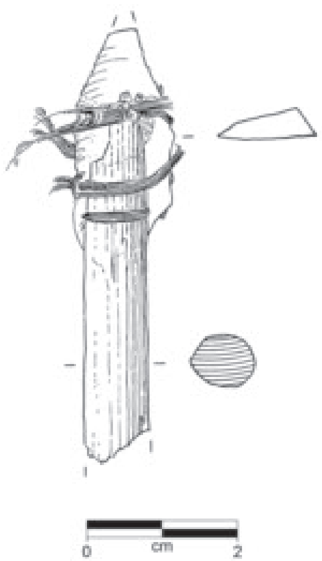


Fig. 3.83
Hafted irregular flake from Qa. Some of the baleen lashing is preserved.

Nine wedges are of antler (Fig. 3.84a). They are generally the smallest specimens. The average length is 80 mm and average edge width is 17 mm. The dimensions of such wedges are clearly limited by the size of the raw materials from which they were made. The other nine wedges are of whalebone (Figs. 3.84b and 3.84c). Most of them are fragmented, typically distal end fragments, but generally they are significantly longer than the antler wedges and made for heavy duty work. The largest are 165–169 mm long with edge widths of about 30–40 mm (Fig. 3.84b).

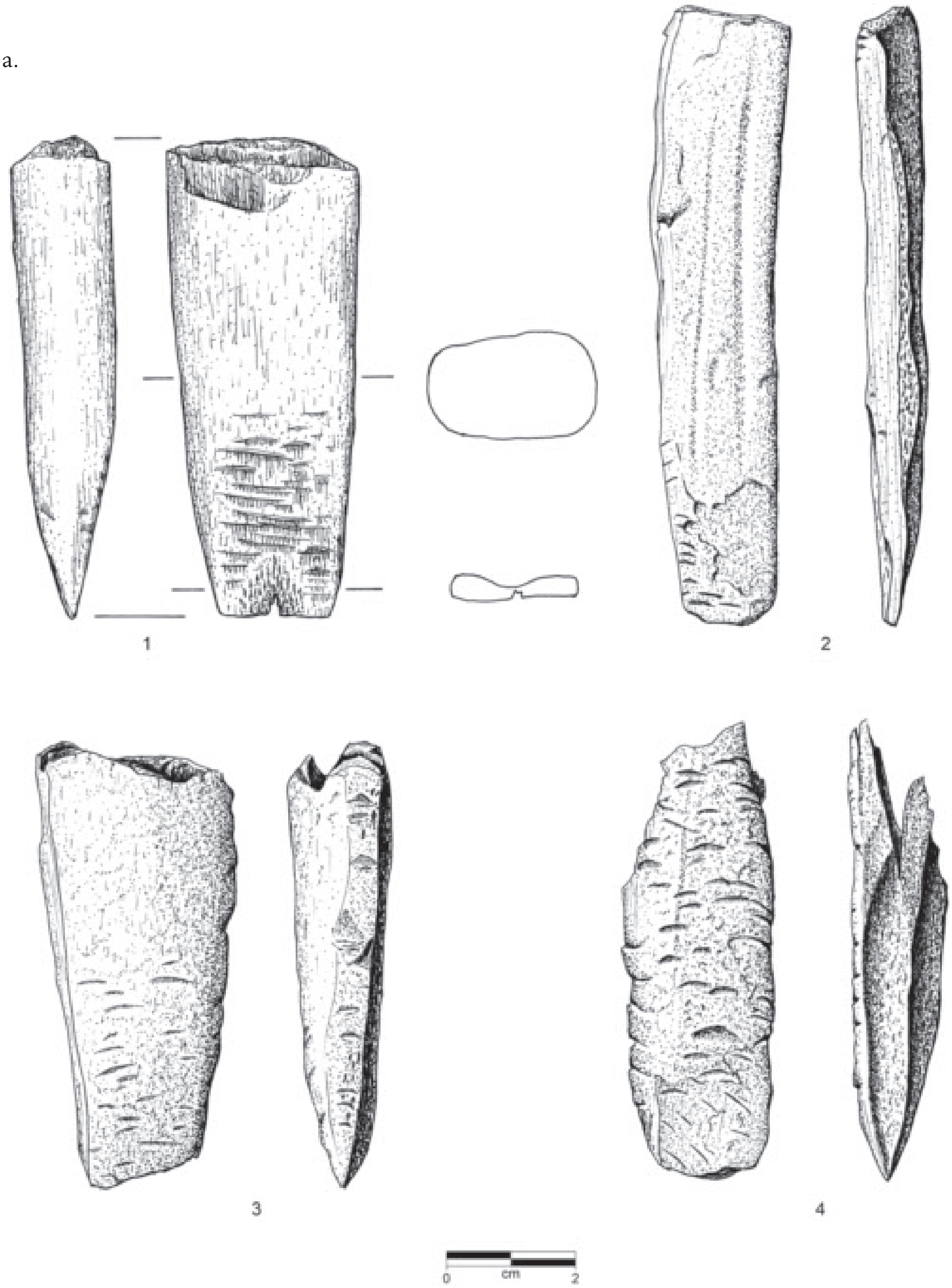
Only one specimen is classified as a chisel. Fig. 3.84d is made from walrus tusk. It has a sharp and narrow distal edge (w: 13 mm) and marks of hammering on the base. The 97 mm long and 11 mm thick chisel is slightly bent following the natural shape of the tusk.

Finds from Qajaa (Fig. 3.85)
Four specimens from Qa are catalogued as wedges (A41, E213, E226 and F268), and one (K308) as a wedge for splitting wood or a 'tuk' for chopping ice. Fig. 3.85, left, is of walrus ivory, the others are of whalebone. Fig. 3.85, right, is a distal end fragment and like the other wedges it is probably completely exhausted. They are all relatively short and have scars from the battering of the proximal end with a hammer. The 'tuk' (K308, Fig. 3.85, middle) is made from a reused shaft or foreshaft of whalebone and has remnants of (ornamental?) lines at both sides.

3.3.11 Adzes and mattocks (Fig. 3.86)

Adze heads were made from killiaq. Seventeen items or 0.8% of the lithic tool inventory are classified as adzes, making this quite a rare lithic tool category (Fig. 3.86a). A flat, bifacial core forms the body of an adze head. Most often both

a.



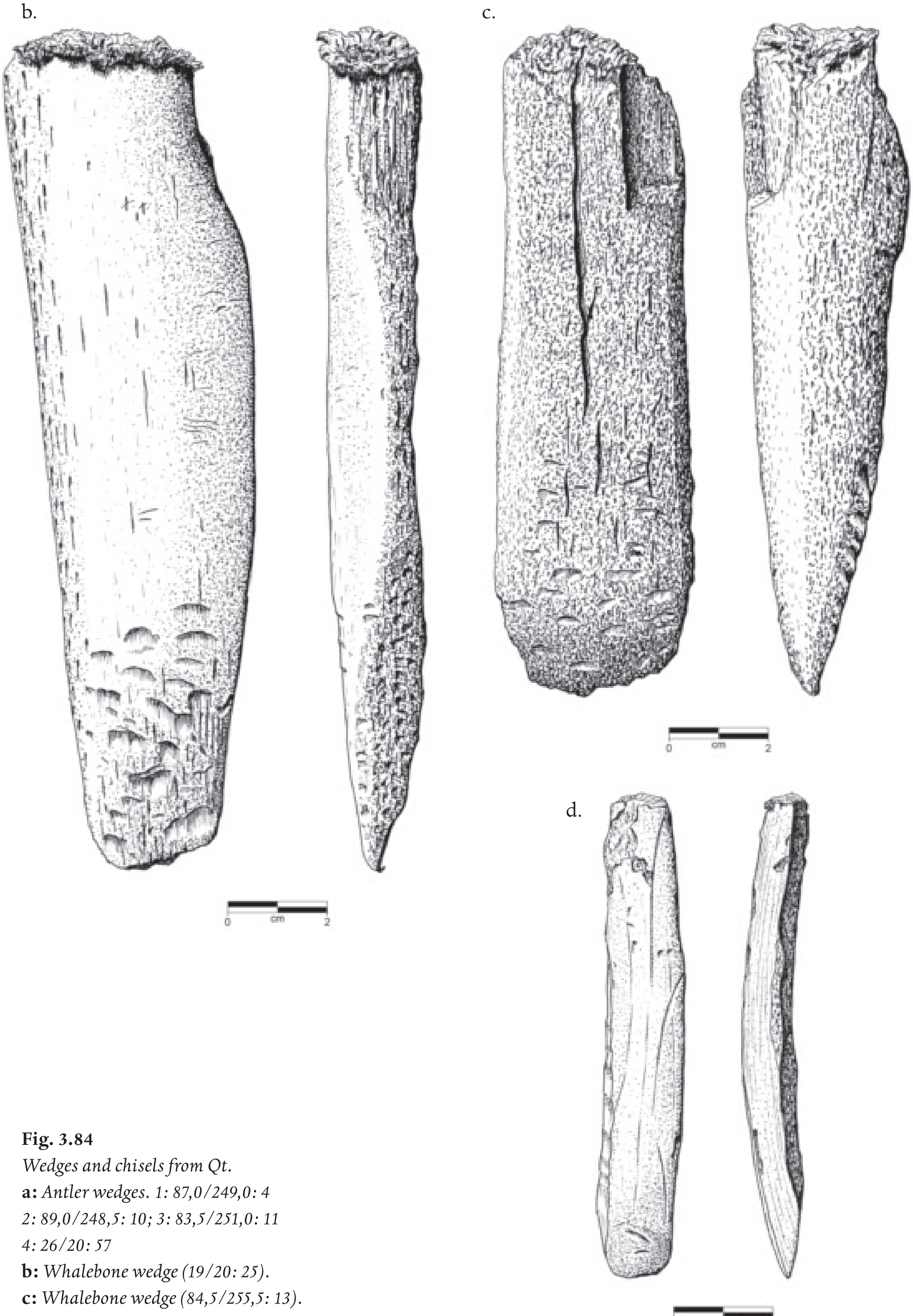


Fig. 3.84
Wedges and chisels from Qt.
a: *Antler wedges. 1: 87,0/249,0: 4*
2: 89,0/248,5: 10; 3: 83,5/251,0: 11
4: 26/20: 57
b: *Whalebone wedge (19/20: 25).*
c: *Whalebone wedge (84,5/255,5: 13).*
d: *Walrus ivory chisel (87,0/251,5: 18).*

Fig. 3.85
Wedges from Qa. From left to right: A41 of walrus ivory; K308 of whalebone; E226 of whalebone.

sides are partially ground, and the edge is shaped by grinding and polishing as well. The adze edges are remarkably steep, sometime forming almost a right-angled edge in relation to the body sides. The proximal end of the adze head is rounded, but in three cases this end shows a polished working edge as well. This shows that some adze heads were turned during the working processes, either as a consequence of reuse or, more probably, as a way of combining two edges of different widths and cutting angles in one tool that could be turned in the haft according to desired function.

Eight adze heads are complete, but quite short (l: 40–60 mm), representing exhausted specimens. They had become too short for the cases holding the adze body. Most of the remaining heads are distal fragments (with hinge fractures) or edge fragments resulting from accidents during use. Regrettably, it has not yet been possible to identify hafts or cases for the adze heads in the material from Qt.

A single specimen is probably a mattock head. Fig. 3.86b was made from a large, flat piece of whalebone (l: 167 mm, w: 62 mm; thickness: 13 mm). In the distal end there is a dull edge. There are four or five notches along the side edges of the proximal end – probably for the lashing, which would have locked the head to the handle.

Finds from Qajaa:
Four adzes all made from killiaq have been found at Qa. Two are proximal fragments, of which one has polish from hafting One is a mid-fragment and one is complete. The complete specimen is 56 mm long 29 mm wide and 9 mm thick.

3.3.12 Pressure flakers, hafts and hammerheads (Fig. 3.87)

No fewer than 51 specimens are classified as pressure flakers (Fig. 3.87a). The identification is based on size, raw material, shape and characteristic usage wear on the distal end (see also Sørensen 2012a: 125–28). Most of the flakers are

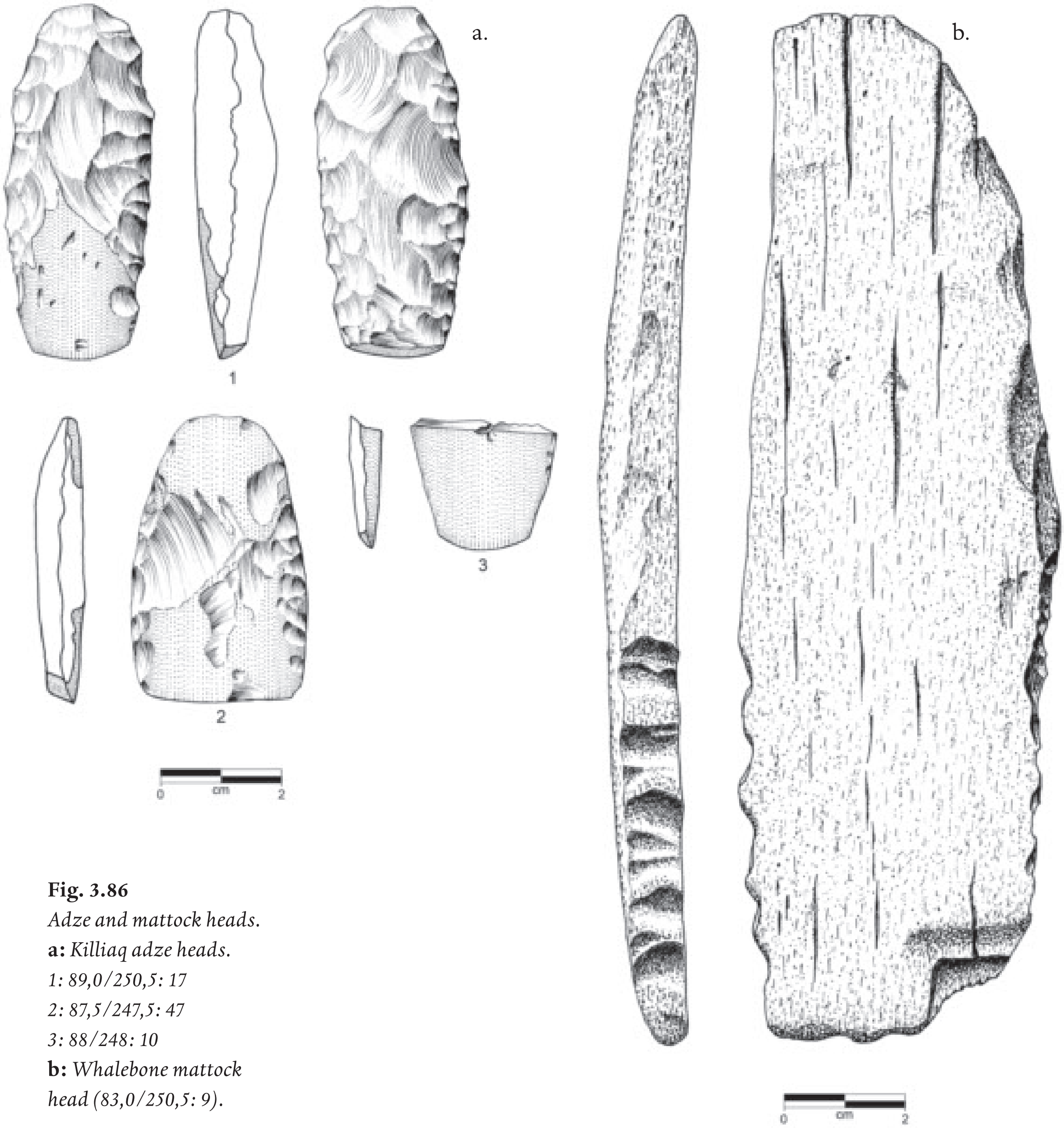


Fig. 3.86
Adze and mattock heads.
a: *Killiaq adze heads.*
1: 89,0/250,5: 17
2: 87,5/247,5: 47
3: 88/248: 10
b: *Whalebone mattock head (83,0/250,5: 9).*

made from bone (80%), most often a quite solid limb bone (probably ulna) from seal, but splinters of whalebone were also used. Antler was the raw material for the remaining 20% of the flakers.

The pressure flakers often show a broad and a slender end, and sometimes both ends are worn. Some ends are rounded (e.g. Fig. 3.87a – 7) whereas others are more pointed (e.g. Fig. 3.87a – 9), probably as the result of different flaking activities, e.g. bifacial knapping, the making of edge serration or microblade production. Almost all pressure flakers represent exhausted specimens. As seen from the metric analysis of 26 complete flakers (Fig. 3.88) they were typically discarded when they were reduced by wear and resharpening by grinding to a length of less than 65 mm. The few unused flakers show that they started out

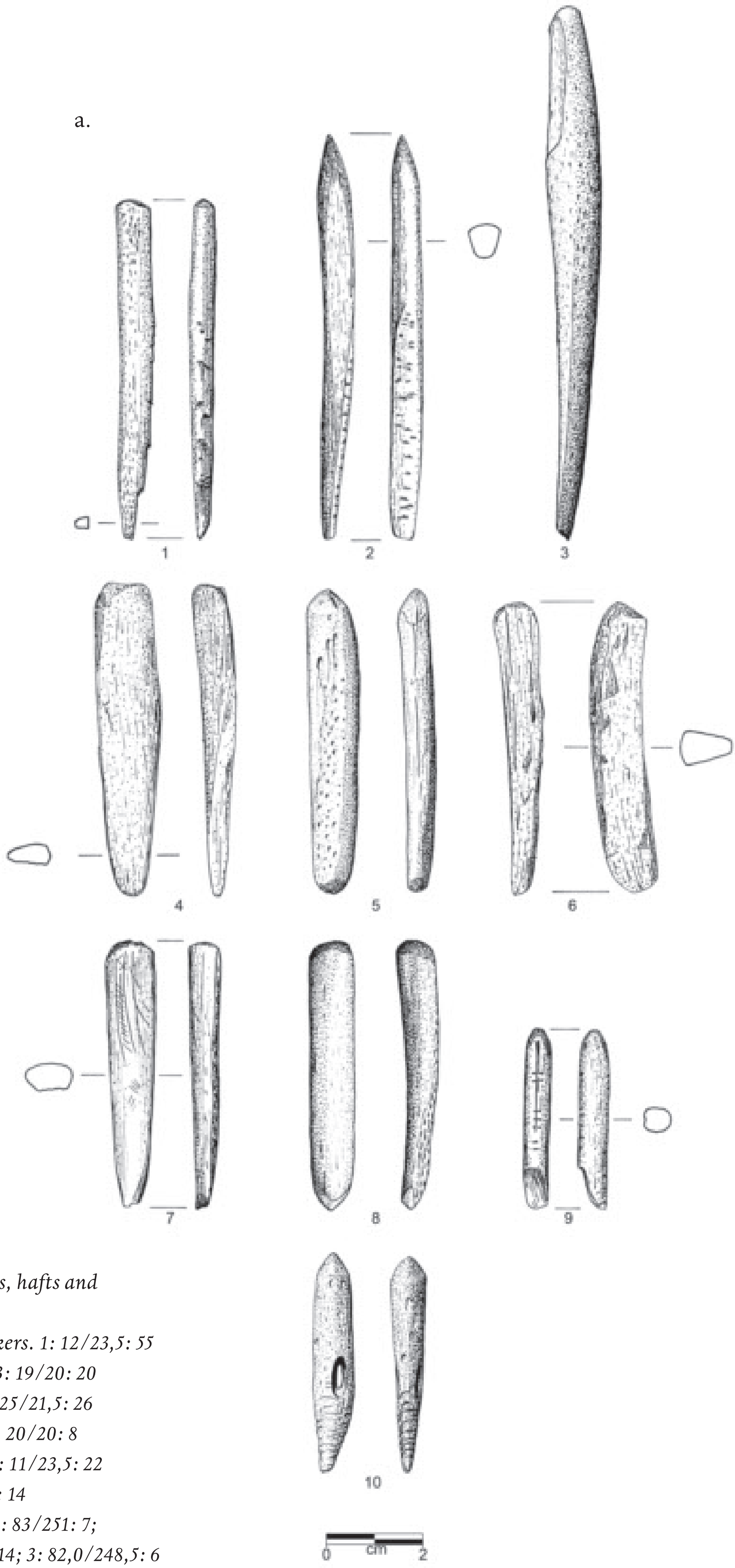


Fig. 3.87
Pressure flakers, hafts and hammerheads.
a: *Pressure flakers. 1: 12/23,5: 55*
2: 11/23: 132; 3: 19/20: 20
4: 20/20: 9; 5: 25/21,5: 26
6: 83/251: 4; 7: 20/20: 8
8: 20/20: 42; 9: 11/23,5: 22
10: 84,0/252,0: 14
b: *Hammers. 1: 83/251: 7;*
2: 84,0/251,0: 14; 3: 82,0/248,5: 6

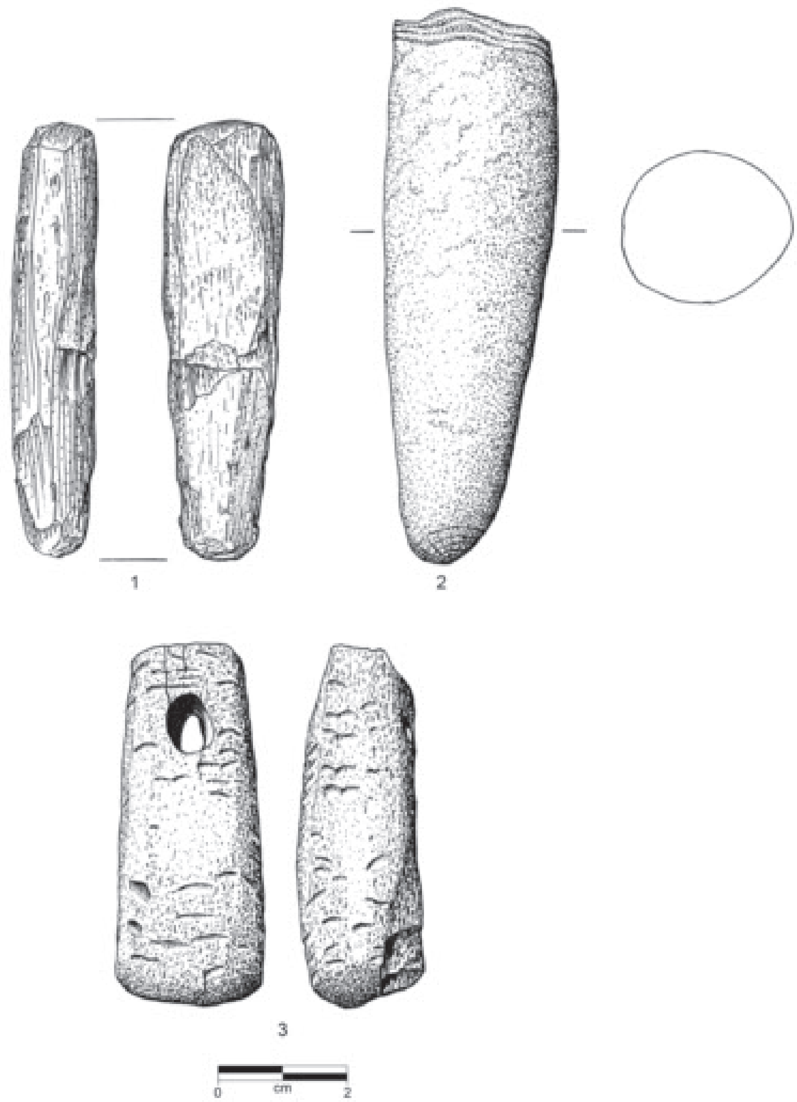
by being at least 80–90 mm long, and some even exceeded 120 mm.

Interestingly, a few flakers were made from reused, broken tools – for example, the proximal end of an antler harpoon head of Type Qt-B (Fig. 3.87a – 10) and a whalebone end prong from a bird dart (Fig. 3.87a – 2).

No doubt all pressure flakers, except for the longest specimens, were mounted in a haft in order to utilize the principle of the lever. However, it is difficult to pinpoint candidates for flaker hafts in the material. No blade beds seem to fit the small and slender flakers. But modern experiments have shown that wooden handles like that in Fig. 3.89, which is a bent haft of *Picea* sp. with a deep distal blade bed and an oval cross section, could have served this purpose. Likewise, modern experiments have shown that whalebone and antler handles, as depicted in Fig. 3.82, could have served as flint flaker handles (Sørensen 2012a: 357–59).

A few other finds of organic matter may be connected with knapping. Fig. 3.87b – 1 is a 65 mm long piece of walrus tusk with a round distal end showing wear that could have been caused by direct soft percussion. The same goes for a 'hammerhead', Fig. 3.87b – 3. It is a 56 mm long and 19 mm thick 'box-shaped' piece of solid whalebone. The distal working surface is heavily worn and splintered. An oval hole has been cut through the sides of the proximal end, indicating that the piece was originally hafted as a hammer-

b.



head. Finally, a complete tooth of a killer whale, Fig. 3.87b – 2, must be mentioned. Its shape, the rounded point and its weight make it suited as a tool for direct soft percussion in connection with the first steps in the processing of lithic raw materials.

Finds from Qajaa:

Fifty-two specimens from Qa are classified as pressure flakers. Most of these are exhausted, discarded specimens similar to the common pressure flakers found at Qt. A few are longer and appear to be pressure flakers at early stages of their life cycle. The lengths of 47 complete specimens found at Qa, combined with the same measurements of 26 complete pressure flakers from Qt, are shown in Fig. 3.88. It appears that the lengths of the pressure flakers cluster between 30 and 70 mm, where they show a Gaussian distribution, with a peak at 46 to 55 mm. Beyond this range is a scattered occurrence of much longer pressure flakers with lengths up to 115 mm. Outliers from Qa (a pressure flaker more than 200 mm (A8)) and from Qt (two pressure flakers with lengths of 132 mm and 149 mm) are not shown. Pressure flakers with a length of 61–65 mm are the most common (n = 5) at Qt, whereas at Qa shorter specimens with a length of 46–50 mm dominate (n = 9).

A wooden haft from Qa, Fig. 3.90, is of the same type as Fig. 3.89 from Qt. This specimen is a likely candidate for a pressure flaker handle. The presumed handle (l: 172 mm; w: 25 × 27 mm) is made from a curved piece of solid wood with an oval cross section. In the distal end there is a narrow 'pressure flaker bed' cut into the concave side of the bent handle. The length (60 mm) and width (*c.* 10 mm) of this bed fit perfectly with the dimensions of the common flakers and it is consistent with the fact that pressure flakers were discarded and replaced with new, considerably longer specimens when they were worn down below 65 mm.

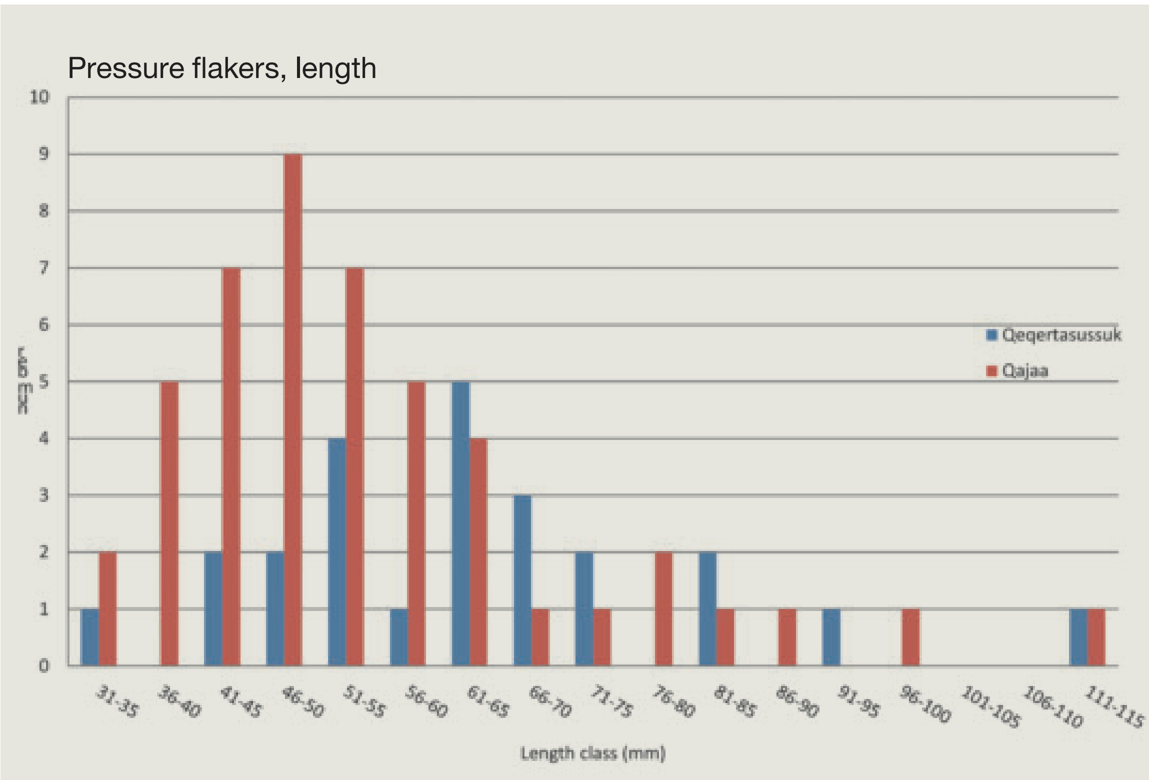


Fig. 3.88 *Length classes of 26 pressure flakers from Qt (blue) and 47 from Qa (red).*

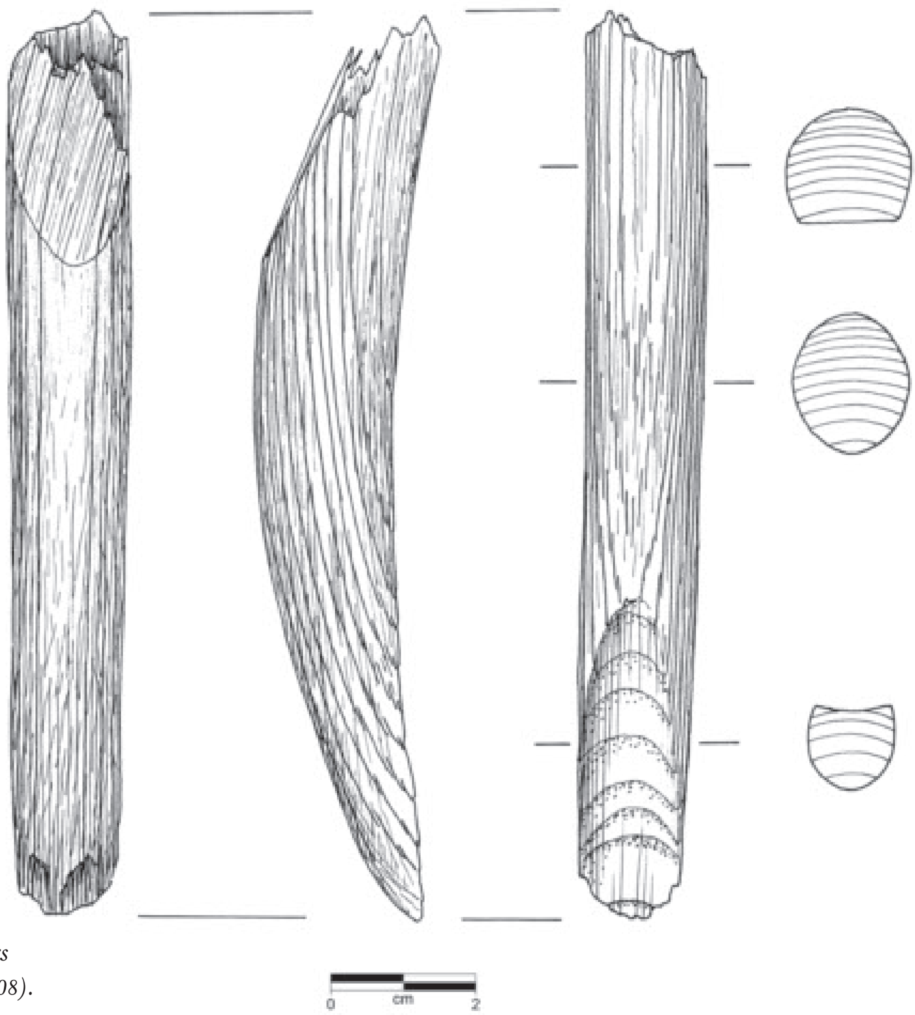


Fig. 3.89
Possible handle for pressure flakers from Qt (12/23: 108).

3.3.13 Grinding and polishing tools (Fig. 3.91)

Grinding and polishing in order to shape and finish the many tools of organic and lithic matter was essential. No fewer than 202 (9.3%) of the total number of tools inform us about this technological activity.

This tool class is completely dominated by grinding and polishing stones of pumice (187 specimens). Nodules of black/grey pumice were collected on raised beaches in great numbers and ended up at the site as rounded grinding stones, which were discarded when they became so small by wear that they could barely be held firmly between the thumb and the forefinger.

The worn-down pumice grinders can be divided into types based on morphology, which are not distinct but nevertheless illustrate the wide range of the grinders:

The most numerous type of pumice grinders (*c.* 120 specimens) are small, irregular 'cones' showing a flat or slightly concave facet (e.g. Fig. 3.91a – 1). Some of these facets show irregular concavities as if they were used for polishing the ends of hard objects. A reasonable interpretation would be that they were used for making and dressing the ends of pressure flakers of bone and antler. A few pumice grinders are disc-shaped with one or more straight facets along their narrow edges.

About twenty pumice grinders are characterized by narrow longitudinal grooves on their active surfaces (e.g. Fig. 3.91a – 2–4). These grooves measure just a couple of millimetres across, and they would have been suited to shaping and resharpening bird bone sewing needles and prongs and drill bits of killiaq. Moreover, 15 grinding stones of pumice show broader longitudinal grooves with smooth surfaces. These grooves measure *c.* 10–16 mm across and they were probably used for finishing the surfaces of shafts of wood, bone and antler of different 'calibres' (e.g. Fig. 3.91a – 5–7) along with objects like end prongs for bird darts. Future analyses of dust in the porous surfaces of the pumice grinders might add more substantial evidence on this subject.

Six pieces of sandstone are designated 'whet-

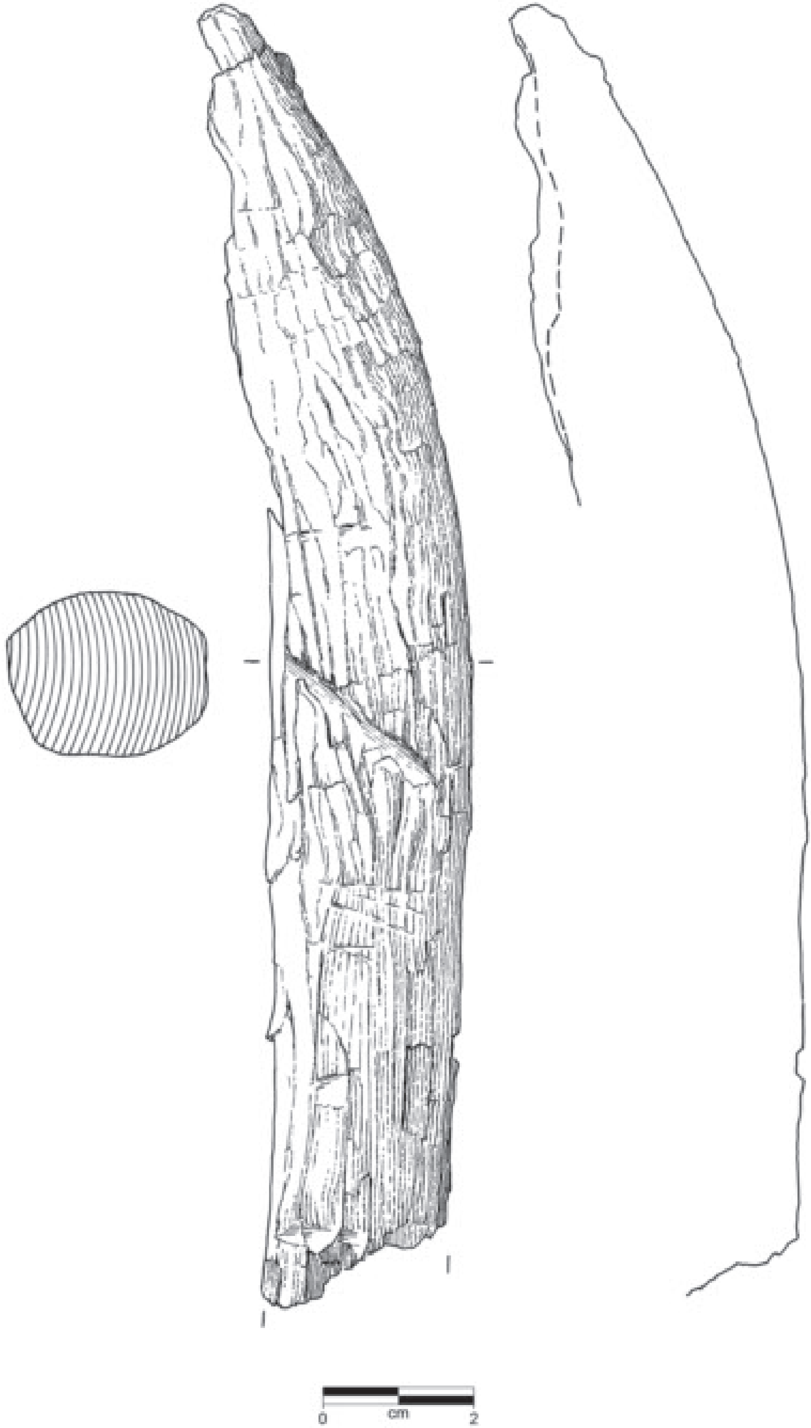


Fig. 3.90
Possible handle for pressure flaker from Qa (F247, 2).

stones' (e.g. Fig. 3.91b). They are highly curated tools which, except for one specimen, are heavily worn down. They represent end fragments of long, narrow pieces with almost square cross sections showing one or two active opposite surfaces and multifaceted ends. They would have been suited for fine polishing of killiaq tools, e.g. the broad sides of burins and adze edges. Three of the fine-grained whetstones show narrow longitudinal grooves probably used for the resharpening of sewing needles or points of drill bits. One of the specimens (26/21,0: 57; Fig. 3.91b – 3) is part of a sandstone flag which is snapped along a narrow groove on one of the flat sides. This

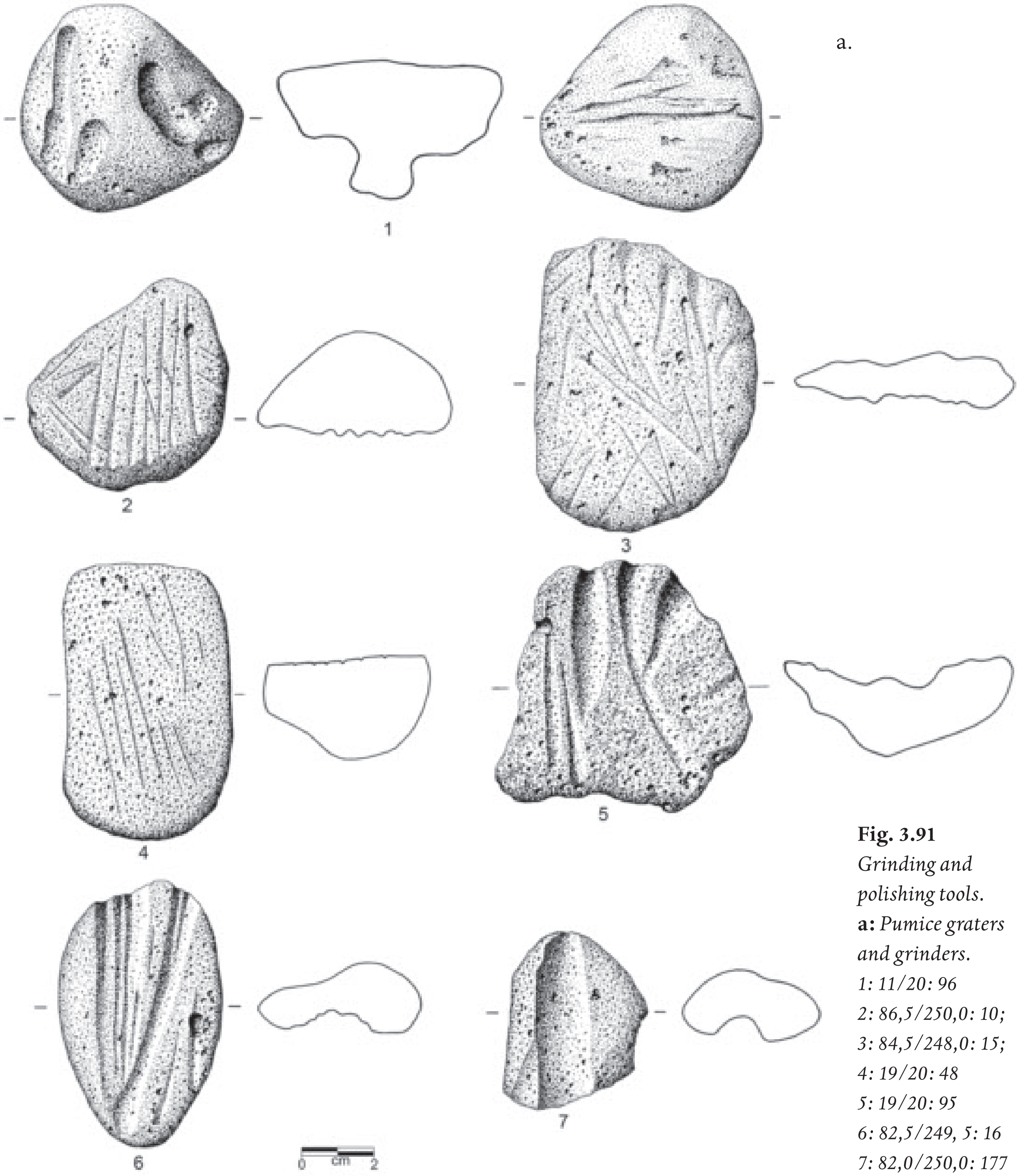


Fig. 3.91 *Grinding and polishing tools.* **a:** *Pumice graters and grinders.* *1: 11/20: 96* *2: 86,5/250,0: 10;* *3: 84,5/248,0: 15;* *4: 19/20: 48* *5: 19/20: 95* *6: 82,5/249, 5: 16* *7: 82,0/250,0: 177*

demonstrates an aspect of the technique behind the making of the long, narrow whetstones.

One flat grinding stone in particular must be mentioned. 20/20: 1 (Figs. 3.92a and 3.92b) is a carefully worked nodule of fine-grained sandstone of roughly oval outline (134 × 107 mm; thickness: 30 mm). It will be further described in 3.3.19 below under the heading 'Lamps' due to the fact that it was originally a lamp preform, but its final function was definitely grinding. The flat upper side shows a central smooth area with oblique shallow scratches across the surface and two narrow parallel grooves running perpendicular to the flat side. Accordingly, this whetstone is a lamp preform, which has secondarily been used both for grinding larger objects of hard materials and for resharpening drill bits and/or needles.

b.

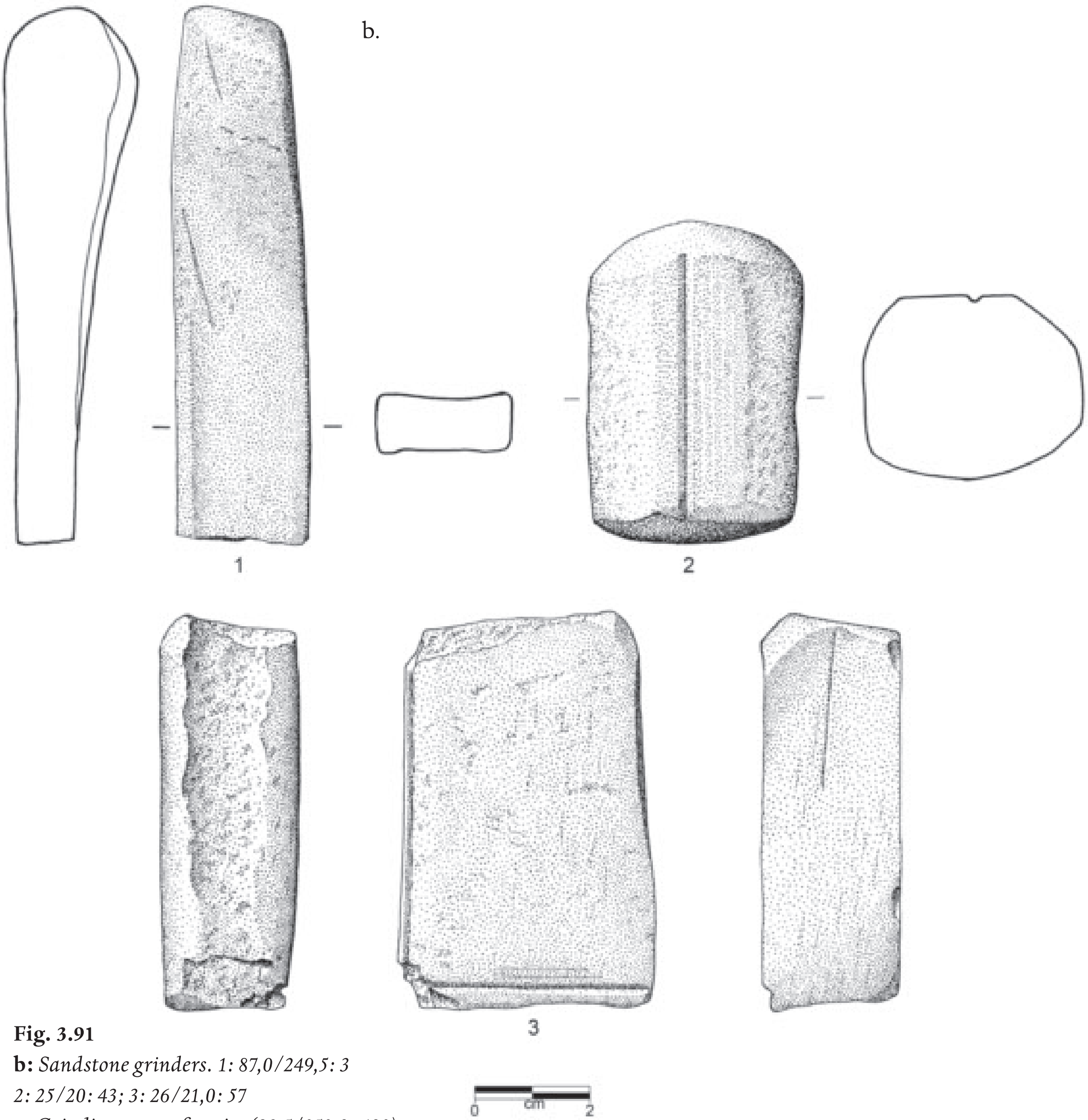
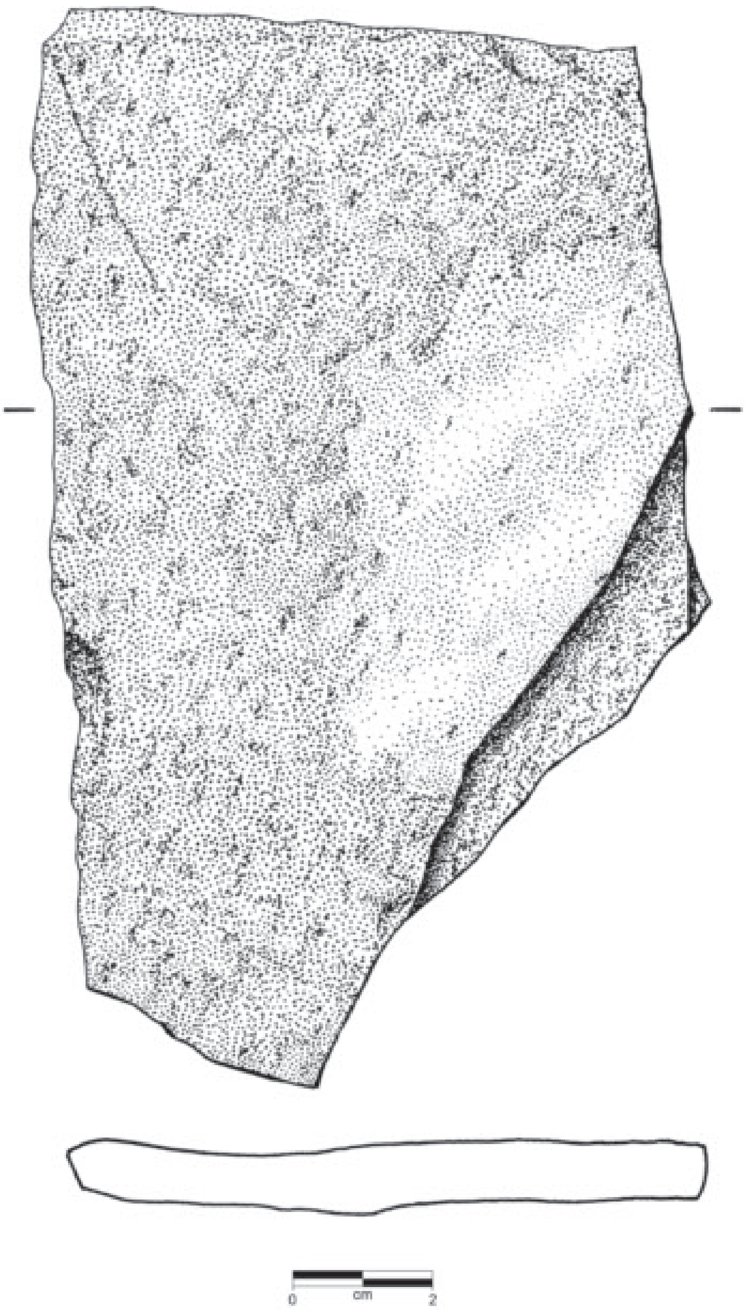


Fig. 3.91
b: *Sandstone grinders. 1: 87,0/249,5: 3*
2: 25/20: 43; 3: 26/21,0: 57
c: *Grinding stone of gneiss (83,5/252,0: 492).*

Five flagstones of gneiss show flat upper sides with smooth, sometimes even shining, patches (Fig. 3.91c). The largest polished patch is about 6 cm × 8 cm. These gneiss flags could have served as 'stationary' grinding stones (or alternatively the patches could be due to wear from skin boots, if the flagstones were in fact floor stones).

Finds from Qajaa:
The Qa assemblage contains 17 pieces of pumice, seven of which have longitudinal grooves and they are morphologically similar to the pumice pieces from Qt. Most of them show a flat, worn side, and they are typically quite small, 30–50 mm long.

c.



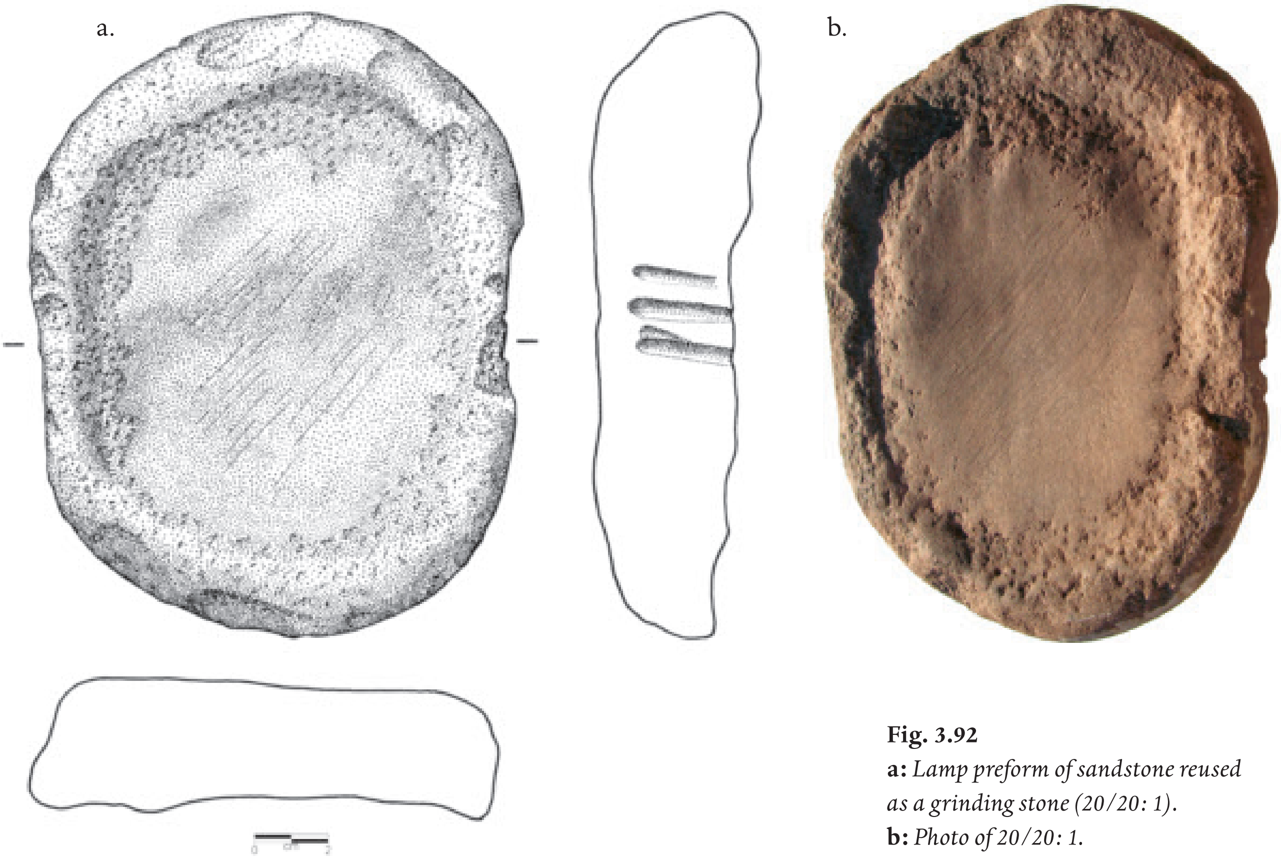


Fig. 3.92
a: *Lamp preform of sandstone reused as a grinding stone (20/20: 1).*
b: *Photo of 20/20: 1.*

At Qa there are 13 complete or fragmented whetstones of sandstone. Seven of these, however, are pieces of one disintegrated whetstone, bringing the total number of whetstones of sandstone down to seven. They represent five larger (>70 mm), worn whetstones, three of them with narrow longitudinal grooves for the sharpening of needles or bone points, and two small (<40 mm), cube-shaped, exhausted whetstones with several facets.

3.3.14 Hammerstones

Twenty-two or 1% of the lithic tools are round or flat stones with crushing marks on parts of their surface (e.g. 88/251: 160). It is very difficult to distinguish between natural and man-made crushing marks on stones, and thus the frequency of identified hammerstones on the site might be too low. However, from the position and character of their crushing marks these 22 specimens are classified as hand-held hammerstones varying in size from a ptarmigan's egg to a human fist. There is almost an equal number of flat and egg-shaped hammerstones, typically from beach deposits, and they are from a variety of gneisses and fine-grained granites. They could of course have been used for all sorts of hammering and crushing activities, for example marrow-splitting and crushing of bones.

3.3.15 Needles and needle cases (Fig. 3.93)

Six bone needles are so small and thin that they must have been for fine sewing (e.g. Fig. 3.93 – 1). The sewing needle's proximal end is provided with a tiny hole (drilled from two sides) with a diameter of only 0.8 mm or less. The cross section of that part of the needle is rectangular. The cross section changes smoothly into oval at the middle and circular at the point of the needle. The needles measure 1.4–2.0 mm across at the widest, the proximal end, whereas the length varies depending on the degree of wear/resharpening and of course of fragmentation. None of the needles are intact, but the most complete specimens are about 50 mm long. They are typically broken across the eye of the needle, and in one case the drilling of a tiny new eye was begun just below the broken one. Most needles are straight, but a couple of them are slightly bent.

The early production stages of sewing needles are illustrated by preforms. Two specimens are bird bones with parallel, narrow longitudinal grooves (probably made with a burin) 2–2.5 mm apart. The next step is represented by two bird bone lists, which are about 2 mm wide, and, finally, one specimen shows the stage where the bone list was shaped by grinding/polishing and only lacks the drilling of the eye with the drill bits of killiaq described above.

A single, very large specimen of antler (l: approximately 160 mm) is a needle as it is provided with a large, elongated eye (7 × 3 mm).

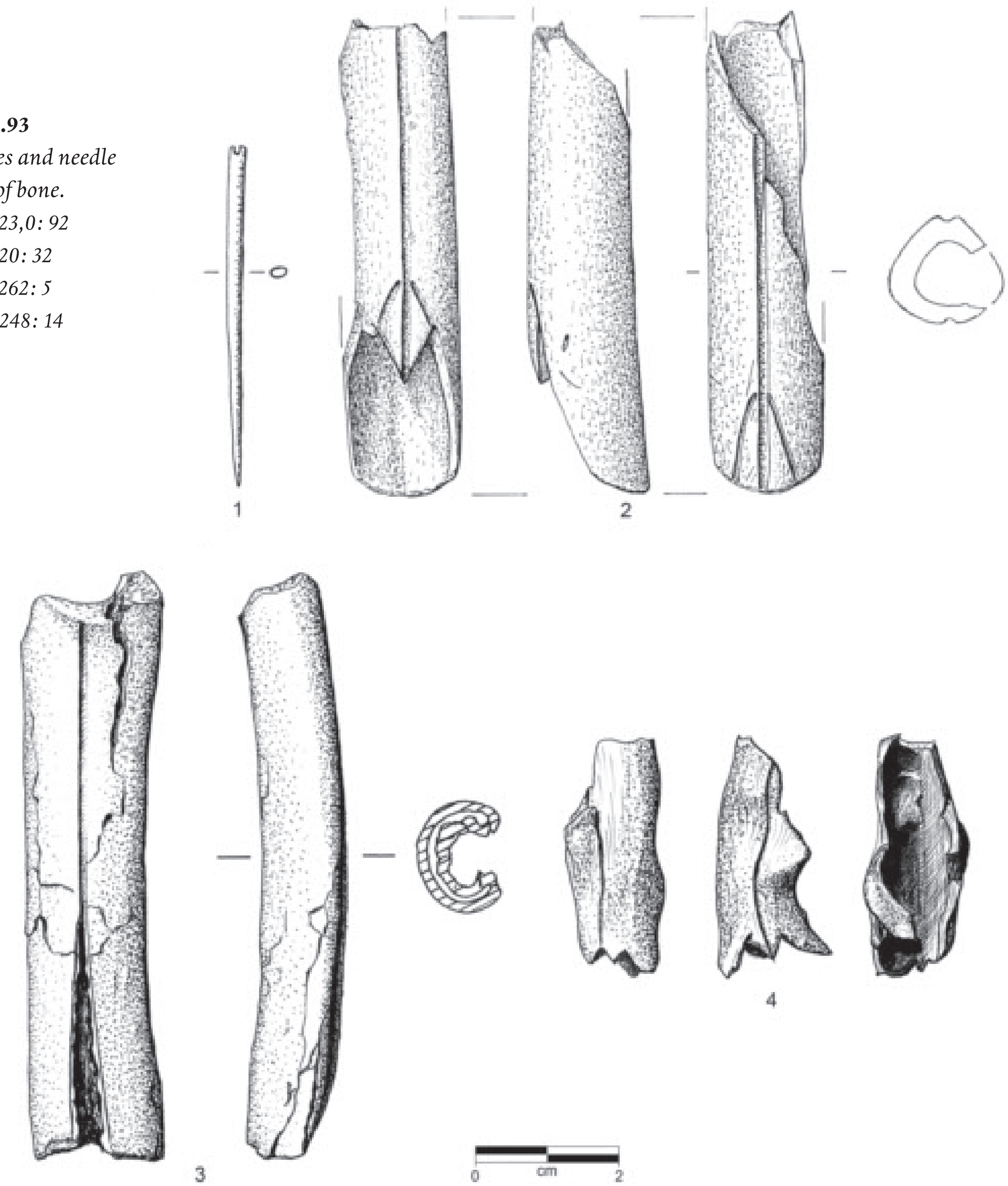


Fig. 3.93
Needles and needle cases of bone.
1: 12/23,0: 92
2: 19/20: 32
3: 85/262: 5
4: 89/248: 14

The proximal part of the eye show wear marks from a string.

The collection includes only a few likely needle cases:

Fig. 3.93 – 2 is a well preserved (distal) fragment of a tube made from a 'cylindrical' long bone of a dog. The outer surface is polished and it is ornamented. The 'front' of the complete distal end is provided with a carved triangular point. A longitudinal groove starts at this point and it runs from here to the broken end of the tube. Two oblique grooves mirror the shape of the carved triangular point so that the pattern on the distal front side appears diamond-like. The 'back' side of the tube is longer than the front. It forms a kind of broad tail. A longitudinal ornamental groove is seen on this side as well. Together with the central line, two oblique grooves form a kind of simple 'bird-foot' pattern on the tail of the tube. The specimen is 66 mm long and its diameter is 16 mm.

Fig. 3.93 – 3 is probably a very badly preserved tubular needle case. It is collapsed and broken at both ends, but it is of somewhat the same dimensions (l: 82 mm; d: 16 mm) as the one described above and also shows a longitudinal ornamental groove on the preserved side.

Finally, Fig. 3.93 – 4 is a small, completely collapsed fragment of a bone tube with almost the same ornamentation as Fig. 3.93 – 2, i.e. a carved triangular point with a longitudinal line which divides it into two parts. The length of the fragment is only 34 mm.

Saqqaq skin working and sewing is described in Chapter 3.7 below.

Finds from Qajaa:
A total of 31 needles or needle fragments were recovered at Qa. Two specimens are complete (E180,1 and E180,2). Fig. 3.94 (l: 65 mm; w: 2 mm) is a nicely polished, slightly curved needle with a perfect circular eye drilled from both sides in the proximal end. The needle tapers towards the polished point in the distal end. The proximal end has a sub-rectangular flattened cross section, whereas the distal end is circular like the needles from Qt. E180,2 is a slightly shorter (l: 50 mm; w: 2 × 1 mm) complete needle, which shows a flat cross section at the proximal end and a round cross section towards the distal end. The remaining 29 needle fragments consist of 11 distal ends, 16 mid-pieces (five of which are broken in the eye in the proximal end) and one proximal end fragment with preserved eye. A single specimen is a piece of an unfinished needle with an angular cross section. Fig. 3.95 shows the width bins (maximum w) of the needles from Qa measured in 0.1 mm-units. A division into three size groups is seen: very slender needles (c. 1.0 mm wide), common needles (c. 1.5 mm wide) and wide needles (c. 2.0 mm wide).

Fifteen lists, probably of bird bones, are discarded needle preforms or broken preforms. At least eleven specimens show burin grooves along the edges. The widths of needle preforms are typically around 3 mm. This obviously leaves space for further polishing towards a finished product. In a few cases the preform lists are quite wide, 8–16 mm, so that they could be longitudinally split into several needle preform lists.

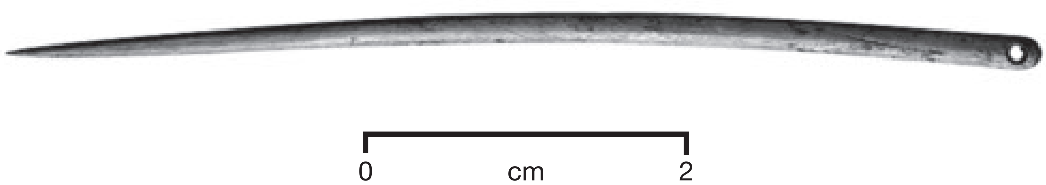


Fig. 3.94 *Needle from Qa (E180).*

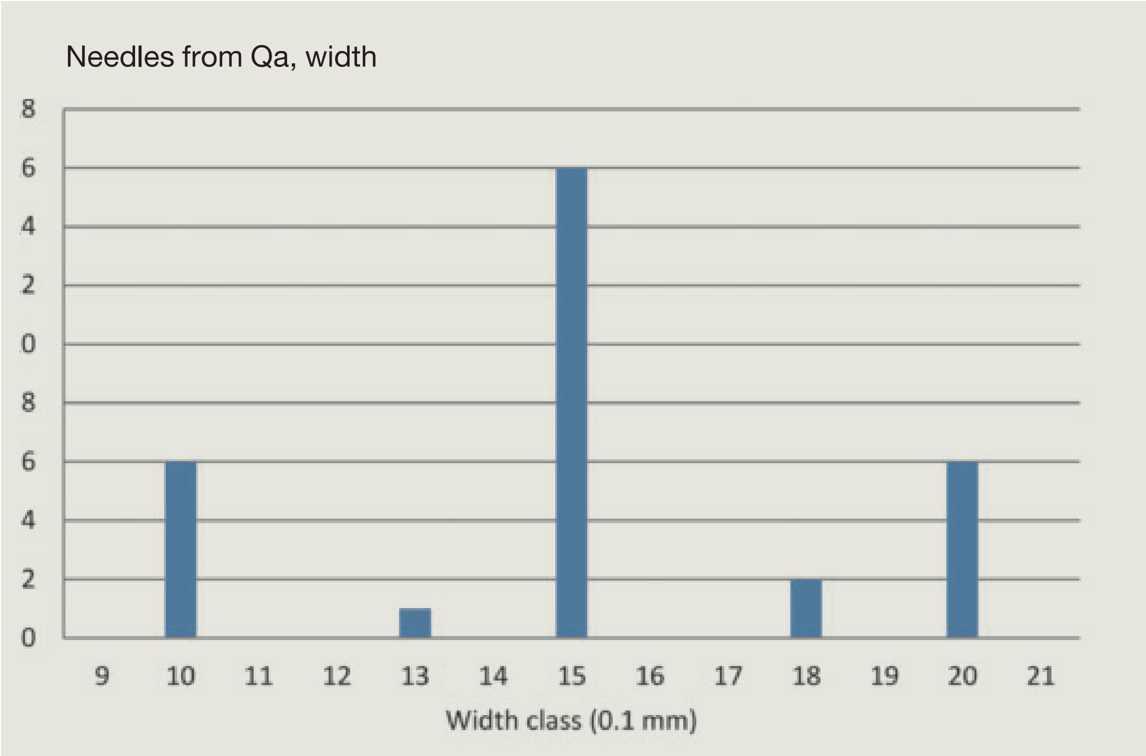


Fig. 3.95 *Width classes of 31 needles from Qa.*

3.3.16 Bodkins, perforators, meat forks (Fig. 3.96)

These artefact classes include bone or antler points (without eye). Nineteen specimens are included in the material. A little more than half of them (eleven specimens) were made from bird bone with extremely sharp, polished points, well suited for perforating skin. Their lengths vary between 64 mm and 113 mm (average 79 mm). Three quite large bodkins/meat forks are from caribou bone and two are from seal bone. Fig. 3.96 – 3 (l: 175 mm) is an example of a carefully made long specimen of caribou long bone. Three very long bodkins (l: 171–204 mm) were made from whalebone and they could be reworked side prongs for bird darts (e.g. Fig. 3.96 – 2).

Finally, two wooden specimens must be mentioned. They show long, carefully made slender points, and they could have functioned as meat forks.

Finds from Qajaa:
Eleven points from Qa are categorized as bodkins or perforators. Four of these (C109,1 and 2, E162, E179) are bird bones with polished ends. One is of antler and six are of bone. The two complete specimens of bird bone, C109, 1 and 2, are polished at both ends so that the distal ends are sharp points and the proximal ends are blunt points. Five of the remainder are pointed bone pins between 67 and 80 mm long. C104 is a harpoon head of Type Qt-A, which was split longitudinally trough the line hole and provided with a sharp, polished point.

3.3.17 Toggles and hooks/gaffs

Both ends are pointed on two small specimens of antler (l: 88 mm and 95 mm). They could have been used for many different purposes. They might have been toggling gull hooks (e.g. 13,0/24,0: 41).

Two short wooden specimens might also be toggles. 85/264: 8 is of *Pinus* sp. It is 120 mm long and has quite roughly carved points at both ends. The middle part shows several transverse cut marks which could indicate that originally a string was attached to this part of the piece. The other probable wooden toggle is of *Juniperus* sp.

Two hooks were made from naturally crooked wood. They are large (l: 100–153 mm) and one of them (88,5/248,0: 18) of *Juniperus* sp. is quite carefully made with transverse cuts at one end

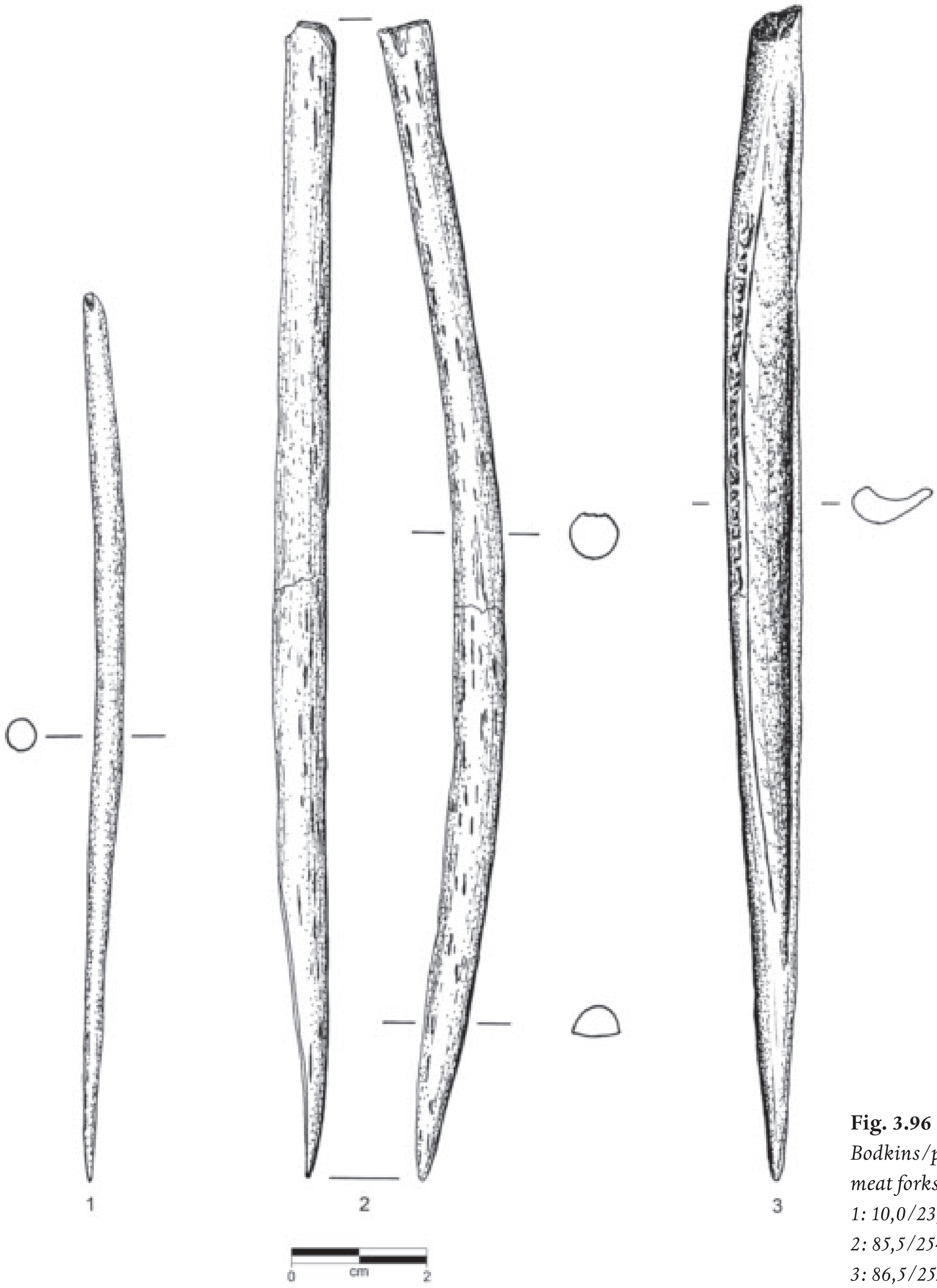


Fig. 3.96
Bodkins/perforators/meat forks.
1: 10,0/23,0: 142
2: 85,5/254,0: 5
3: 86,5/252,0: 16

and a point at the other, as if it was originally attached to a shaft or a string. An equally simple hook (88,0/250,5: 8) was made of antler. These large hooks could have functioned as blubber hooks or gaffs.

3.3.18 Fire-making tools (Fig. 3.97)

Four small rounded lumps of pyrite are faceted, and seven flat bifacial cores of killiaq show characteristic very fine crushing marks along their dull edges. Together these specimens are evidence of fire-making activities.

The pyrite nodules (19/19: 1015; 12,0/23,5: 263; 19/19: 1499; 26/20: 45, Fig. 3.97a) have all been exposed to striking from several angles, as evidenced by the many wear facets on each specimen. They seem to have been completely exhausted before they were discarded.

While specimens like the slender core and the thick flake in Fig. 3.97b – 1–2 probably were made as formal 'strike-a-lights', some of the killiaq 'hammerstones' with the characteristic fine crushing marks are reused preforms (Fig. 3.97b – 3), broken adzes (Fig. 3.97b – 4) or exhausted bifacial knife blades (Fig. 3.97b – 5).

It must be added that a microscopic investigation of the killiaq strike-a-lights described above was carried out by Stapert and Johansen in 1996. Based on their experiences and experiments the traces on only two of the above-mentioned seven killiaq specimens are with high probability connected with fire-making (89/249: 84 (Fig. 3.97b-2) and 10/23: 333). The remaining strike-a-lights must be considered 'possible', but not 'certain' (Stapert and Johansen 1996a).

There is no evidence in the assemblage of fire-making by means of fire-drilling or fire-making by rubbing pieces of wood.

Finds from Qajaa:

Three specimens from Qa have been classified as fire-making tools. One is a reworked microblade core, one a flake with a heavily crushed edge, and the final one was probably made specifically for this purpose. All three are of killiaq.

3.3.19 Lamps (Fig. 3.98)

The Qt assemblage contains none of the well known formal circular 'Saqqaq soapstone lamps' and only a couple of informal blubber lamps.

A single, quite large specimen of coarse-grained sandstone, Fig. 3.98, is evidence of the

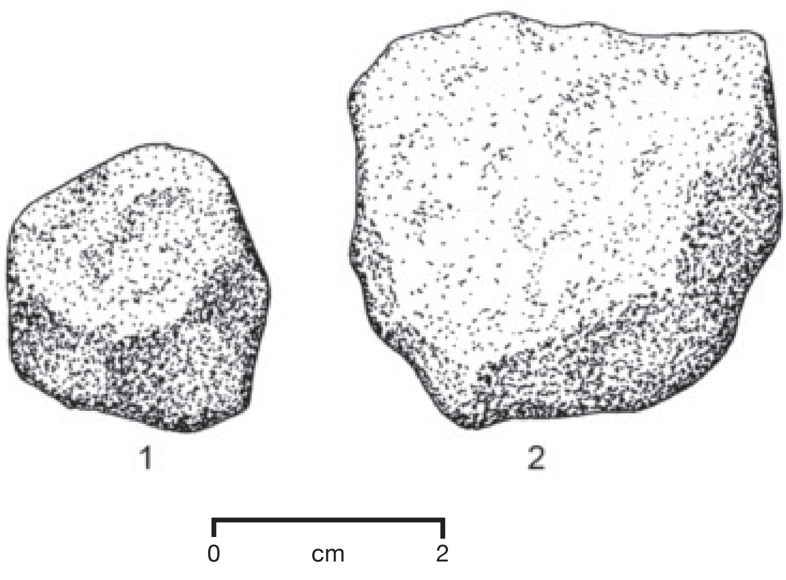


Fig. 3.97
Fire-making tools.
a: *Pyrite nodules.*
1: 26/20: 45
2: 19/19: 1015

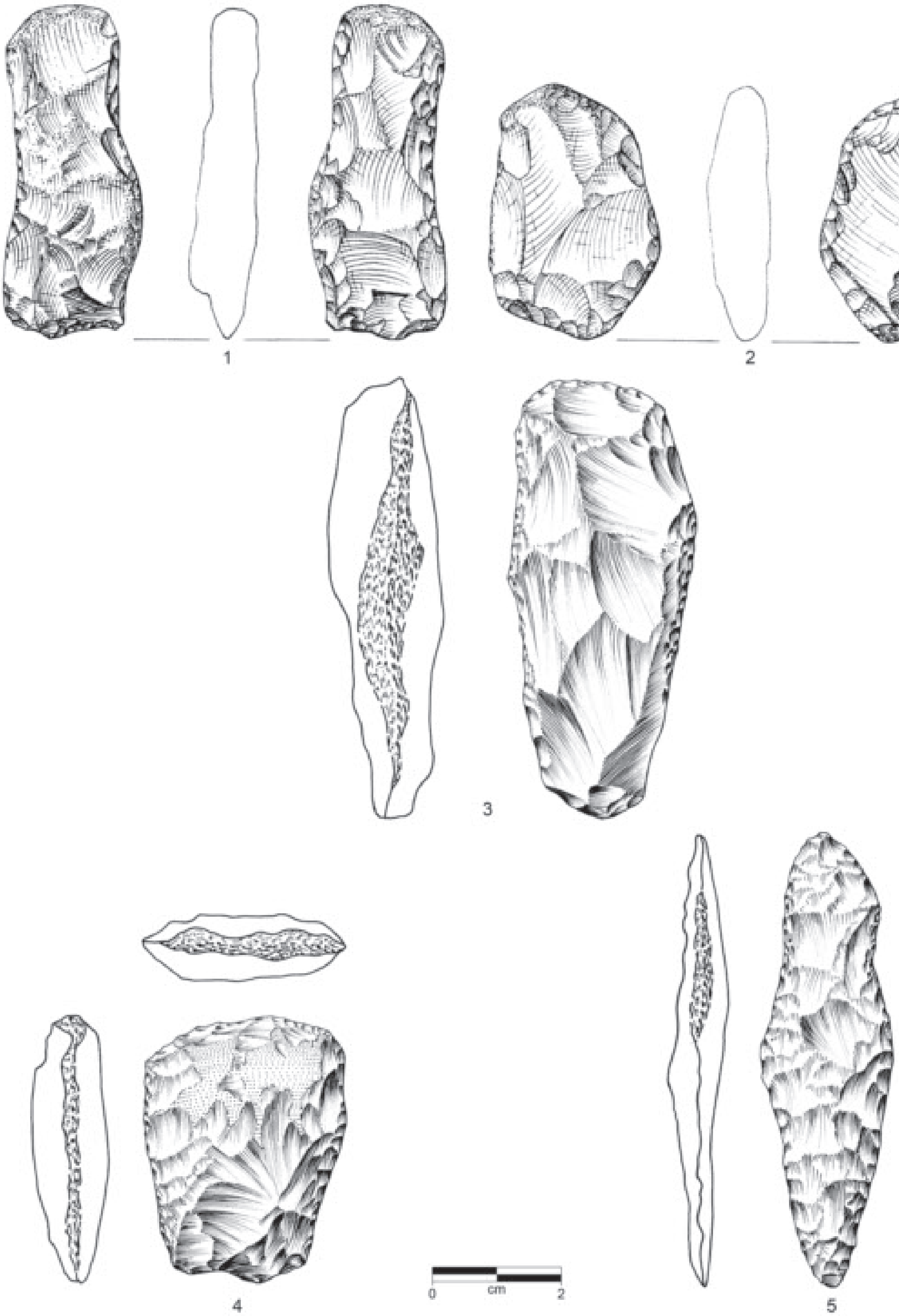


Fig. 3.97
b: *Hammerstones of killiaq, probably for striking sparks from pyrite nodules (1 and 2 drawn by Lykke Johansen, the remainder by LH).*
1: 83,5/252,0: 488; 2: 89/249: 84; 3: 12/23: 273; 4: 14/23: 59
5: 84,0/250,0: 6

rare use of blubber-fuelled lamps during the early Saqqaq period (see also Grønnow *et al.* 2014). This is not a formal lamp, but nevertheless it was shaped by coarse chopping and, judging by the black patches of charred blubber along the rim, frequently used. The lamp is a heavy sandstone measuring 230 mm by 240 mm, and is 90 mm thick. It weighs *c.* 3,200 g. It has an irregular depression on the upper side, surrounded by a 5–20 mm high rim. Part, if not all, of this concave upper side was shaped by hammering. Some naturally harder parts of the stone were not removed by this method and stand out as protrusions on the surface. The underside is asymmetric and only slightly worked. Only the rim shows a thin, heterogeneous black coating or thin crust of charred material, probably blubber. The weight, and the shape of the underside of the lamp, would enable it to stand steady on a soft surface of sand or turf.

From the uppermost layer in Area B, i.e. in a stratigraphically much later context than the informal blubber lamp described above, a worked kidney-shaped nodule of fine-grained sandstone (134 × 107 mm; thickness: 30 mm) was recovered. This object, depicted in Fig. 3.92, is described above (3.3.13) as it was ultimately used as a grinding stone. However, it was originally a preform of a sandstone blubber lamp. This is seen by the fact that the upper, flat side was shaped by careful picking with a pointed hammerstone resulting in a low rim (just 10 mm high) surrounding a shallow depression. The size and shape of this unfinished lamp indicate that it was intended to produce light rather than heat.

As already mentioned, blubber lamps are more than rare at the Qt site, reflecting the fact that lamps played a minor role in the material culture. However, the occasional use of a blubber lamp could have facilitated specific activities in areas inside the dwelling, providing light as a supplement to the central fireplace.

Finds from Qajaa:
The formal, circular Saqqaq soapstone lamp from the upper layers in Area K is an unusual finding from Qa. This is one of the few formal lamps discovered in Disko Bay (Fig. 3.99). The

Fig. 3.98
Heavy, informal blubber lamp of sandstone from Qt (88,0/251,0: 31). (Photo: JL).

Fig. 3.99
Formal soapstone lamp from Qa. (Photo: JL).

diameter of the circular lamp is 113 mm and the wall is 13.5 mm thick at the bottom. Scratch marks are seen on the convex as well as on the concave side. No soot is seen on the surface.

In addition, a single small rim fragment of a soapstone lamp was found in Area E,a at a depth of 70–80 cm, which is also the upper part of the Saqqaq layers.

3.3.20 Spoons and ladles (Fig. 3.100)

Spoons and ladles were most frequently made from driftwood (nine specimens), but also antler (three specimens) and sperm whale tooth (one specimen) were used. The designs revolve around elongate oval or 'drop-shaped' bowls with smooth transitions to short, flat handles with rounded or chevron-shaped ends.

The wooden spoons are present at different stages of their *chaîne opératoire*:

First stage:
Fig. 3.100a is a preform made from *Picea* sp. of a slender drop-shaped spoon (l: 220 mm, w: 55 mm). The blank shows adze marks all over and is quite roughly worked at this stage. The depression was chopped in two stages. The first series of adze blows roughly marked the outline of the bowl of the spoon and the second series deepened the central part of the depression.

Second stage:
Fig. 3.100b is a complete but probably not quite finished spoon or ladle. The sides have not been thinned (the walls are 10 mm thick), the handle has not been shaped and the surface has not been polished in order to remove the chopping marks. The shape and the growth rings suggest that it was made of a trunk with a diameter of no more than 100 mm. The spoon is 201 mm long, including a 45 mm long, roughly shaped handle, and the diameter of the bowl of the spoon is 66 mm.

Fig. 3.100c is like the previous spoon, complete but not quite finished. It is a large spoon (l: 270 mm; w: 64 mm; t: 6 mm) with a quite flat bowl and a flat handle (l: 78 mm) with an angular end. It was made from driftwood with remarkably wide growth rings.

Third stage:
Fig. 3.100d is a fairly small, slender spoon (l: 172 mm; w: 37 mm) with a 45 mm long, thin tapering handle. It shows a 'polished' surface and in particular the distal end is worn. Made of *Picea*

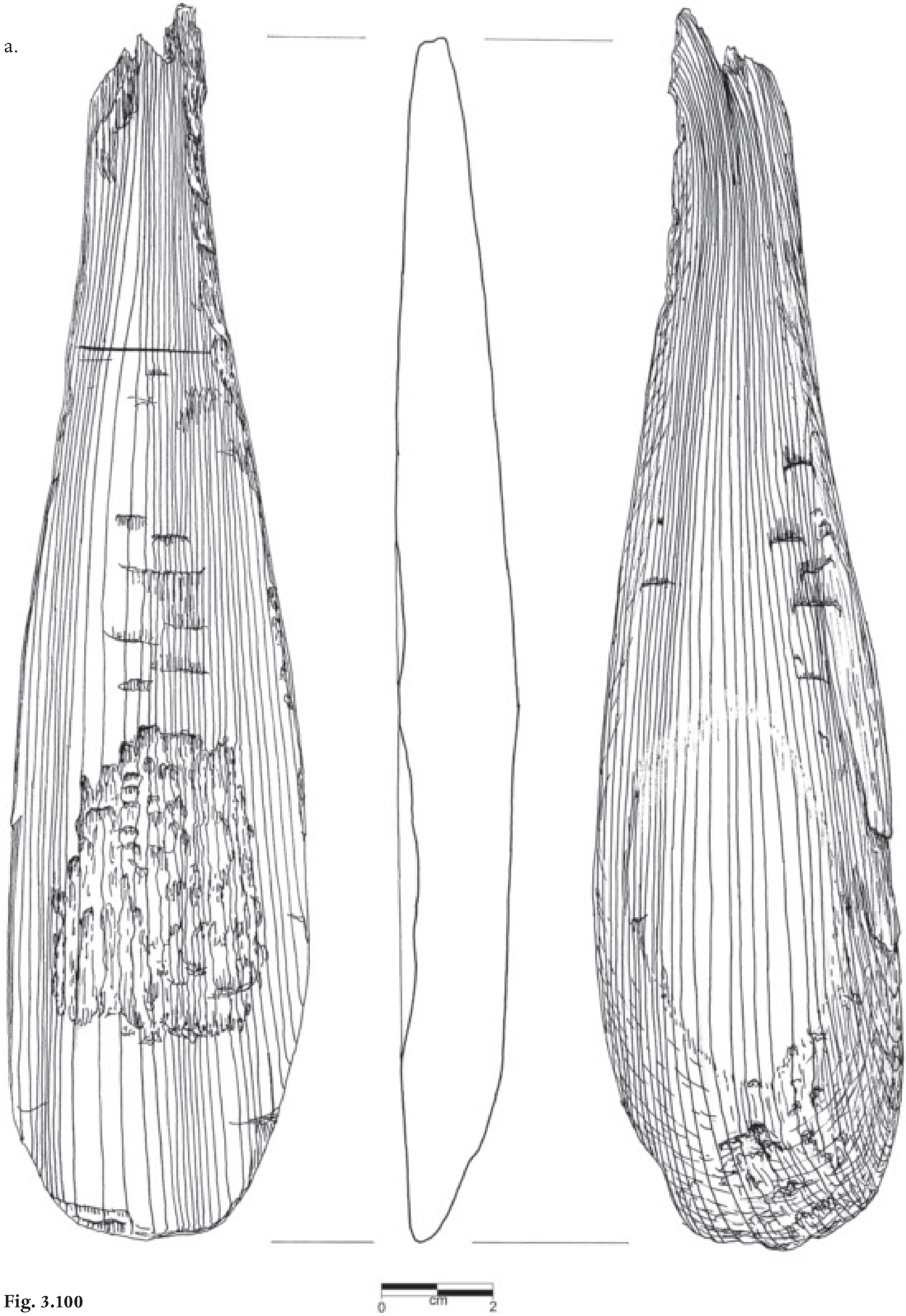
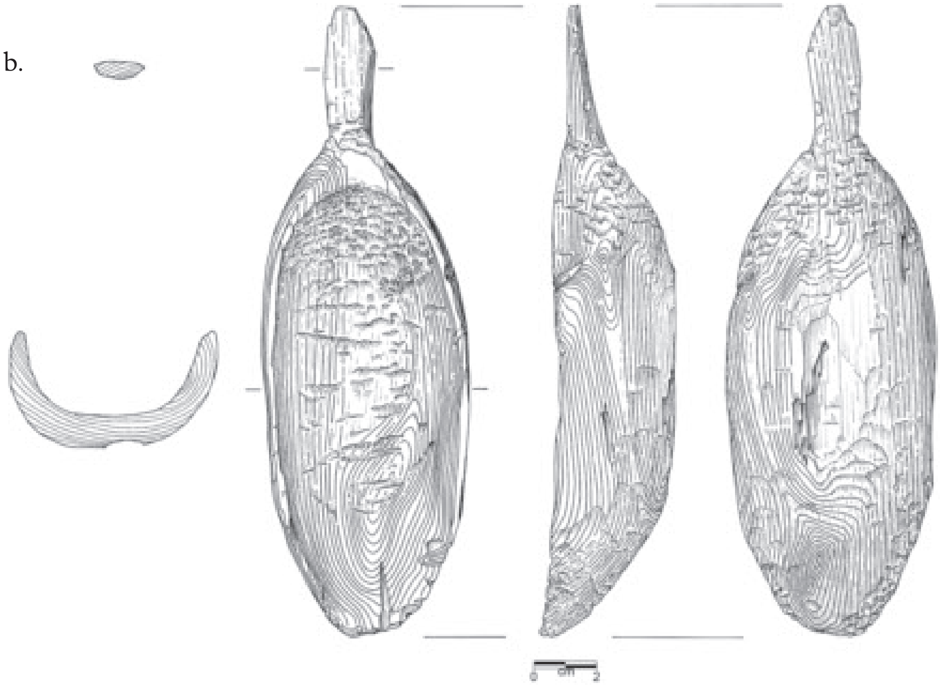


Fig. 3.100
Spoons and ladles.
a: *Preform (20/20: 55).*

b.



c.

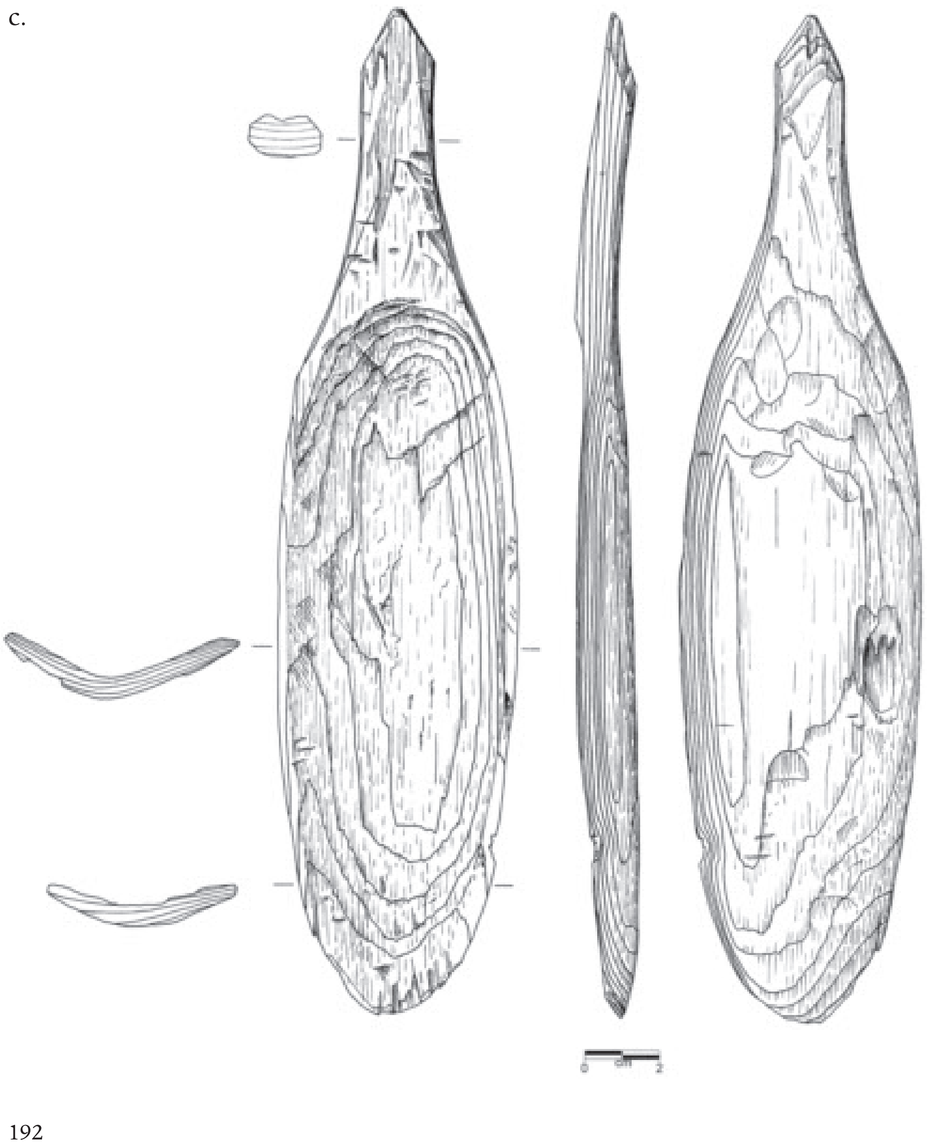
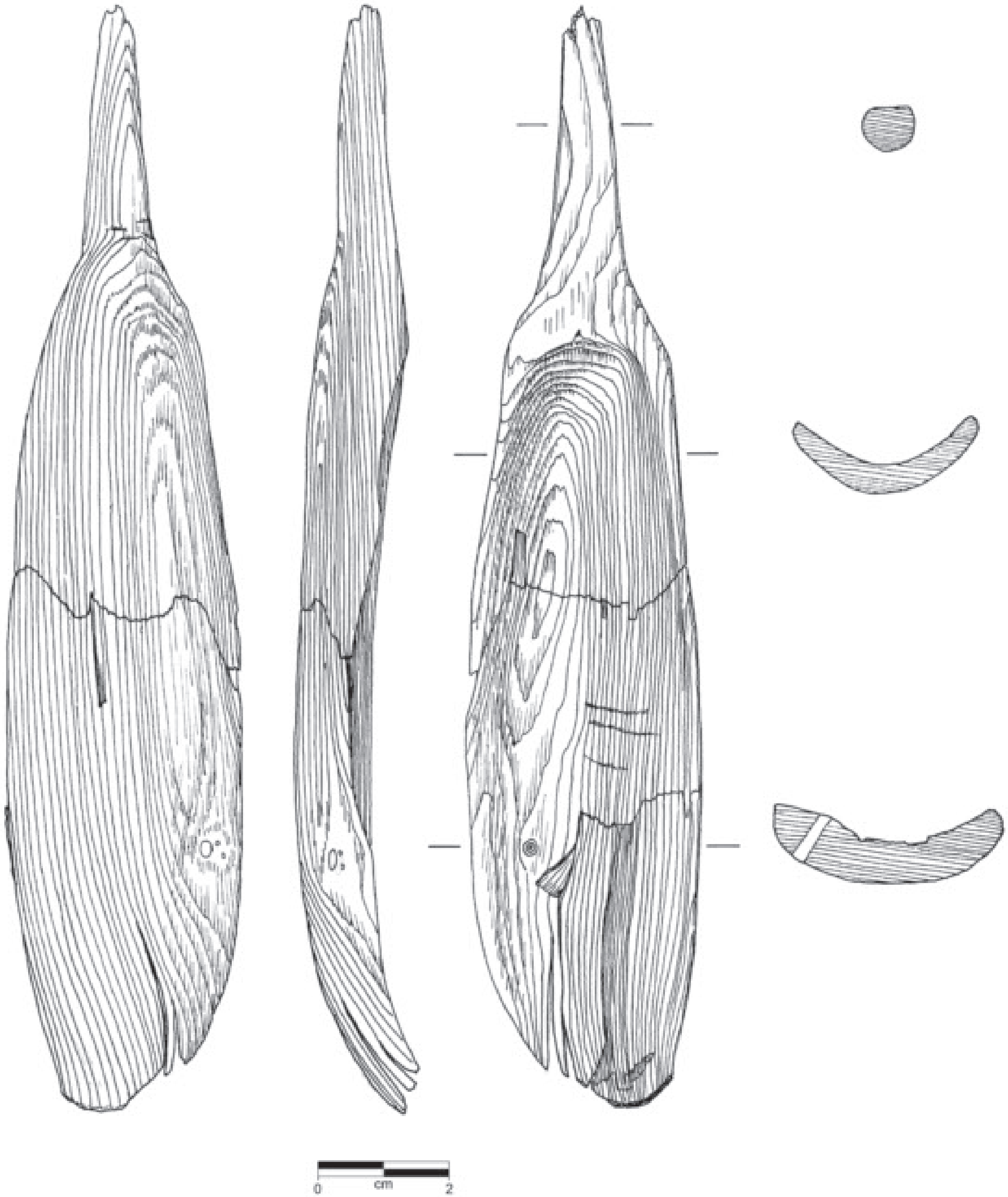


Fig. 3.100
b: *85/250: nn*
c: *26/21,5: 30*
d: *88,5/249,5: 22*

d.



sp., the thickness of the side of the bowl increases towards the distal end (from 5 mm to 7 mm). It represents a stage where the spoon is worn, but not yet exhausted.

Fourth stage:
Fig. 3.100e is a used, repaired and discarded largish spoon of driftwood with broad growth rings. The bowl of the spoon is quite deep (about 30 mm) and has a flat front, which is marked by heavy wear. The total length of the spoon is 210 mm (including the 146 mm long and 70 mm wide bowl). The proximal end of the now 60 mm long handle is broken and was originally longer before the specimen was discarded. One side of the bowl of the spoon was repaired: a loose fragment of the rim and a connected crack was fixed by lashing with baleen strings through four elongated holes cut through the side of the bowl. The lashings were locked and the holes tightened by means of small wedges of wood, which were pressed into the holes. A loose 'locking wedge' of this kind is included in the assemblage as well (85/254: 10).

The remaining wooden spoons or ladles are fragments:

Fig. 3.100f is a handle with a fragment of the proximal end of the bowl of the spoon. The 67 mm long handle with rounded end is quite carefully made of *Picea* sp.

Fig. 3.100g is a fragmented bowl of a very slender spoon (w: 35 mm) of *Juniperus* sp. with a carefully worked surface. It is partially burnt.

Fig. 3.100h shows three connected fragments of a spoon or ladle with a pointed oval bowl. It was made from *Picea* sp.

88,0/251,5: 22 is the proximal end fragment of a flat spoon handle (w: 14 mm), very carefully made with chevron-shaped end and a longitudinal (ornamental?) groove on the upper side. It was made from *Abies* sp.

As mentioned above, four spoons of a similar design to the wooden ones were made of antler and ivory:

Fig. 3.100i is a large, now quite flattened spoon carved from a solid 'plate' from the palmation of a caribou antler (l: 215 mm; w: 75 mm). It has a quite short (l: 47 mm), flat handle with a rounded end. Longitudinal shallow grooves (from use?) are seen on the back side of the bowl.

Fig. 3.100j is a somewhat deformed spoon carved from a thin antler plate. The wall is only 1–2 mm thick. The bowl of the spoon is only 105 mm long and 40 mm wide, but the handle, with its chevron-shaped end is about the same length as the above-mentioned large specimen (47 mm) making the total length of the spoon 152 mm.

Fig. 3.100k is also carved from a plate of the palmation of an antler and it is roughly of the same design (l: 147 mm; w: 51 mm). The handle is 42 mm long and the length of the now flattened bowl is 105 mm. Longitudinal, irregular grooves are seen on both the inner and outer sides of the bowl.

Fig. 3.100l is a small spoon of an unusual material: sperm whale tooth. It was carved from a tooth with an original diameter of about 60 mm, and the design of the spoon is to a certain extent determined by the natural shape of that tooth (l: 131 mm, w: 40 mm; bowl l: 101 mm; handle l: 30 mm). The bowl of the spoon has kept its original oval shape and its depth of 20 mm. The side is 2 mm thick at the rim and a maximum of 5–6 mm thick at the bottom. The spoon shows longitudinal shallow grooves (work traces or from use) on the inside of the bowl and transverse cut marks on the outer side.

In spite of the relative uniformity of their design, the preserved spoons and ladles are of such different sizes and materials that they must have had many different functions, ranging from soup spoons to ice scoops.

Many bowls of spoons are probably represented in the comprehensive material of undetermined wooden side fragments.

Finds from Qajaa:
A single piece of a wooden spoon was recovered from Qa. The fragment is 100 mm long and 26 mm wide. Part of the handle is preserved along with part of the rim. The convex exterior

e.

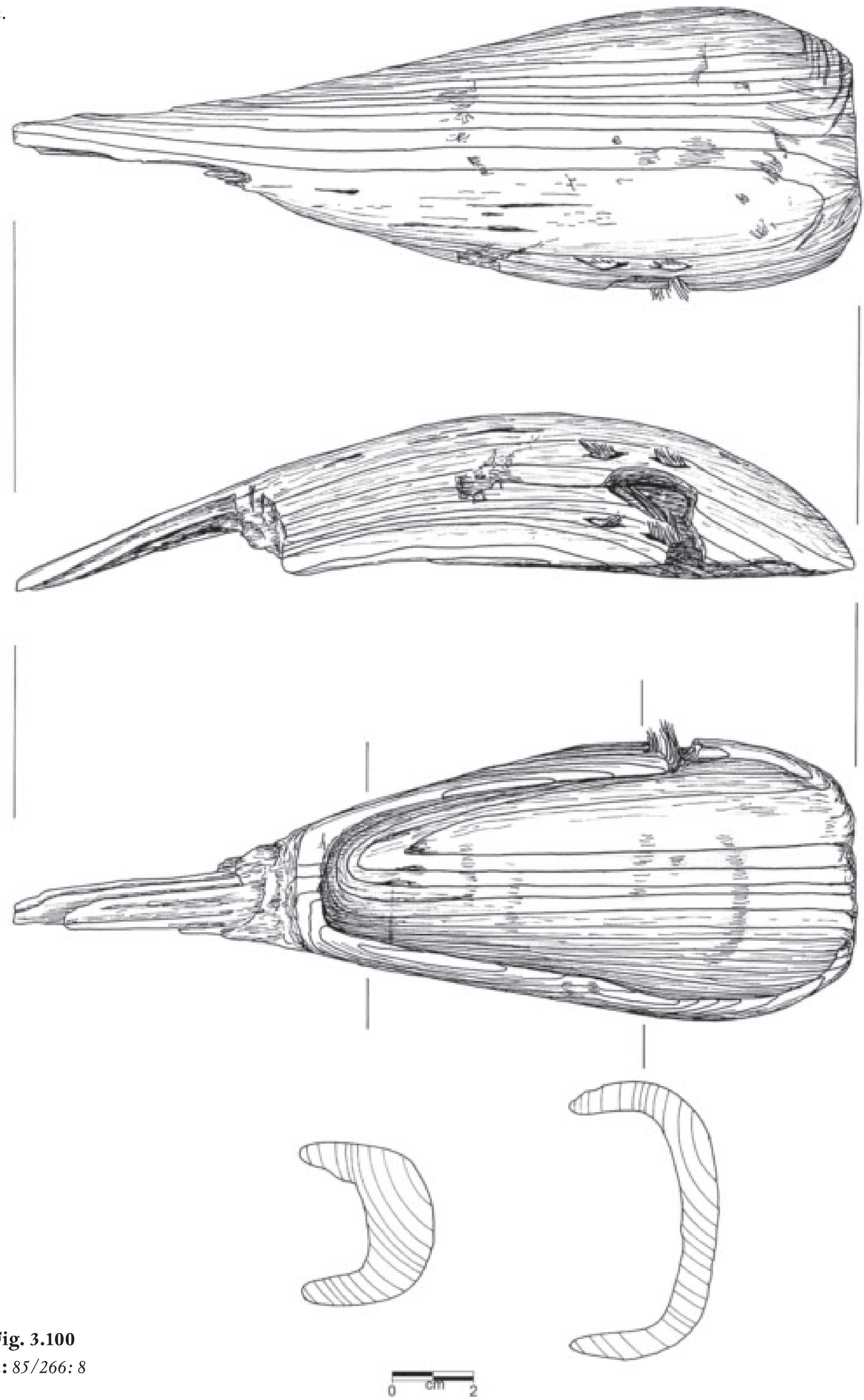
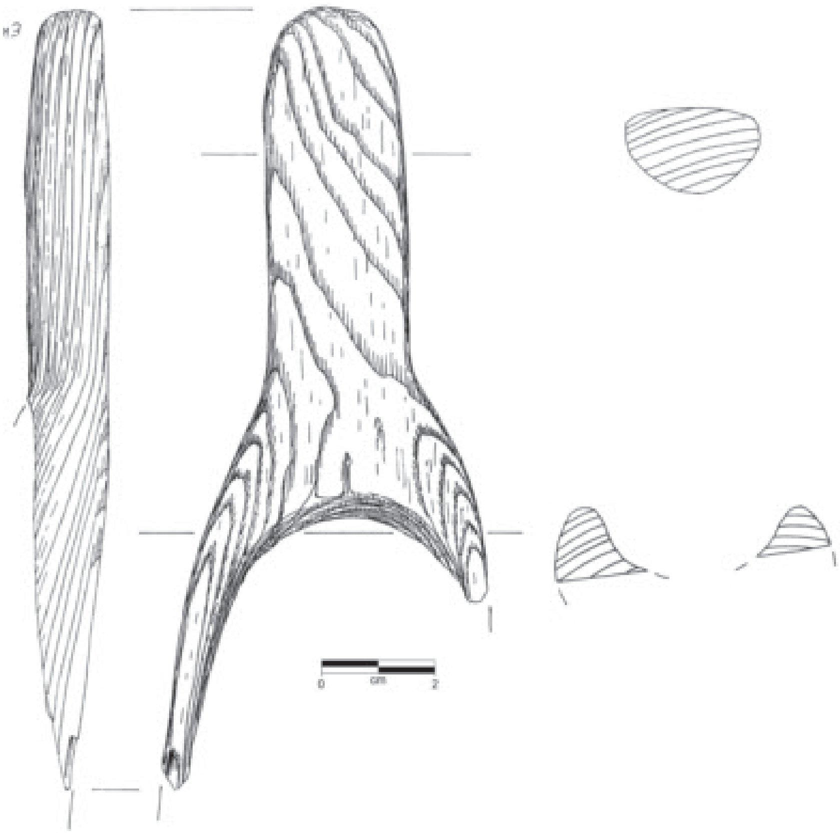


Fig. 3.100
e: *85/266: 8*

f.



g.

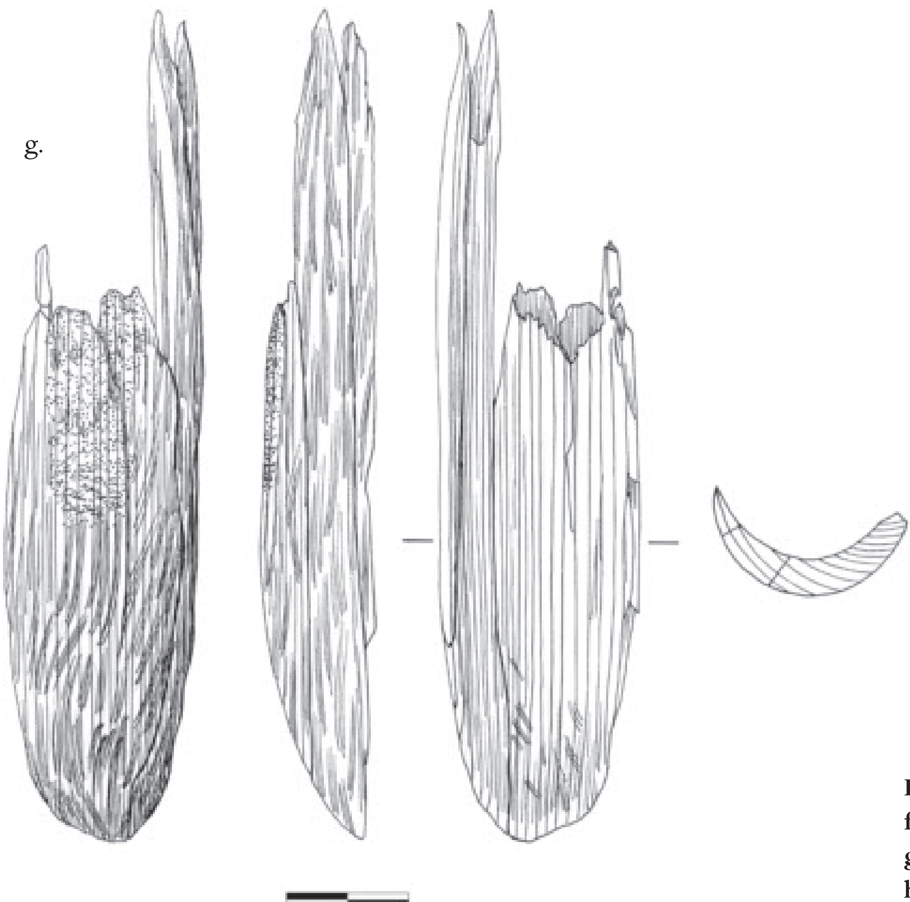
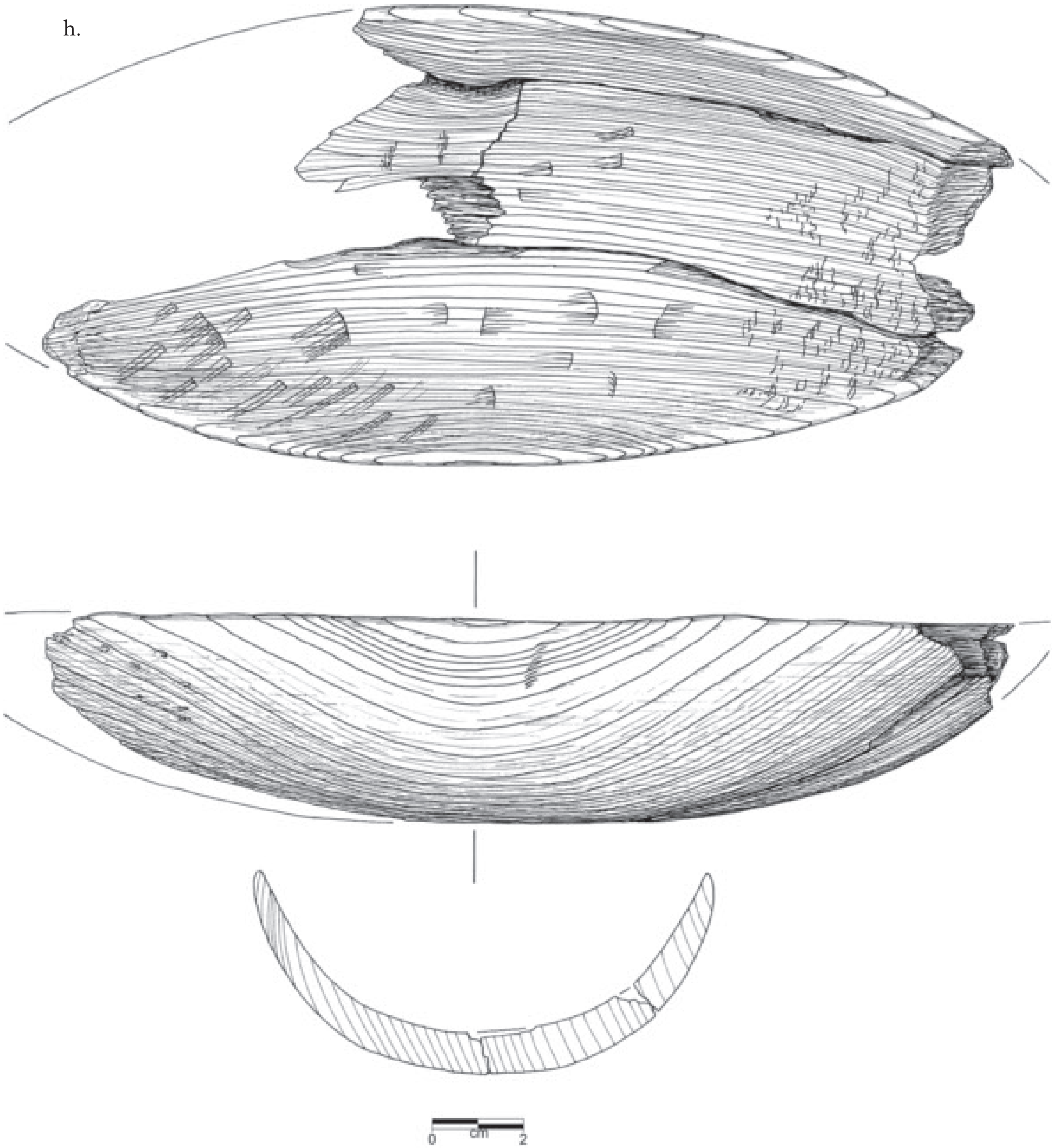


Fig. 3.100
f: *85/256: 12*
g: *83,0/251,5: 18*
h: *87,5/248,0: 10, 11 and 12*

h.



i.

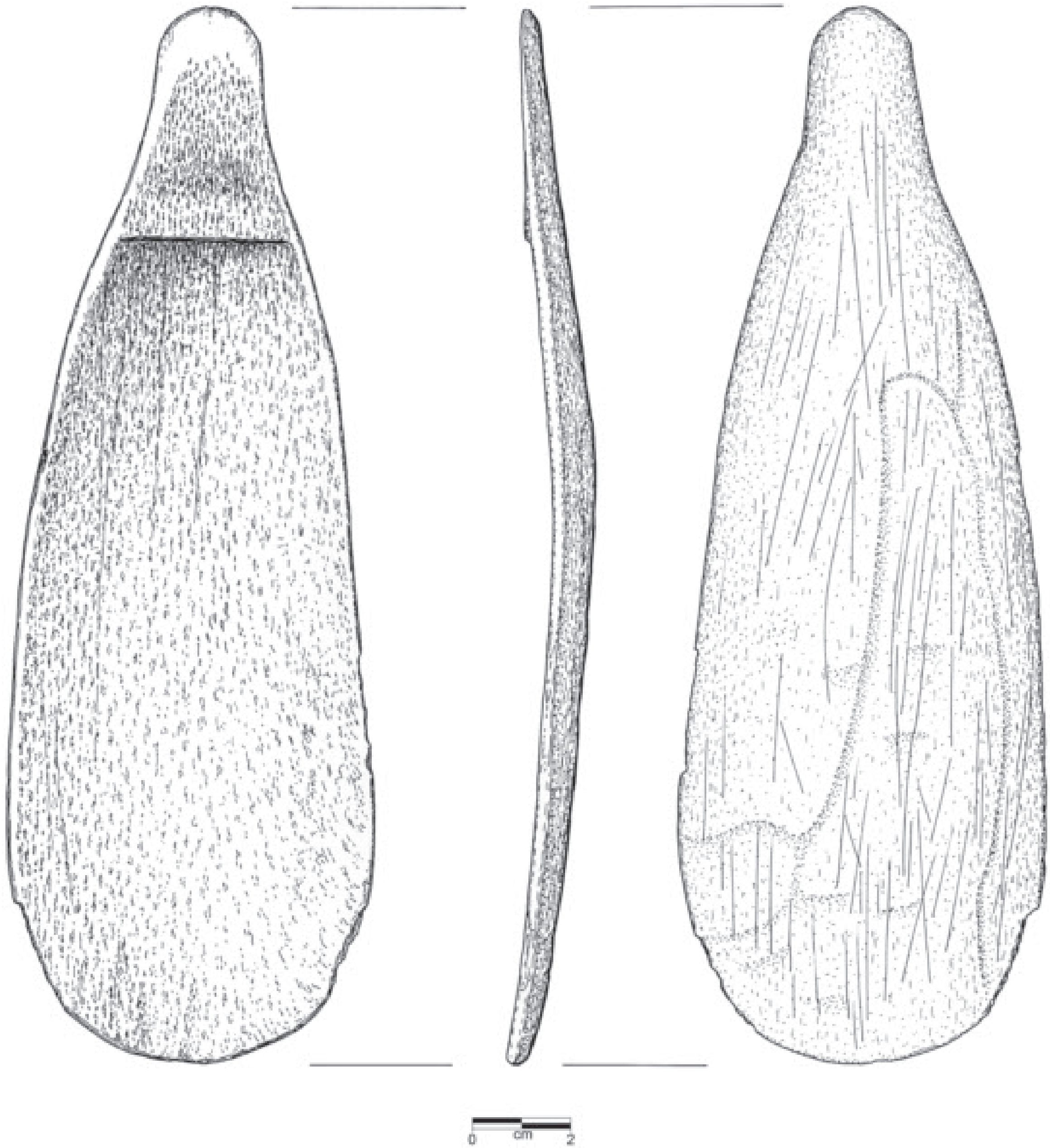
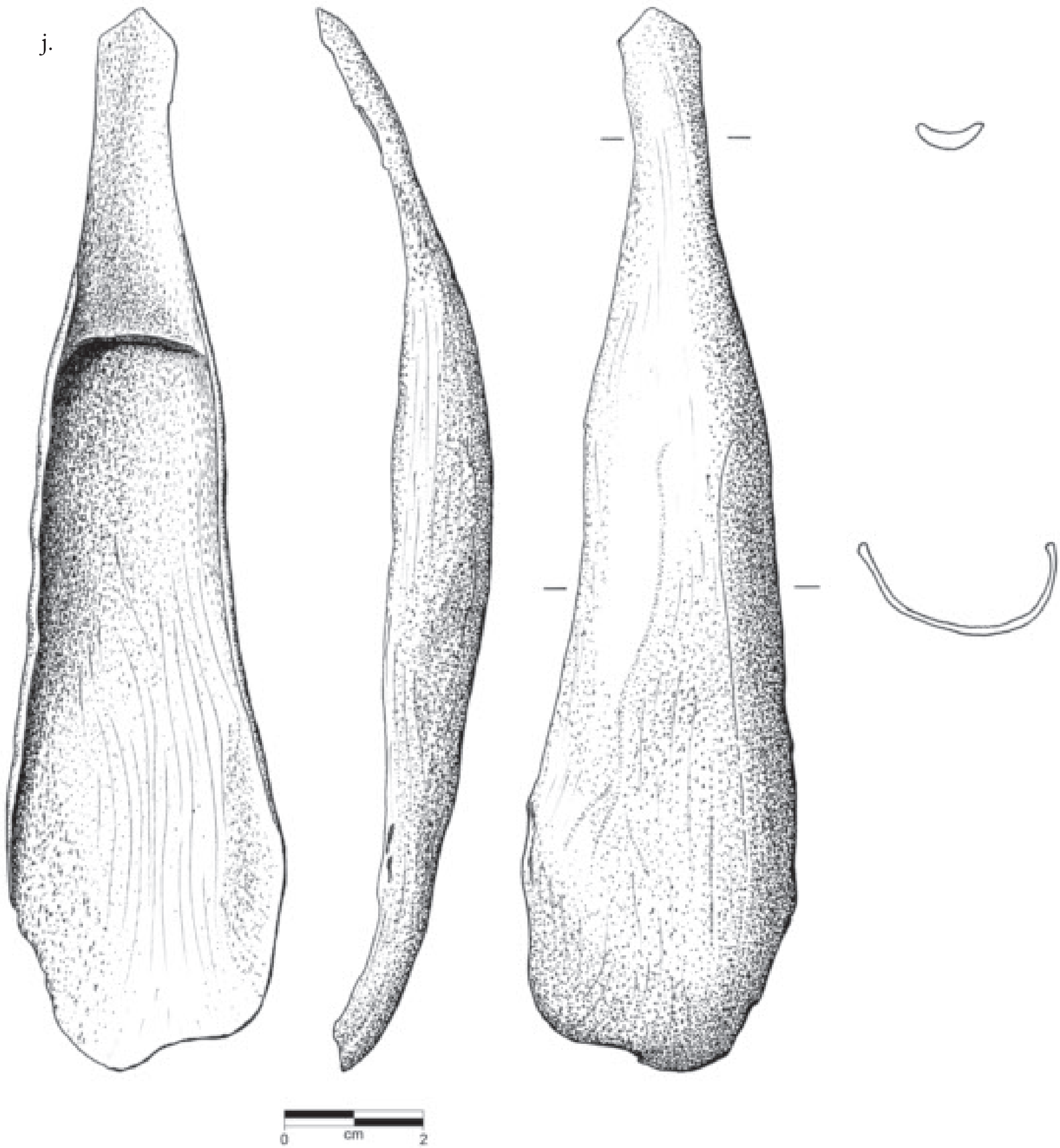
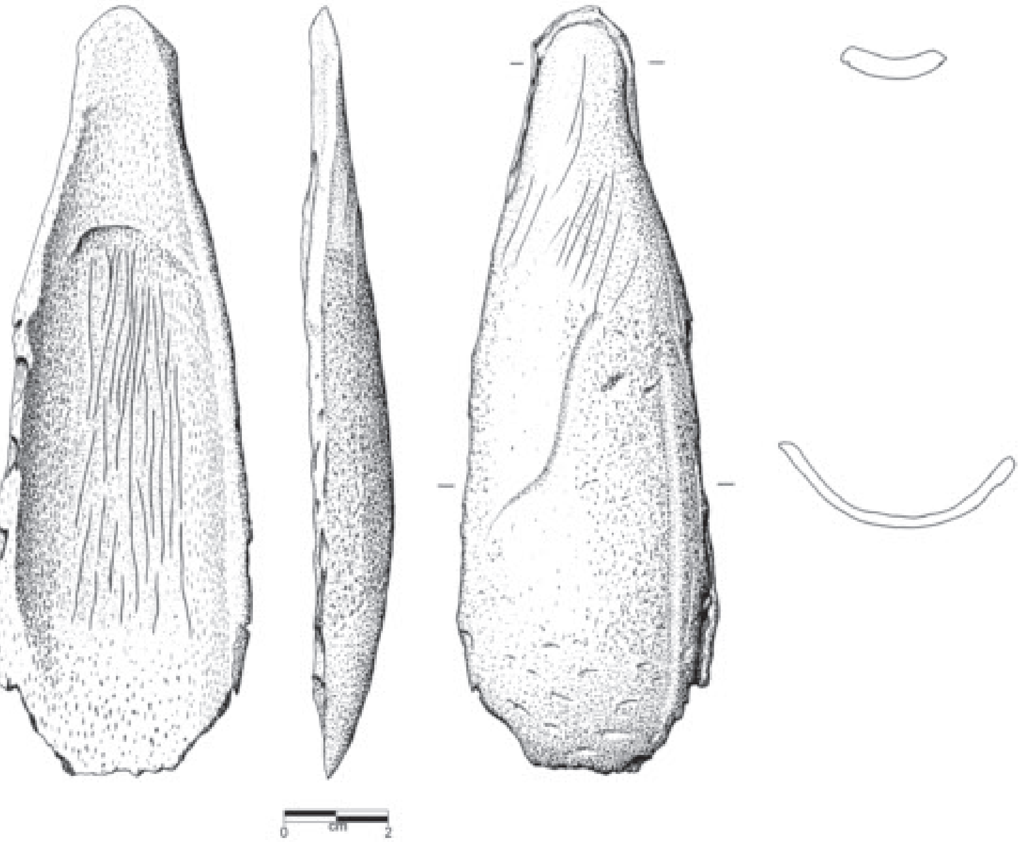


Fig. 3.100
i: *87,0/248,5: 5*
j: *12/23: 5d/6*

j.



k.



l.

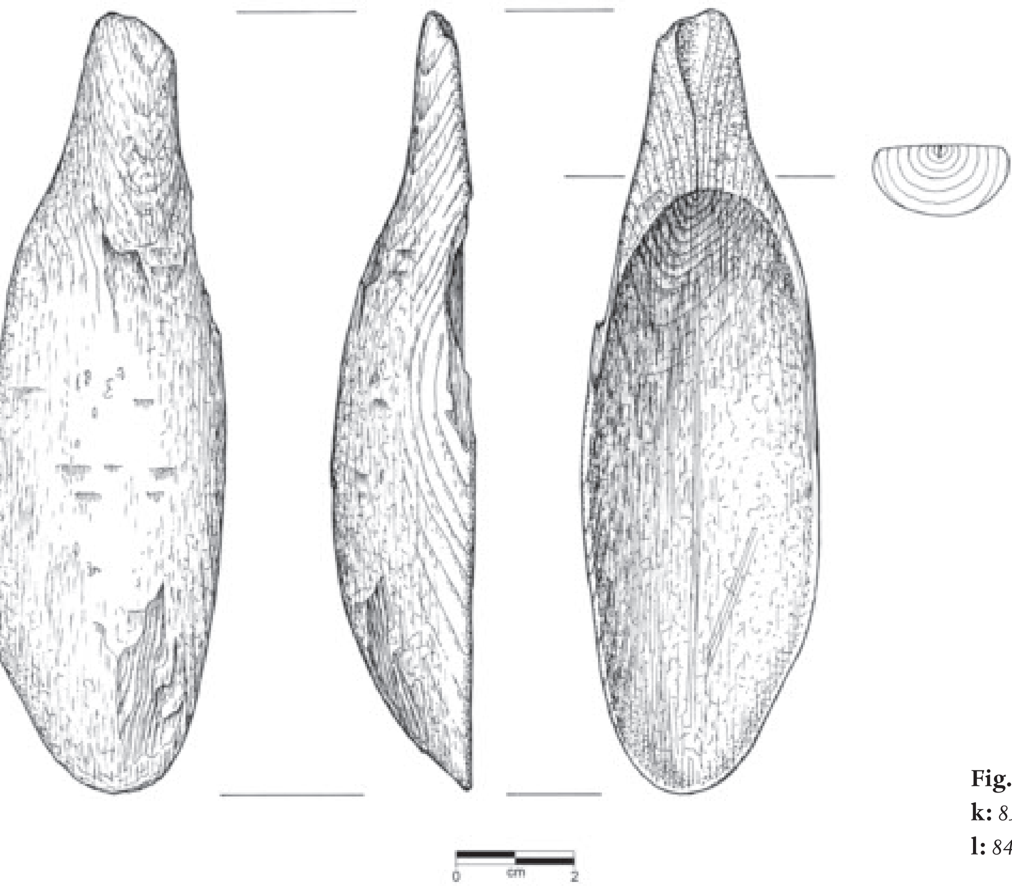


Fig. 3.100
k: *85/250: 12*
l: *84,0/251,0: 10*

side shows series of parallel scratches from the manufacturing. Wall thickness: 8 mm.

3.3.21 Bowls and trays (Fig. 3.101)

The large number of fragments – more than 60 – of various wooden containers is evidence of the importance of these classes of utensil in the domestic sphere at Qt. Only a few almost complete specimens have 'survived' settlement activities in the past as well as later deformation in the culture layers, but some are in a state which allows reconstruction of the complete container.

Fig. 3.101a is an almost complete, large oval bowl (l: 401 mm; w: 161 mm) with quite thin walls (max. t: 8 mm). Consisting of six connected fragments, it is completely flat, probably due to deformation in the soil. It was made from coniferous wood with quite wide and irregular year rings. Cut marks from an adze edge are seen on both sides, and the inner side was also finished by grinding or scraping. Probable usage wear is seen as polished zones at the inner side of the rim. The inner side is also characterized by charred round depressions and irregular charred areas, a feature which is often seen on bowls. This phenomenon will be discussed below.

Fig. 3.101b is a complete bowl consisting of several fragments. It is now deformed, but the reconstruction shows that originally it was a carefully made, quite deep oval bowl (l: 194 mm; w: 92 mm) with thin walls (max. t: 6 mm). It was carved from a piece of coniferous wood with irregular, wide year rings. The bowl shows large charred areas on the inner as well as the outer side.

Fig. 3.101c is an end and side fragment of a large thick-walled (t: 10 mm) bowl with a rounded rim. It was made from an irregular *Picea* sp. trunk with quite wide growth rings and lots of small holes from insects.

a.

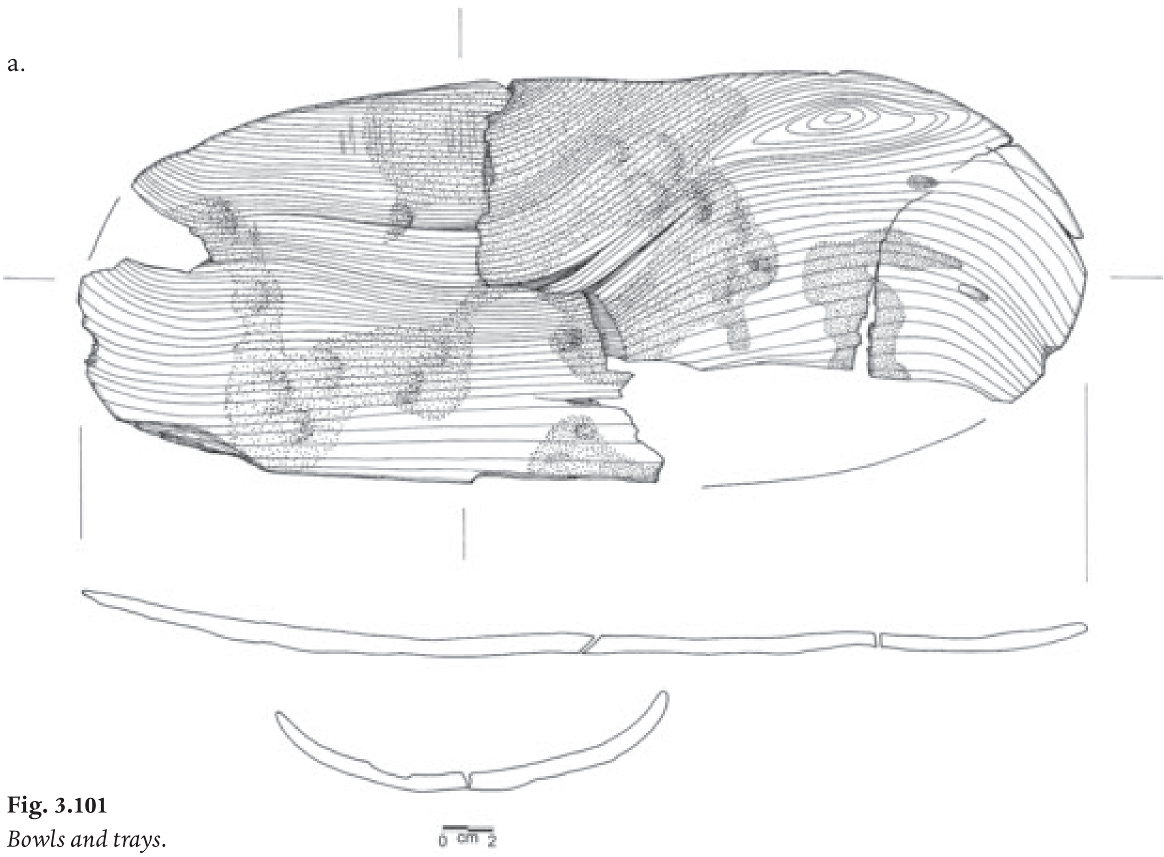


Fig. 3.101
Bowls and trays.
a: *14/23: 35*

19/19: 88 is a fragment of the largest bowl or tray in the assemblage. From one end to the other the fragment is 545 mm long, and the original length of the specimen is estimated at about 600–650 mm. The width cannot be calculated from the fragment. The walls are only 8 mm thick at the mid section, but 15 mm at the ends. Thus this huge bowl can best be described as a 'dug out' tree trunk of coniferous wood with wide year rings.

Fig. 3.101d is an end fragment of a large bowl or tray of the same kind as 19/19: 88 described above. It is quite coarsely made from a trunk of a *Salix* sp. with clear chopping marks on both sides and it is thick-walled (t: 18–25 mm). It may well be a preform of a long, slender bowl. It is charred on both its inner and outer sides.

Fig. 3.101e is a rim fragment of a very large bowl. The piece is repaired: two pairs of elongated carved holes show that a large rim section that had broken off was patched to the side of the bowl by means of two lashings. One lashing was made through a pair of elongated, carved holes at one end of the break; the other lashing connected a hole in the bowl wall with a notch in the rim of the fragment. The bowl is quite thin-walled (t: 7 mm) and from *Picea* sp.

Fig. 3.101f is an end fragment of a large bowl of wood with remarkably broad growth rings and a wall thickness of 10 mm. Traces of repair are seen in the shape of an elongated carved hole for patching up this piece with a counterpart now lost. Wear marks are seen on the outer side of the rim.

95/250: nn consists of two connected fragments forming about half a large oval bowl. The piece is now 324 mm long, but the original dimensions are estimated at l: 340 mm and w: 120–130 mm. The wall is 12 mm thick. It was made from a piece of irregular driftwood.

Fig. 3.101g is an end fragment of a bowl or a spoon/ladle. It is thin-walled (t: 5 mm) and very carefully finished and repaired. The fragment is 205 mm long, and shows very fine traces of scraping on the outer side. It was patched up using the same technique as the spoon/ladle described above. Its broken, rounded end was lashed to its counterpart via two carved holes and connected grooves for countersunk lashings, which were locked by tiny wooden wedges – still preserved – pressed into the holes. This excellent piece was made from *Juniperus* sp.

The remaining 28 fragments of rims of wooden containers confirm the picture drawn by the almost complete specimens and larger fragments described above. Their wall thickness varies between 5 mm and 18 mm (average 9 mm), and except for one of *Larix* sp. they were all made from *Picea* sp., most often with wide, irregular year rings. Eight of the fragments show irregular, charred areas, six of them only on the inner side.

Fourteen specimens are fragments lacking rim zones. Their average wall thickness of 9 mm confirms the measurements presented above. However, one piece is no less than 20 mm thick. Three have been determined to be of *Picea* sp. and one of *Juniperus* sp. Two 'shards' show charred inner sides.

As is indicated in the descriptions above, the technology applied in producing and repairing driftwood containers was quite advanced, and the finds show that a wide variety of sizes and shapes were produced: from carefully made, thin-walled oval bowls to dug out containers over 600 mm long, which could be designated 'trays'. Obviously they served different functions. Marks of wear – in particular polishing at the rim zone of the regular oval containers – and the careful patching up of broken vessels show the intensive use of these implements, probably in connection with food processing and serving. In this respect the bowls and the spoons/ladles are related.

The charred areas on both inner and outer sides of many containers are due to events in the final stage of their life cycle: discarded bowl fragments were, like many other exhausted wooden implements, used as fuel in open fireplaces. However, a number of containers show patches of charring only on the inner side. These patches are irregular and overlap traces from the finishing of the inner side by scraping. Thus they are not traces from the hollowing out by means

b.

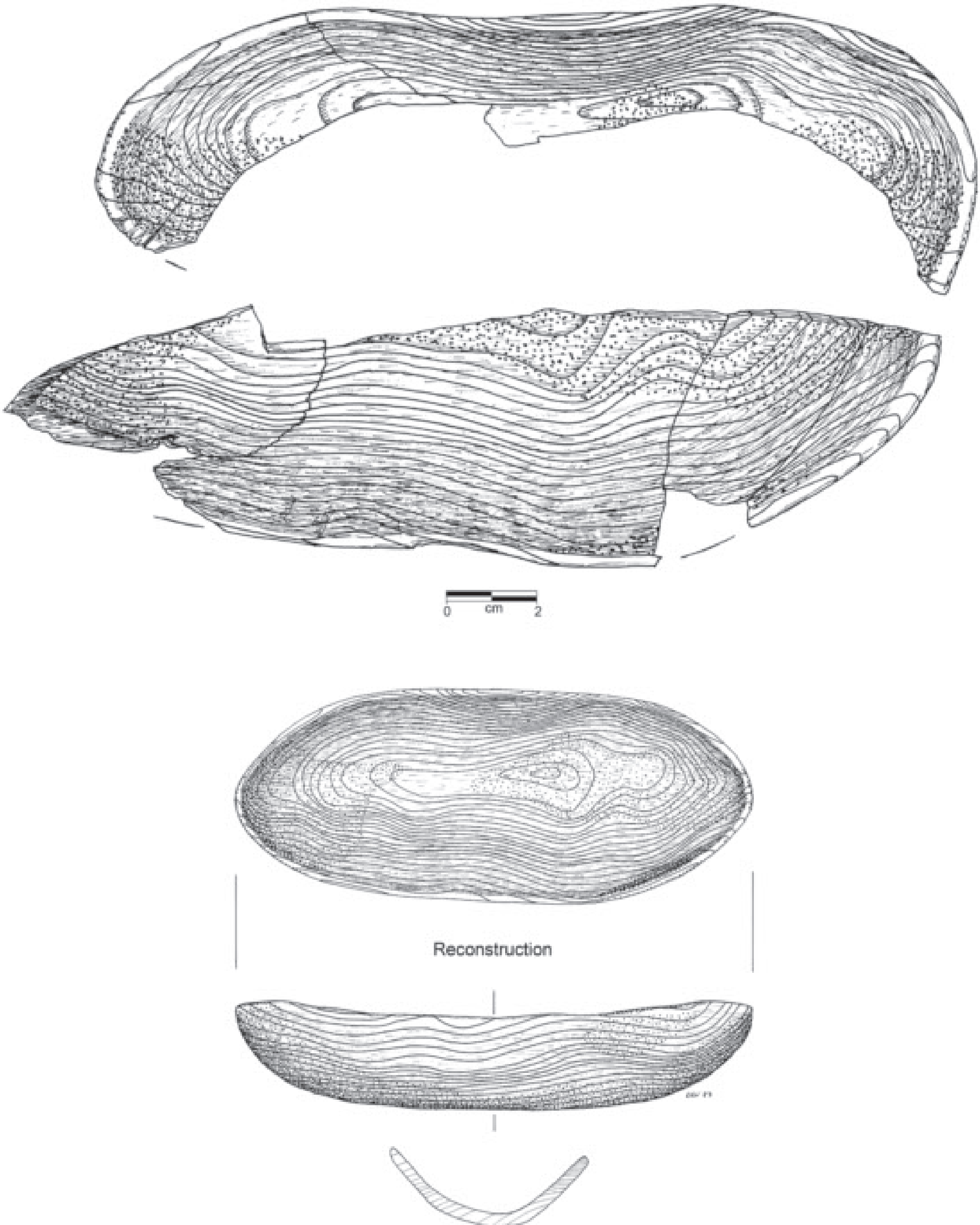


Fig. 3.101
b: *85/265: 9*

c.

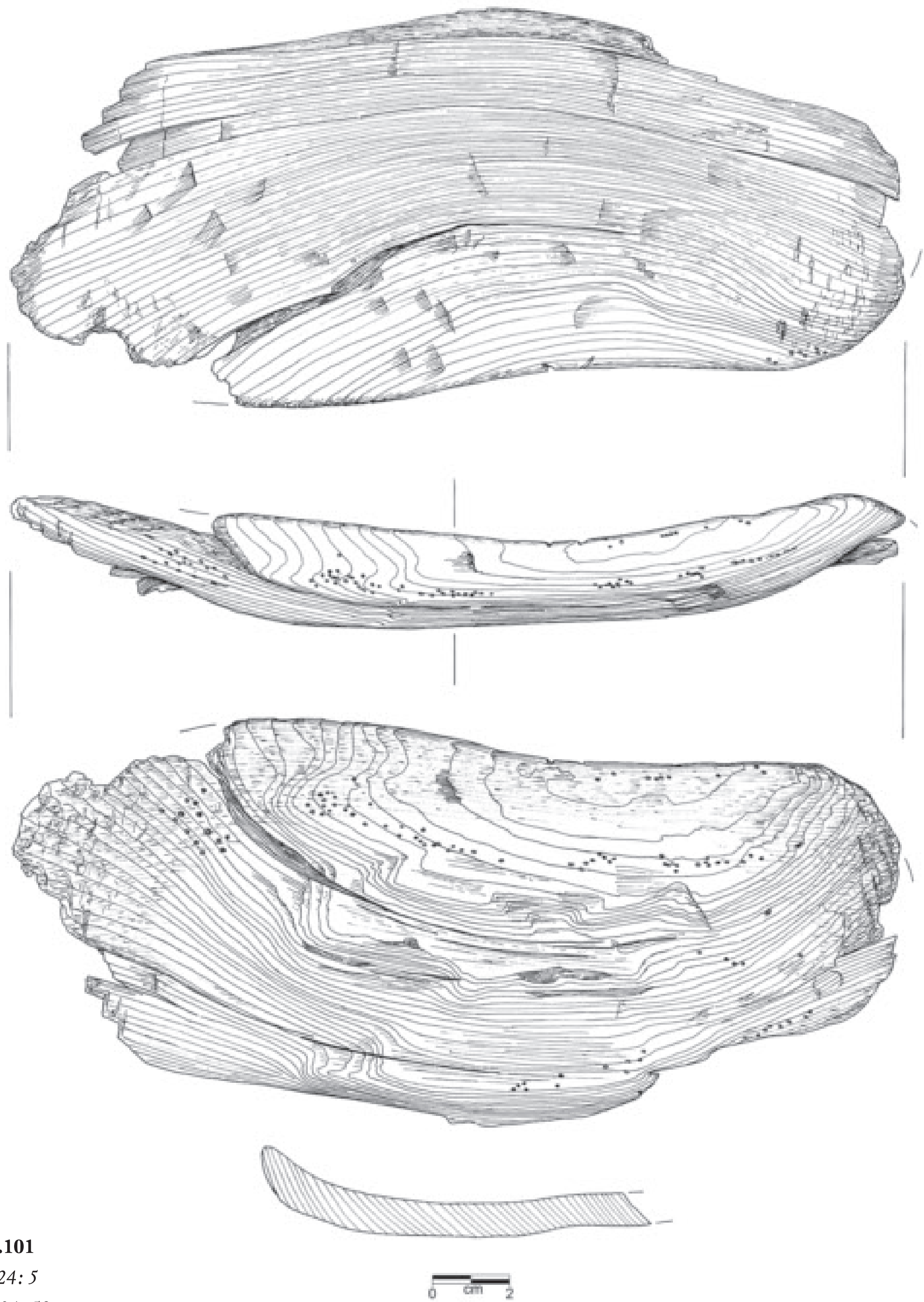
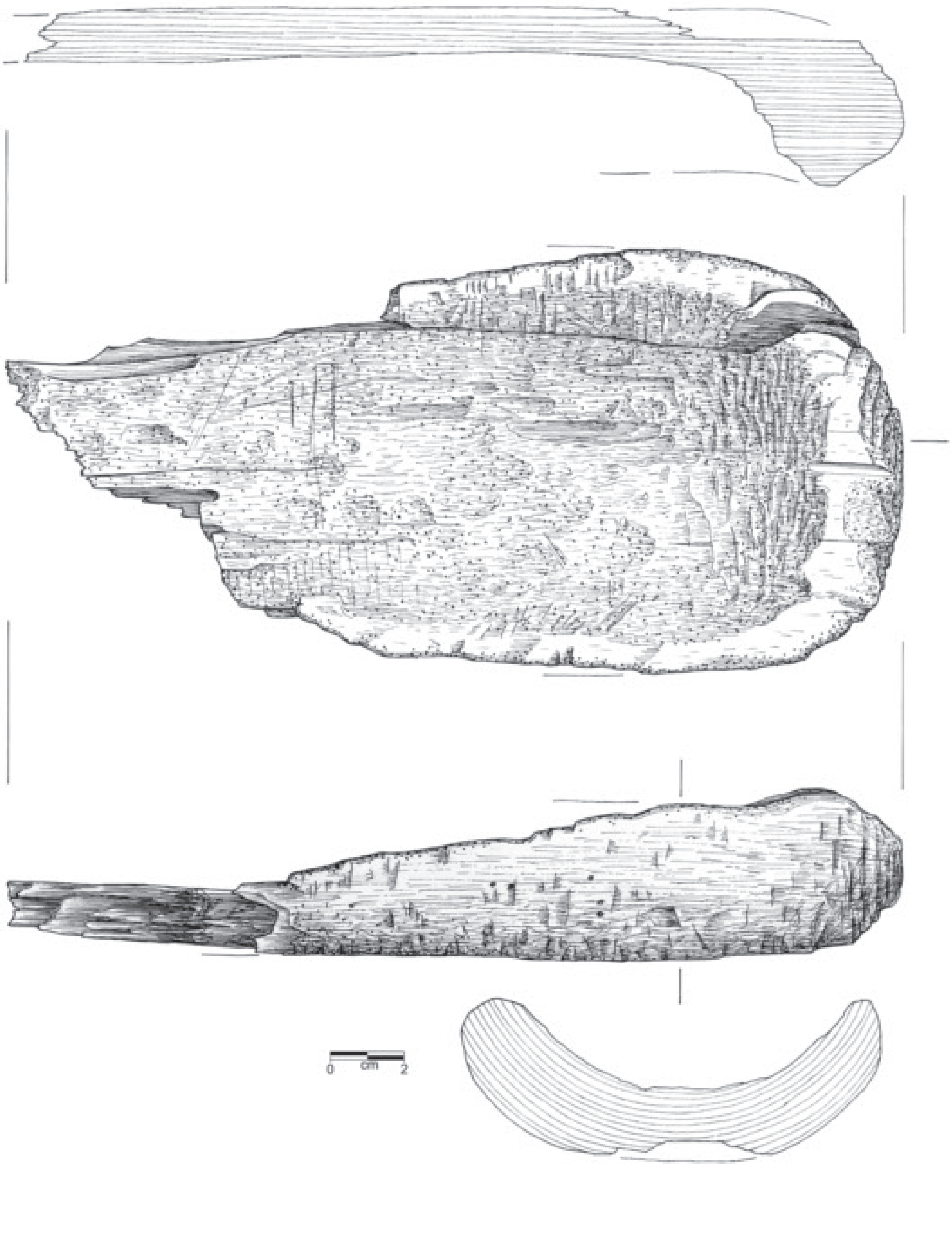


Fig. 3.101
c: *13/24: 5*
d: *14/24: 50*

d.



e.

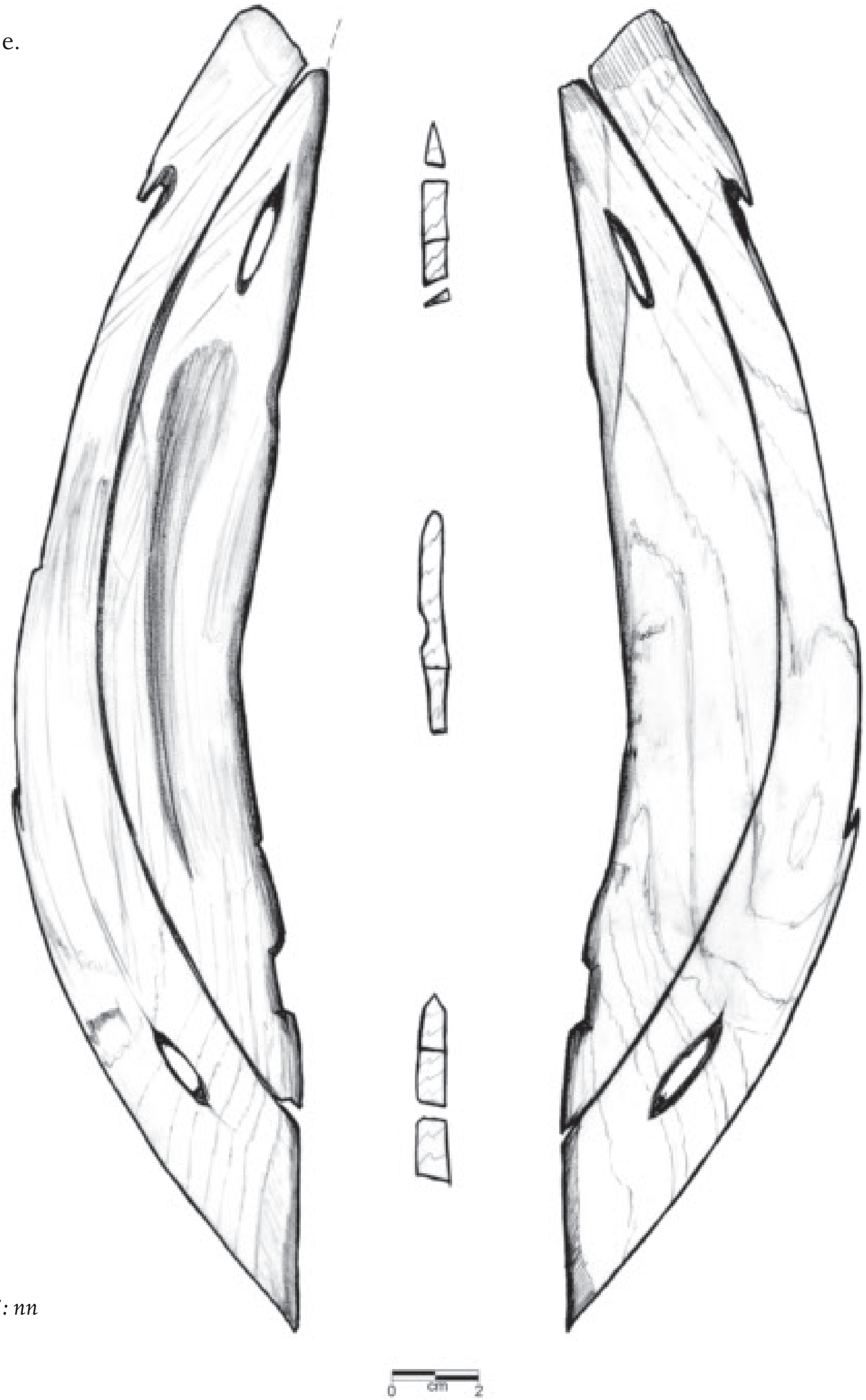
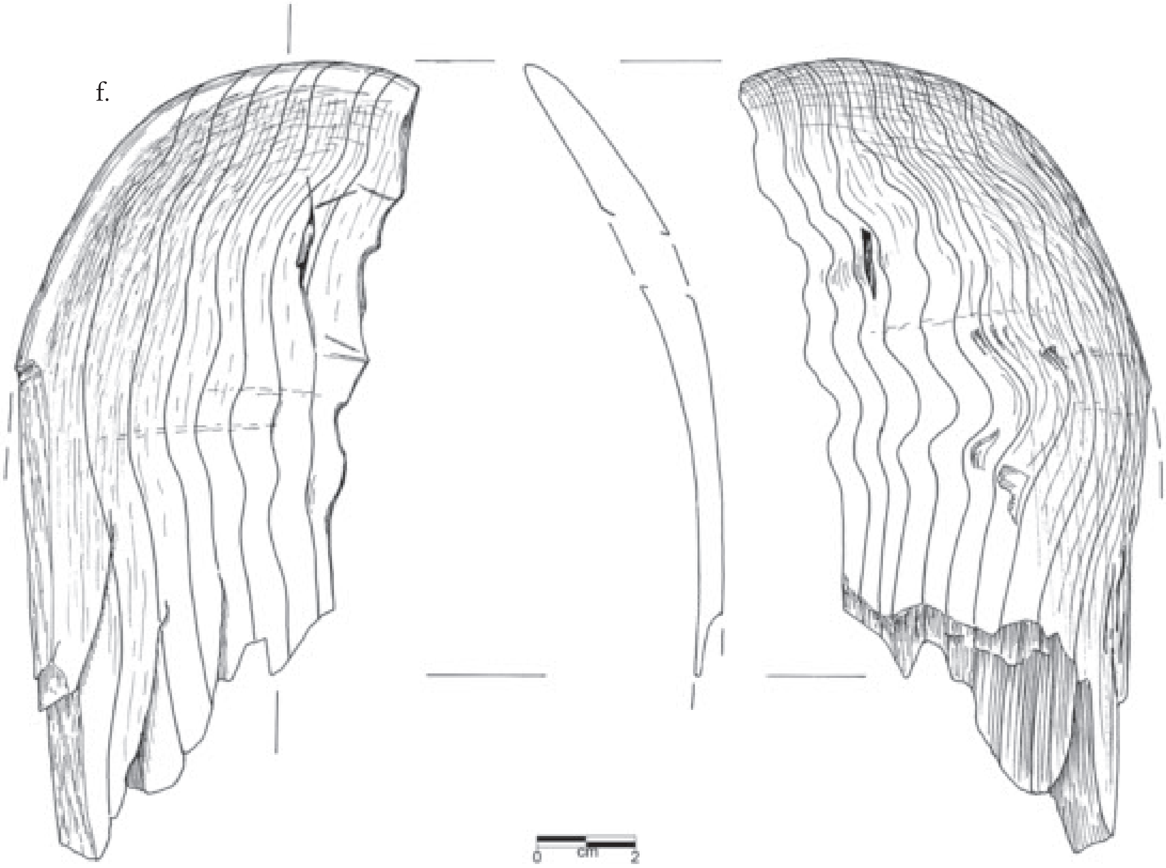
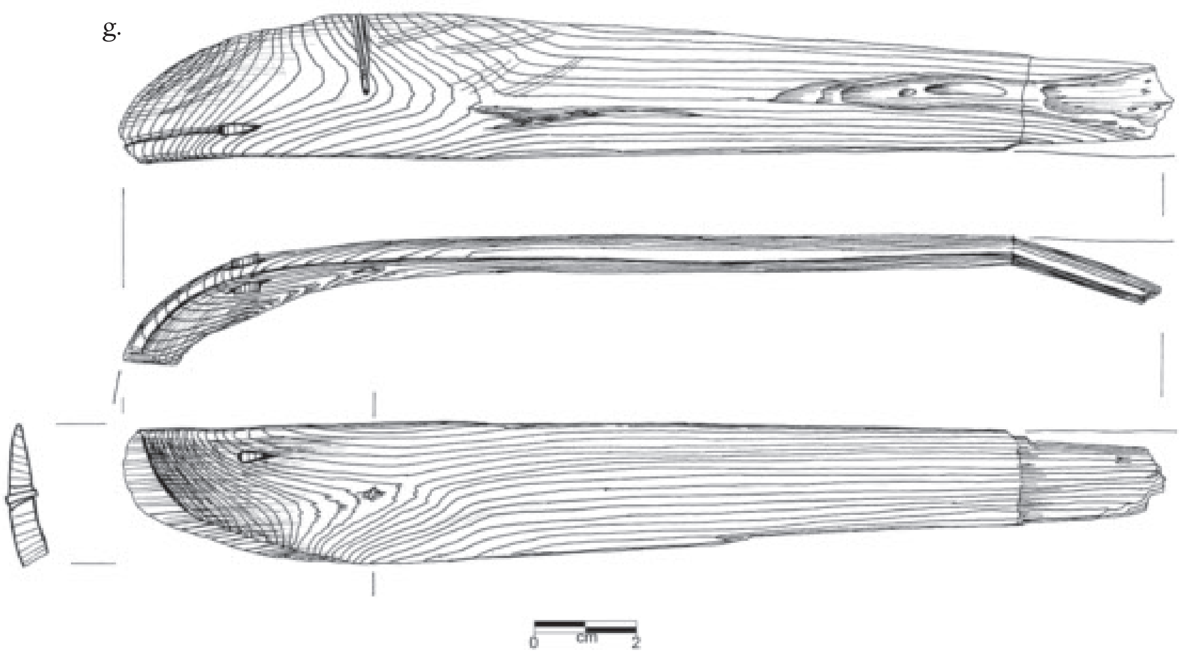


Fig. 3.101
e: *83,0/250,5: nn*
f: *13/23: nn*
g: *85/253: 6*

f.



g.



of fire of the preform of the bowl. Rather, they may be traces from fire-making with strike-a-lights like the ones of killiaq and pyrite described above (3.3.18). According to this interpretation, some of the bowls contained the tinder ignited by the sparks of the fire-making tools. This would explain the patchy character of the charred areas and the small, round depressions in the centre of these. However, it can also be speculated that the charred patches might originate from the transportation of hot fist-sized stones from outdoor fireplaces to the indoor midpassages (see Chapter 5.1 below).

Finally, some fragments are charred only along the rim zone. Based on historic analogy (e.g. Egede 1925 [1741]: 365), it is suggested that some bowls were in close contact with fire while serving as lamp supports to contain the excess blubber oil that dripped from the stone lamp.

Finds from Qajaa:
Six fragments of wooden containers have been recovered at Qa. All are fragmented and in a relatively bad state of preservation, but parts of the rim zone are preserved on five of these. At least one of the bowls (C85) is from a very long specimen – more than 400 mm. Two other fragments (C84 and C86) are from large bowls or trays as well. The two remaining pieces, D138 (l: 87 mm; w: 22 mm) and F243 (l: 98 mm; w: 19 mm), are smaller fragments from bowls, scoops or trays of unknown size. The wall thickness and the character of charred areas on the fragments are like those from Qt described above.

3.3.22 Various hand tools (Fig. 3.102)

3.3.22.1 Tools with polished distal ends
All facets are polished on four killiaq 'burins'. They seem expedient tools made on distal ends of flakes (Fig. 3.102 – 1) and blades (Fig. 3.102 – 2, on backed blade) or reused burins (Fig. 3.102 – 3).

3.3.22.2 Multiple function tools
Lithic artefacts which have changed function or had different functions added during their lifetime are remarkably rare in the Qt assemblage. Only four killiaq hand tools are 'double function

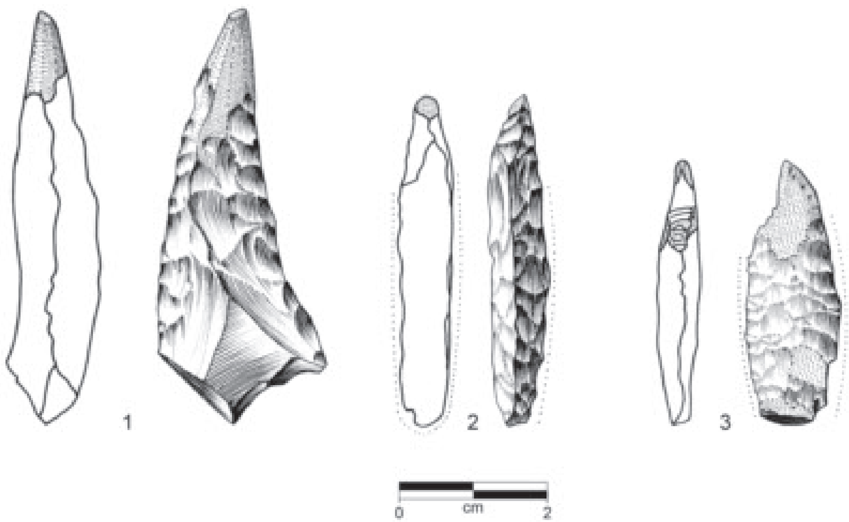


Fig. 3.102
Tools with polished ends.
1: 88,0/247,5: 14; 2: 86,0/248,0: 6
3: 85,5/249,5: 13

tools': three of them show a side scraper edge as well as an end scraper edge, whereas one shows a burin in one end and polished burin facets in the other end (87,0/247,5: 17).

3.3.23 Saqqaq hand tools and household utensils: summary of the finds from Qt and Qa and evidence from other Saqqaq assemblages

The descriptions and analyses of artefacts interpreted as belonging to kits of hand tools and household utensils have demonstrated a high technological standard and complexity – in line with the conclusion drawn from the analyses of the wide range of hunting implements. About thirty different well-defined classes of tools intended for working processes in connection with crafts, toolmaking, food preparation and other 'domestic' activities have been described, and, notably, within each class there are often several types and groups characterized by their morphology and metric properties (Fig. 3.103). Saqqaq material culture was indeed remarkably complex, standardized and specialized.

The key to defining and interpreting the functional artefact classes and types is the many finds of complete tools, for instance hand tools with lithic endblades still *in situ* in wooden hafts and household utensils like spoons of wood and antler found in almost intact condition. Moreover, other Saqqaq sites, in particular those few where organic artefacts are preserved, provide important additional information, making the picture of the general Saqqaq hand tool and household kit more complete.

3.3.23.1 Knives

Complete knives with bifacial endblades were the tools most frequently uncovered as hafted specimens (eleven at Qt and one at Qa). The wooden haft of a 'typical' Saqqaq knife is split longitudinally in two halves. A shallow blade bed in each of the shaft parts holds the proximal end of the killiaq bifacial endblade, and a lashing of baleen string covering the entire haft locks the two halves and secures a stable hand grip. Knives come in a wide variety of sizes and designs, but it must be taken into account that resharpening and reworking of the endblades – and thus morphological change – are part of the 'life cycle' of a knife. Among the 75 lithic knife endblades (3% of the total number of formal lithic tools) from Qt, four (functional) types of knife blade (Types A–D) were defined. Only very few wooden, bone and antler objects show working traces from bifacially fabricated edges of knives, and probably the knives were used for butchering and food preparation rather than in connection with crafts.

Bifacial knife blades are part of the standard Saqqaq inventory all over Greenland, and the great majority of them are – like the ones from Qt and Qa – heavily resharpened, exhausted and fragmented pieces (e.g. Larsen and Meldgaard 1958: Pl. 1; Kramer 1996b: 88; Godtfredsen and Møbjerg 2004: 63; Hinnerson-Berglund 2004: 158–59; Diklev and Madsen 1992: 18; Møbjerg 1988: 85). The *chaîne opératoire* of the bifacial knives is described in detail by Sørensen (2012a: 105 ff.). Morphologically, all Saqqaq knife blades fit the Types A–D as defined from the Qt and Qa finds, whereas raw material preferences seem to vary geographically. Detailed investigations of this have not yet been carried out, but a comparison between the knives from Qt and those from Nuuk (Hinnerson-Berglund 2004: 436) shows that while 83% of the knife blades at Qt were made from killiaq, only 44% were from killiaq in the Nuuk area. Here quartzite/quartz was the preferred raw material for bifacial knife blades.

3.3.23.2 Burins

While burins form the second most frequent lithic tool type at Qt (402 or 18%), only five at Qt and one from Qa were found in their original wooden hafts. A few burin hafts without burins were identified from the two sites (seven from Qt and four from Qa), but it is tempting to conclude that lithic burins became exhausted relatively fast during use, and were frequently replaced by fresh ones in the same hafts. Formal burin hafts are short and, in contrast to knife hafts, they are only split at the distal end, where the proximal end of the lithic burin was embedded in a shallow blade bed formed by the two haft parts. A lashing covered the distal end of the haft and secured the burin. A few 'expedient' burin hafts, consisting of a small piece of wood split at one end for mounting of the burin were uncovered.

The lithic part of the burin was in 94% of the cases made from killiaq. The resharpening processes of the burin can be followed from the first burin spall via, typically, five to ten resharpening episodes (burin spalls and thinning of distal part by polishing) to the exhausted, sometimes reused, and finally discarded specimens.

The burin with polished sides and one or more scars from burin spalls (and the resulting burin spalls with polished sides) is a hallmark of Saqqaq material culture. Along with the characteristics of the Saqqaq lithic *chaîne opératoire* (from which it is seen that the so-called 'knives or end scrapers with transversal edge' (e.g. Larsen and Meldgaard 1958: Pl. 4; Hinnerson-Berglund 2004: 158) in fact are preforms for burins), the polished burin with burin spalls detached by pressure-flaking serves to differentiate a Saqqaq inventory from those of other cultures (Schledermann 1990: 344 ff.; Sørensen 2006: 38–40; Grønnow and Sørensen 2006).

Killiaq and killiaq-like raw materials, which are suited for polishing, completely dominate within this artefact class, even on Saqqaq sites far beyond the Disko Bay area, e.g. Asummiut (Møbjerg and Grummesgaard-Nielsen 1997: 251–53) and Nipisat (Gotfredsen and Møbjerg 2004: 60–64). Also Hinnerson-Berglund's analysis from the Nuuk area (2004: 139 ff.; 436) shows that the percentage of killiaq as raw material for burins (92% of all burins) matches Qt, even though there is a distance of 1,000 km as the crow flies to the killiaq outcrops. Bifacially ground burins, a few of them of killiaq, are found on the Ellesmere Island Saqqaq sites, like Topo Site (Schledermann 1990: 75 ff.). From Møbjerg (1988: 88) and Tuborg and Sandell (1999: 80 ff.) it is seen that Saqqaq burins from East Greenland generally show less bifacial polishing than burins from West Greenland. Chronological trends in the burin inventories will be discussed in Chapter 4.3.1.3 below.

3.3.23.3 End and side scrapers

A pair of the typical fan-shaped end scrapers was found sitting in a wooden 'double-haft' – an open U-shaped haft with a scraper blade in an open blade bed at each end of the 'legs'. Thus scrapers with different edge properties were part of the same tool. A second haft like this confirms that this characteristic kind of hafting of end scrapers was not a unique feature. With 82 specimens (3.8% of the total of lithic artefacts), end scraper blades are common on the Qt site (25 at Qa). The majority were made from killiaq, but still over one third were made from mcq of different colours. Due to the resharpening process, where only the convex distal edge was exposed to retouching while the blade was still in the haft, it is possible to use their metric properties to identify three different types, which probably reflect different functionalities: Type A (consisting of the groups A1 and A2), Type B (consisting of the groups B1 and B2) and Type C. End scrapers were probably used for working skin as well as wood and other organic materials.

Only one of the numerous side scrapers (113 or 5% of the lithic artefacts at Qt; 27 at Qa) was found with its haft. This is a short, carefully made wooden haft with a peculiar flat oval cross section and an open blade bed in its distal end. The characteristic working edge on one side of the distal end of the scraper blade is represented in different stages of wear: from a straight, fresh edge to a deep concave shape resulting from several resharpening episodes by retouch. Metric analysis of intact proximal ends of side scraper blades reveals three distinct size and raw material types: the small ones (Type A) are almost all made of coloured mcq, whereas the large ones (Type B and Type C) are mainly of killiaq. Some round wooden shafts show traces ('spiralling grooves') of finishing, which were probably made with side scrapers.

End and side scrapers are part of Saqqaq inventories all over Greenland (e.g. Kramer

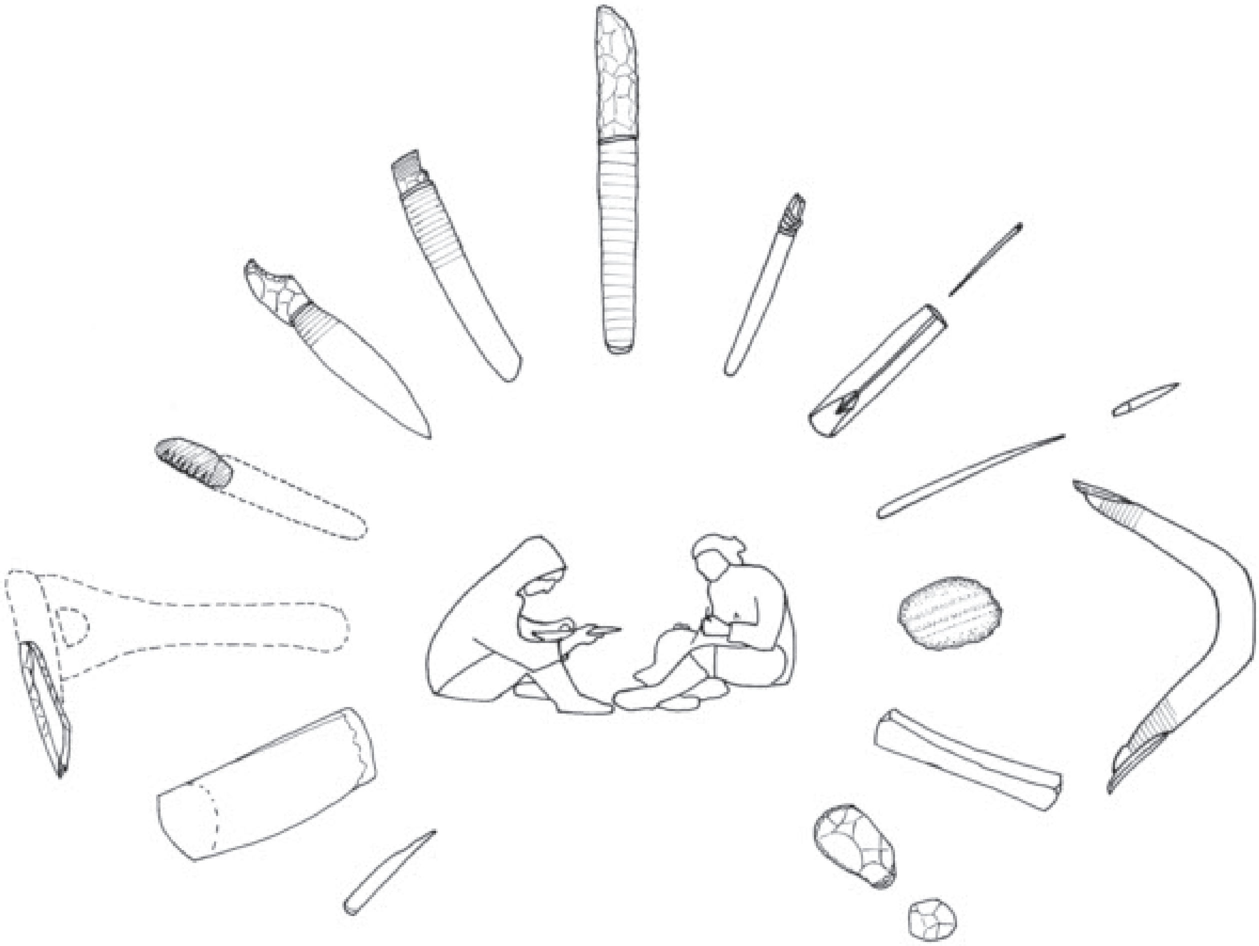


Fig. 3.103 *Reconstruction of the Saqqaq hand tool kit and household utensils (from Grønnow 1994).*

1996b: 88; Larsen and Meldgaard 1958: Pl. 3; Godtfredsen and Møbjerg 2004: 64–65; Hinnerson-Berglund 2004: 155 ff.; Møbjerg 1988: 85). The metrically based categorization of the scrapers developed from the Qt material probably covers all Saqqaq scrapers, but obviously systematic comparative analyses must be carried out in the future in order to qualify this notion. Concerning raw material preferences, the trend from Qt and Qa (that scrapers are often made from mcq, quartz crystal and quartzite) is confirmed by inventories from sites beyond Disko Bay. From the Nuuk area, Hinnerson-Berglund (2004: 436) shows that out of 26 end scrapers 'only' 42% were made from killiaq, 35% were made from mcq, while the remainder (23%) were from quartzite and quartz crystal. Here all side scrapers (13) were made from mcq and quartz crystal. The assemblages from Akia, Asummiut and Nipisat confirm this characteristic variation in Saqqaq's selection of raw materials for end and side scrapers (Møbjerg and Grummesgaard-Nielsen 1997: 252; Kramer 1996b: 88; Godtfredsen and Møbjerg 2004: 65–66).

3.3.23.4 Microblades and microblade cores

With 156 specimens (7%) of the total at Qt microblades are quite frequent. Three of them from Qt were found still sitting in their wooden hafts, but only one of these shows a thoroughly made formal haft. This is a short haft with a distal open blade bed for the microblade of mcq and a rounded proximal end. A few wooden hafts without their blade were probably for microblades as well. Metric analysis of intact microblades indicates the existence of two types based on length/width measurements, which in general reflect the size of the raw material nodules: the majority of the 'large' Type B microblades are from mcq, whereas mcq and quartz crystal are equally represented among the small microblades (Type A). It is noteworthy that the hafted microblades – in contrast to the 'loose ones' – all show partly retouched edges. This indicates that only a few blades with certain properties were actually selected for use. The delicate character of the microblade edges and their hafting indicate that they were intended for precision work like cutting or shaving skin.

Originally, microblades were not considered as belonging to the Saqqaq inventory (Meldgaard and Larsen 1958; Mathiassen 1958). However, later investigations show that microblades are an integral part of the technology of the Saqqaq, even if the blades and cores are more heterogeneous than those of the Dorset culture. Several raw materials, in particular quartz crystal, are involved in microblade production (e.g. Gulløv and Kapel 1988: 53; Kramer 1996b: 72; Gotfredsen and Møbjerg: 65–67; Hinnerson-Berglund 2004: 154; see also Owen 1988).

The production of Saqqaq microblades is described in detail by Sørensen (2012a: 118–21). At Qt and Qa, Sørensen's methods B1 (reduction of naturally formed quartz crystal) and B3 (reduction of wedge-shaped, single-fronted preform) were mainly used, whereas a third method (bifacial core as preform) was hitherto known only from Itinnera. As discussed below in Chapter 4.3.1.2, the raw material preferences at Qt concerning microblades hold chronological information.

3.3.23.5 Drills, saws, tools for cutting and hammering

Fully ground drill 'bits' are rare in the Qt and Qa assemblages, but they and four slender probable drill bit shafts are important, as they indicate the use of a device – a bow or a string with handles – for rotating the drills. They were probably used for precision drilling of, for example, needle eyes.

A number of hafts of wood, bone and antler were found without their lithic blade, but they must have served as hafts for different small endblades, including microblades and the characteristic, but very rare, fully polished saw blades of killiaq.

It must be emphasized, however, that a large number of small cutting, scraping and sawing hand tools were expedient and they were probably not hafted. At Qt these flakes numbered 490 specimens or 22.5% of the total number of lithic artefacts. They are typically killiaq flakes originating from the production of bifaces. Used for cutting and sawing, the flakes show slight modifications like partial retouching or fine serration of edges. They are by far the most frequent tool type at Qt.

A number of hammerstones – natural egg- or fist-sized cobbles of granite or gneiss – used for a wide variety of purposes must be considered expedient hand tools as well.

These observations from Qt and Qa can be supplemented with information from other Saqqaq assemblages:

The fully polished drill bits (also known as 'awls' (Sørensen 2012a: 111–12)) and fully ground saws of killiaq are found, even if they are quite rare, at a number of Saqqaq sites from the entire geographical range of this culture (e.g. Larsen and Meldgaard 1958: Pl. 3; Kramer 1996a: 59; Hinnerson-Berglund 2004: 160, 311; Sørensen 2012a: 113; Diklev and Madsen 1992: 19; Tuborg and Sandell 1999: 94). Strangely, drill bits have not been found on Nipisat, where sewing needles with tiny round eyes are extraordinarily frequent (Gotfredsen and Møbjerg 2004: 54).

When the inventories from Itinnera and Nipisat are examined, a characteristic handle type for 'undetermined small hand tools' is added to the Saqqaq tool kit: a small (*c.* 45 mm long) handle with a 'mushroom-shaped' proximal end and a socket for a very thin point in the distal end (Fig.

3.104). A burin spall or a very thin awl, needle or drill bit would fit into the socket. One could suggest that the handle is for a bone needle and used in connection with delicate skin sewing or tattooing, but in fact the function of this small tool is not clear (sketch in Gynther and Meldgaard 1983: 44; Gotfredsen and Møbjerg 2004: 55, 57). Moreover, the Nipisat assemblage includes a few items of antler with distal blade beds. They are interpreted by the excavators as handles for various small hand tools (Godtfredsen and Møbjerg 2004: 55–56, 59).

The numerous flakes from Qt and Qa with partially retouched or serrated edges probably have counterparts at practically every Saqqaq site. They were identified, for example, at Nipisat in the Sisimiut area (Kramer 1996b: 82) and in the Nunnguaq material from the Nuuk area (Appelt and Pind 1996: 135), but especially in earlier excavations and analyses these 'modest' but very frequent and important cutting and sawing tools were overlooked. In a similar way, expedient hammerstones are hard to distinguish from naturally battered, rounded rocks, and they are at present only sporadically described from Saqqaq sites (e.g. Godtfredsen and Møbjerg 2004: 67; Sørensen 2012a: 129). This probably does not reflect the original importance of hammerstones, which must have been used in connection with a wide variety of daily activities like marrow-splitting and bone-crushing.

Fig. 3.104
Handle with 'mushroom-shaped' head from Itinnera. (Drawing by H.C. Gulløv).

3.3.23.6 Wedges, adzes and shaft straighteners

Large wedges for splitting driftwood trunks were made of whalebone, whereas small wedges were of antler. They all (18 from Qt and 5 from Qa) show characteristic notches on the broad sides made in order to prevent rebounding. Split pieces of wood were worked into shafts and tools with adzes. A few ground adze heads of killiaq with steep-angled edges were recovered. They represent exhausted, discarded specimens. Neither sockets or cases nor hafts for the adze heads were identified among the finds, which is surprising judging from the importance of this tool in the work processes. A single large whalebone mattock head probably for cutting turf was found at Qt.

The only comparative material concerning wedges comes from Nipisat (Godtfredsen and Møbjerg 2004: 58, 62). Here, all wedges (18) except one of ivory were made from antler. The robust wedges are quite like the ones from Qt and Qa, typically made from an antler base and with the characteristic transverse cuts around the edge part. There is also a group of shorter and more slender wedges of antler tines with parallels in the Qt material. In contrast, the bones of the few whales represented in the Nipisat faunal material were not selected as raw material for wedges.

Adze heads of killiaq or – in northern East Greenland – of basalt (Sørensen 2012b) are found in limited quantities throughout the entire Saqqaq range (e.g. Schledermann 1990: 68, 87; Diklev and Madsen 1992: 19; Larsen and Meldgaard 1958: 60; Kramer 1996b: 95; Sørensen 2012a: 116; Møbjerg 1988: 85). Sørensen's *chaîne opératoire* studies of adzes from the Itinnera site in the Nuuk area (2012a: 116–18) show that the three types – a thin bifacial adze with broad edge, a bifacial adze with narrow edge, and a unifacial adze – start as 10–15 cm long heads but, as they are resharpened by grinding during use, they typically end up 4–6 cm long before being pulled out of the socket and discarded. This observation fits very well with the adze heads from Qt and Qa (see 3.3.1.1 above), which are all within this size range. As will be seen from the evidence of chopping marks and shavings from Qt, adzes were used in all steps of working driftwood, antler and whalebone – from the rough shaping of preforms to very delicate work in these different raw materials. This explains the wide variations in the edge width, curvature and angle of the adze heads. Often the edge angle of the discarded pieces is surprisingly steep, about 80° (e.g. Schledermann 1990: 68). Modern experiments have shown that such steep-edged adzes are well suited for working soapstone (Appelt *et al.* 2012), but there is still a lot of experimental work to be done in order to explore the full range of functions of this important tool.

As with the handle mentioned in the previous section, the collections from Nipisat and Itinnera add a type of hand tool to the Saqqaq kit that has not been identified at Qt and Qa: shaft straighteners. On these sites two almost identical shafts of caribou antler beams, *c.* 240 mm long and 35 mm wide, both provided with carved circular holes in their broader distal end (diameter of holes *c.* 35 mm) have been found (Gotfredsen and Møbjerg 2004: 56, 60; the Itinnera piece is unpublished). Both pieces are broken across their wide hole. Taking into consideration how much technological skill and effort was invested in the making of precise wooden arrow, dart and lance shafts, the Saqqaq must have made use of shaft straighteners and these two finds are the best candidates for such a tool.

3.3.23.7 Pressure flakers

Pressure flakers – or rather the points of these – are numerous (51 from Qt and 52 from Qa). Pressure flakers were made by preference from solid seal bone, antler or whalebone. These small 'sticks' show characteristic wear from use and resharpening by grinding at one or both ends. In order to work properly as flakers they must have been hafted. Metric analysis shows that 'fresh' flakers were about 90 mm long, and typically they were worn down to a length of 65 mm before they were replaced and discarded. No pressure flaker handles have been identified with certainty, but a couple of curved wooden handles and a small whalebone handle are probable candidates.

At the few sites with preservation of organic matter, pressure flakers are numerous, partly due to their robustness and partly to the fact that they were used frequently for resharpening edges of all sorts of lithic tools, meaning that they were quickly worn down and discarded. A comprehensive material comes from Nipisat (19 specimens), where caribou antler and bone, in contrast to Qt and Qa, provided the dominant raw material for the flakers (Godtfredsen and Møbjerg 2004: 56, 61). However, the morphology and the variations in the points of the flakers are similar to those from Disko Bay, as are the sizes of the discarded flakers (29–75 mm). Analysis of no fewer than 43 pressure flakers from the Itinnera site in the Nuuk area (Sørensen 2012a: 125–26) reveals a significant size difference when compared with the items from the Disko Bay and Sisimiut sites. At Itinnera the range of the lengths of the discarded pressure flakers of antler, caribou bone and seal bone is 22–48 mm. This is considerably shorter than the pressure flakers from the north. Apart from these finds, a few Saqqaq pressure flakers have been recovered at Bight Site, Ellesmere Island (Schledermann 1990: 69, 88), where one of the flakers was made of a seal baculum, and at the

Qorluulasupaluk site in the Thule area (Diklev and Madsen 1992: 20).

3.3.23.8 Grinding stones

Many processes of Saqqaq crafts involved the polishing and grinding of killiaq and wood and other organic matter. There are many grinding stones included in the materials, over 200 at Qt. Most of them are of black or grey pumice. The small clumps of pumice show either facets for polishing flat surfaces, deep irregular grooves for dressing pointed ends on e.g. pressure flakers, or longitudinal grooves of different diameters for finishing the surfaces of round shafts of wood, antler or bone or tiny sewing needles.

Among the grinding stones there are also a few fragments of carefully made, slender pieces of fine-grained sandstone with a rectangular cross section. These portable grinding stones were probably used for polishing and resharpening small tools like burins and triangular endblades for harpoon heads.

Grinding stones of pumice with flat as well as grooved sides are a common hand tool type at many localities in West Greenland (e.g. Hinnerson-Berglund 2004: 97; Gotfredsen and Møbjerg 2004: 67; Møbjerg and Grummesgaard-Nielsen 1997: 253; Larsen and Meldgaard 1958: 59), whereas none have yet been reported from East Greenland.

The slender grinding stones of sandstone are very rare but known, for example, from Itinnera (unpublished) and Nipisat (Gotfredsen and Møbjerg 2004: 67) in West Greenland.

3.3.23.9 'Strike-a-lights' and lamps

The Saqqaq fire-making tool was a 'strike-a-light' consisting of a small faceted pyrite nodule and a killiaq hammerstone with characteristic fine crushing marks along an edge. There are no traces of fire-drilling at Qt and Qa, but several of the wooden trays or bowls show charred irregular pits on the inside. It was suggested in 3.3.21 above that they might be traces from burning tinder which had been ignited by sparks from the strike-a-lights.

Hammerstones for strike-a-lights are generally rare in the assemblages, which might be due to the fact that they make up a heterogeneous category of artefacts as regards both morphology and raw materials, and thus they are not easy to recognize (Stapert and Johansen 1996a, 1999; Sørensen 2012a: 114–15). Nevertheless, they are known from several sites in West Greenland (e.g. Kramer 1996b: 95; Møbjerg and Grummesgaard-Nielsen 1997: 253; Gotfredsen and Møbjerg 2004: 86; Hinnerson-Berglund 2004: 83). A few of these hammerstones are, as at Qt, broken and reused bifaces.

At Qt only two blubber lamps have been identified: one large and heavy, irregular lamp of a coarsely shaped gneiss stone and one preform of a small, kidney-shaped sandstone lamp (secondarily used as a grinding stone). There are no fragments of formal soapstone or sandstone lamps from Qt, but a couple of fragments from the upper layers of Qa indicate the presence of formal soapstone lamps in a late phase at this site.

Hitherto, only a single parallel to the informal blubber lamps from Qt is known (Grønnow *et al.* 2014), but this must to a certain extent be due to the 'casual' morphology, which makes it difficult to recognize informal lamps during excavation. A coarse soapstone lamp was found beside the frame of a midpassage or axial structure at Narsaarsup Nuua in the Nuuk Fjord (Hinnerson-Berglund 2003: 334, 340; 2004: 51–52). This head-sized lamp was made of coarse quality soapstone and an oval depression was carved into the upper side. A few other coarse lamps belong, by context, to the Saqqaq culture as well. This goes for a coarsely chopped round lamp of mica schist (diameter *c.* 16 cm) from Illorsuatsiaat I, just 10 km north of Qt as the crow flies (Meldgaard and Larsen 1958: 60). This piece resembles a formalized circular lamp.

Fragments of formal, most often perfectly circular, soapstone and sandstone lamps are known form several Saqqaq sites in West Greenland (e.g. Larsen and Meldgaard 1958; Kramer 1996b: 59) (Fig. 3.105). The largest number of formal lamps have been excavated at sites in the innermost part of the Nuuk Fjord complex. The Itinnera

Fig. 3.105 *Formal Saqqaq lamps from sites in the Nuuk area. (Photo: John Lee).*

material includes 55 fragments of at least seven different lamps, both formal, round lamps and more coarsely made, irregular, flat lamps (Gulløv and Kapel 1988; Meldgaard 1961; Hinnerson-Berglund 2004: Fig. 54). Excavations at Nuunguaq produced about fifty fragments and a number of complete lamps of soapstone as well as sandstone, of which several appear in sets within well defined dwellings (Appelt and Pind 1996). These sets each consist of a large lamp together with two to six quite small lamps, indicating that each woman/girl in the dwelling managed her own source of light (Grønnow *et al*. 2014). As at Itinnera, a few of the formal Saqqaq blubber lamps are not of the 'classic' circular type. One of the large soapstone lamps at Nunnguaq is saucepan-shaped with an almost flat bottom and low walls (Appelt and Pind 1996: Fig. 10.6–2). Hitherto, no blubber lamps or fragments thereof have been reported from the northern and eastern parts of the Saqqaq range.

3.3.23.10 Bowls, trays, spoons, ladles and hooks

Wooden bowls and trays and fragments thereof are remarkably numerous: about sixty fragments from Qt and seven from Qa. Most of them were made from pieces of *Larix* or *Picea* sp. with undulating year rings. Some represent carefully made, oval-shaped bowls with regular rims and quite thin sides (6 mm). Originally they would have been 300–400 mm long. Others represent quite coarsely made 'dug-out' bowls or trays of sections of trunks exceeding 600 mm in length. Usage wear in the shape of worn-down rim zones, polished areas and charred pits is frequently seen, as well as repair in the shape of patching up by countersunk lashing running through cut holes on each side of a crack. The bowls and trays are so diverse in shape and size that they must have served several different purposes. They could have been used for transportation of hot rocks from outdoor fireplaces to inside midpassages and as containers of tinder in connection with fire-making – the burnt patches inside some of the bowls could indicate this – but primarily they must have been connected with food processing and serving: the oval wooden bowls were ideal for containing soup and the long trays for placing lumps of hot meat on. Finally, the wooden containers could have served as support for stone blubber lamps.

Spoons and ladles were most often made from driftwood, but also antler and sperm whale tooth spoons are found in the Qt assemblage. The spoons are present in different sizes and in all stages of their life cycle: from preforms to repaired and discarded specimens. The bowls of the spoons were typically oval or drop-shaped, and the carefully made short and flat handles were integrated in the oblong design. Only the larger wooden ladles could have been provided with a separate haft that was lashed to a handle part protruding from the bowl of the spoon. Traces of wear are seen in particular on the distal part of the bowl of the spoon, and traces of careful patching up by means of lashing with baleen thread show that the spoons and ladles must have been a precious part of the household kit connected to food, along with bowls and trays.

A number of pointed 'sticks' of wood and bone, interpreted as 'meat forks', and a few large hooks that could have served as blubber hooks, were probably connected with food preparation and consumption, as well.

No Saqqaq bowls, trays, spoons or ladles of organic matter have been recovered at Saqqaq sites other than Qt and Qa, probably due to preservation conditions, and comparative material concerning the supposed meat forks and blubber hooks is also non-existent within the Saqqaq range.

3.3.23.11 Needles, needle cases and prongs

Sewing was part of the domestic activities as well. A few needles and blanks for needles made from bird long bones have been recovered. They are tiny, maximum 50 mm long and 2 mm in cross section at the broadest proximal end, where a tiny, drilled eye is situated, only a little more than 0.5 mm in diameter. The sewing needles were probably contained in small, tubular needle cases made from long bones. Three fragmented

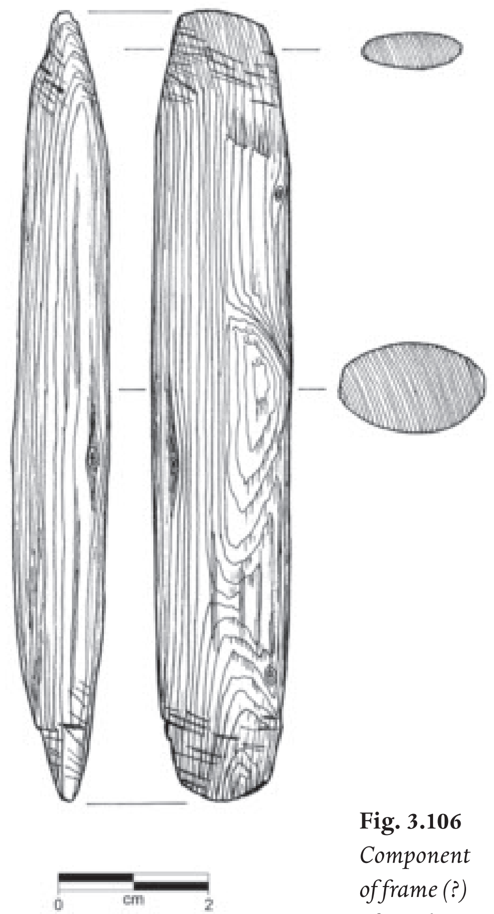


Fig. 3.106 *Component of frame (?) of wood (10/23,5: 50).*

specimens with simple longitudinal line ornamentation are probably such needle cases. Only one of these is well preserved. It is made from a dog long bone and shows an elaborately carved diamond-shaped 'tail' as an integral part of the ornamentation. The relatively large number of needles and preforms from Qa (31) suggests that needle production took place at this site.

The Saqqaq needle cases from Qt do not have counterparts in other Saqqaq materials, but this is not the case with sewing needles. They have been reported from Bight Site on Ellesmere (Schledermann 1990: 69, 88) and, not least, from Nipisat (Gotfredsen and Møbjerg 2004: 54–56). With 114 fragments of sewing needles at all stages of the needle production process (mainly made from goose and gull bones), this site holds a unique position. The morphology, including the tiny round eyes in the flattened proximal end, and size range of these needles (l: 35–84 mm) match those of the specimens from Qt and Qa.

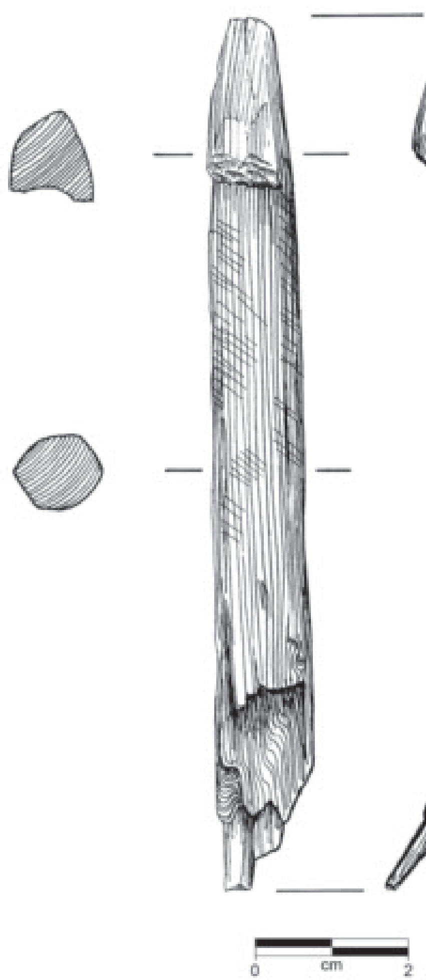


Fig. 3.107
Fragment of handle (?), perhaps a pressure flaker handle (14/24: 32).

3.4 Indeterminable artefacts

Some artefacts from Qt did not fit into any of the classes or types presented above, either because their function or 'type' is indeterminable or because they were so fragmented that they could not be classified.

'Atypical artefacts' are few among the lithic artefacts. Only 15 specimens (14 of killiaq and one of mcq) do not fit into the established categories. In total 116 artefacts of wood and 18 specimens of bone or antler could not be classified in any of the artefact categories described above.

Among the indeterminable wooden artefacts there are probably components from composite artefacts like tents, paddles, supports and frames (large pieces like 19/19: 149), small pieces of frame or rack constructions (e.g. Fig. 3.106) and parts of hafts (e.g. Fig. 3.107).

The species of a selection of 44 of these wooden implements has been determined: 18 (41%) are from *Picea* sp., 17 (39%) are from *Larix* sp., 6 are from *Juniperus* sp. (13%), 2 (5%) are from *Pinus* sp., and 1 (2%) is from *Populus* sp.

The bone artefacts of this category include a bird bone tube (88,5/248,0: 13), small bone and antler rods with a broad, longitudinal groove (83,0/251,0: 32 and 13/23: 88), and a heavy flat piece of whalebone (90 × 80 mm; t: 17 mm) with a large carved central hole (d: 38 mm) and a natural transverse hole. This specimen (Fig. 3.108), which was reworked and discarded, may originally have been part of a larger construction or it might be a distal fragment of a straightener for heavy wooden shafts.

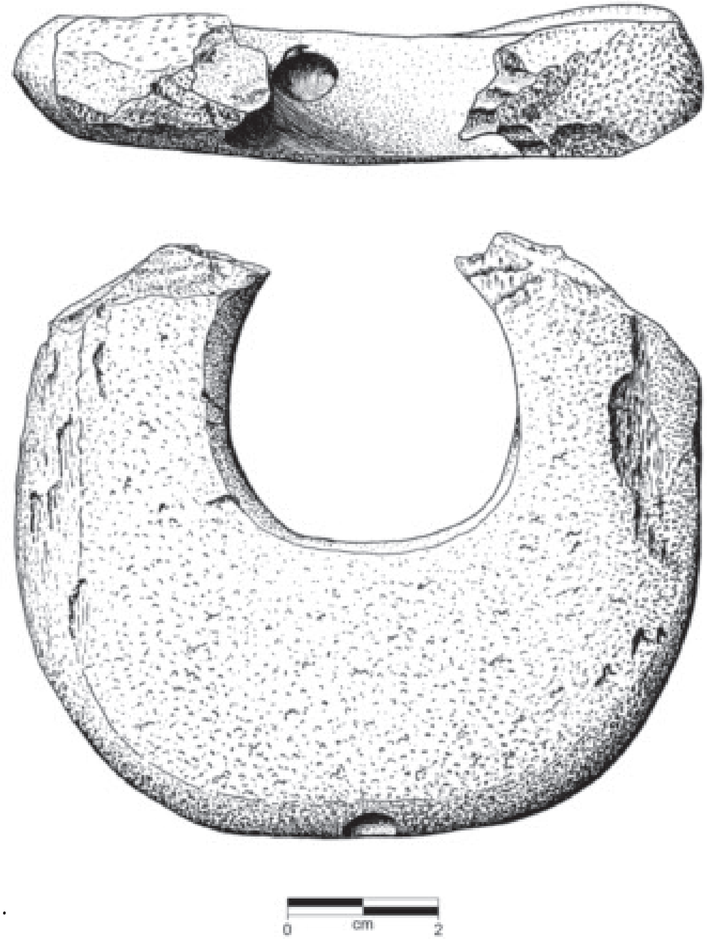


Fig. 3.108
Fragment of shaft straightener (?) of whalebone (13/23: 42).

3.5 Amulets and drums

3.5.1 Small containers (amulet boxes?) and amulets (Fig. 3.109)

Five specimens are fragments of small, elongate containers of whalebone or antler. They are thin-walled containers and they show cut, narrow holes. These items do not invite a functional explanation and, inspired by late Dorset finds, ethnographic descriptions and conversations with the late Jørgen Meldgaard, they are interpreted here as amulet containers.

Fig. 3.109a – 1 is a 82 mm long, 12 mm wide and 15 mm deep spoon-like container of antler. There are two elongated cut holes in the midsection of the bowl of the 'spoon' and two at the rim in the distal end as well. The broken proximal 'handle' end shows oblique cut marks and a small cavity on the upper side. A lid or a counterpart could have been lashed to the flat upper side of the object.

Fig. 3.109a – 2 consists of two connected fragments of a 156 mm long and 25 mm deep thin-walled spoon-like container with almost the same characteristics as the object described above, except that it is considerably larger. Made of whalebone, it has a carved hole at the midsection of the bowl and a handle part with notches, probably for lashing a lid or a counterpart to the flat upper side of the object. Only half of the bowl is preserved. It would have been about 50 mm wide.

88/251: 11 is a (distal) fragment of a thin-walled container of bone or antler. Two elongated cut holes are seen at the intact edges, and the piece could originally have been lashed together with a similar piece, thus making up a spoon-like object or a tube.

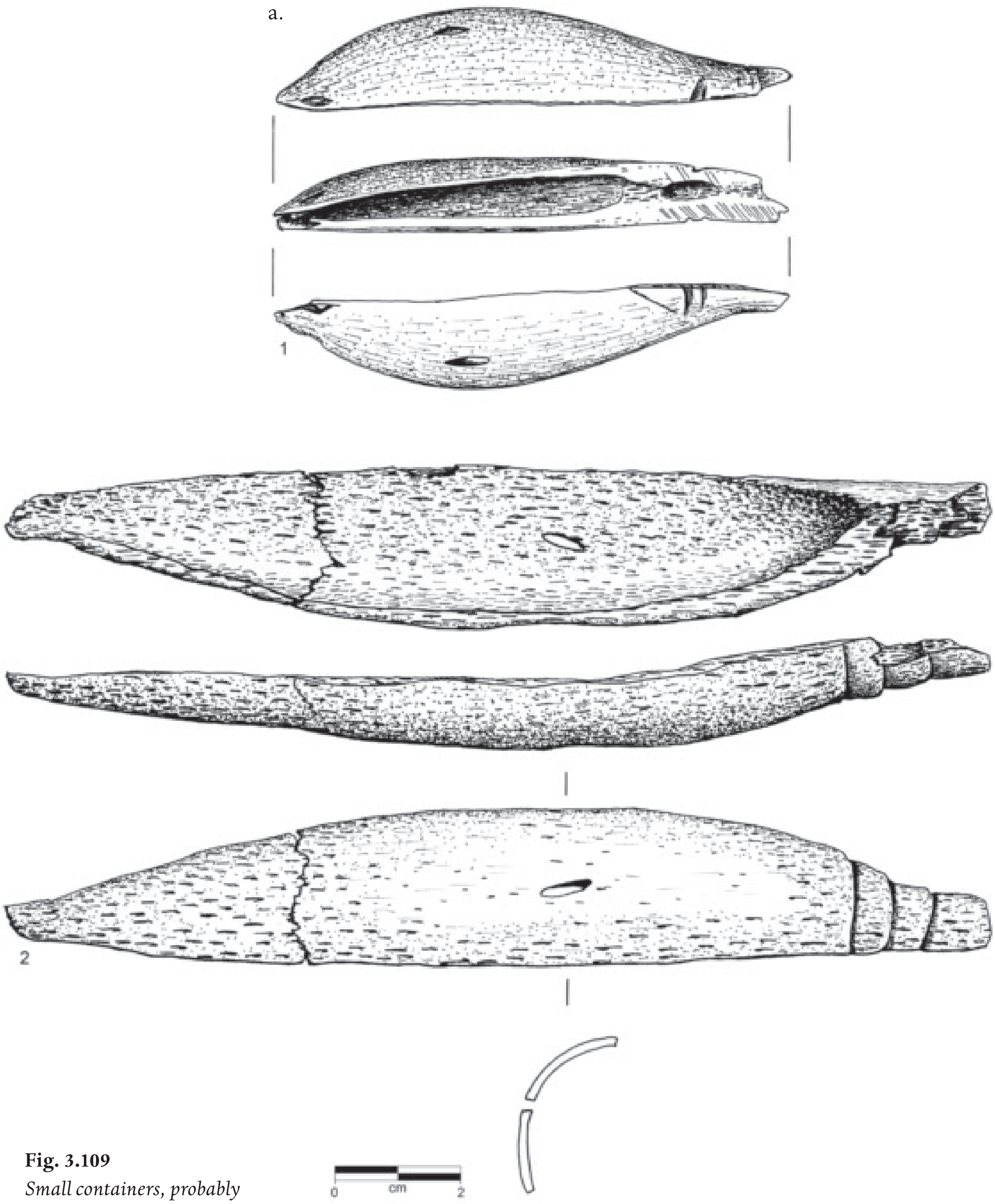


Fig. 3.109
Small containers, probably amulet boxes.
a: *1: Antler (20/20: 3)*
2: Whalebone (86,0/250: 16 and 17).
b: *1: Whalebone (89,0/247,5: 14); 2: Bone or antler (19/19: 134).*

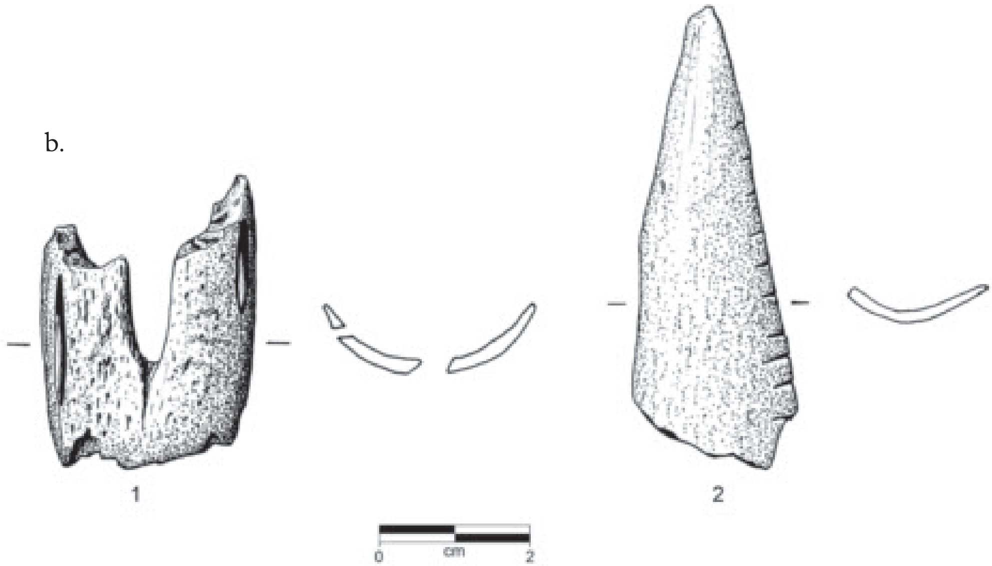


Fig. 3.109b – 1 of whalebone is a 40 mm long and 28 mm wide fragment of a thin-walled narrow 'container' perforated by three large carved holes: one in the middle and two at each rim.

Likewise Fig. 3.109 b – 2 is a fragment of a thin, elongate bone or antler container with a thin rim. It shows 10–12 short notches cut on the outer side perpendicular to the rim, which might be ornamental.

Due to preservation conditions there are few counterparts to these possible amulet containers. However, a single fragment of a thin-walled, elongate container made from antler with carved holes in the rim zone has been recovered at the Saqqaq site of Bight Site (Feature 2) on Ellesmere Island (Schledermann 1990: 69, 88).

Finds from Qajaa:
The Qa assemblage does not include fragments of small containers. However, a 30 mm long, 10 mm wide and 4.5 mm thick carefully carved ivory object deserves to be mentioned (Fig. 3.110). One end of E214 is rounded (drop-shaped), the other is bipointed like a swallow's tail. No obvious function can be ascribed to this tiny specimen, and it may have been a sort of amulet.

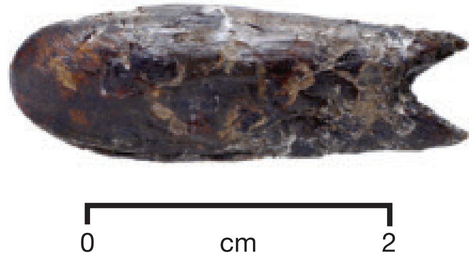


Fig. 3.110
A tiny (30 mm long) carving of ivory from Qa (E214). (Photo: JL).

3.5.2 Inserted bird bones

In three cases so-called 'inserted bird bones' were found at Qt (Meldgaard 2004: 143). These objects consist of a radius plugged into an ulna of a gull or kittiwake wing. This could be a toy (Jens Rosing, pers. comm. 1995), a way of extracting a small bit of marrow, a sort of amulet, or maybe these odd inserted bird bones are the result of early preparation and cleaning of bird bones for later use as raw materials for needles. At Qa a total of five inserted bird bones have been recovered.

3.5.3 Drums (Fig. 3.111)

Five wooden objects are most likely drum frame fragments. The most complete is Fig. 3.111a, which is a slightly bent 245 mm long slender list (cross section: w: 19 mm; t: 13 mm) of *Picea* sp. with a characteristic longitudinal groove along the flat outer side. This groove is V-shaped in cross section and 4–5 mm wide. The inner side of the list is slightly convex in cross section. One narrow side tends to be flat, whereas the other is slightly convex. Both ends are bevelled: one end on the narrow side and the other on the broad

a.

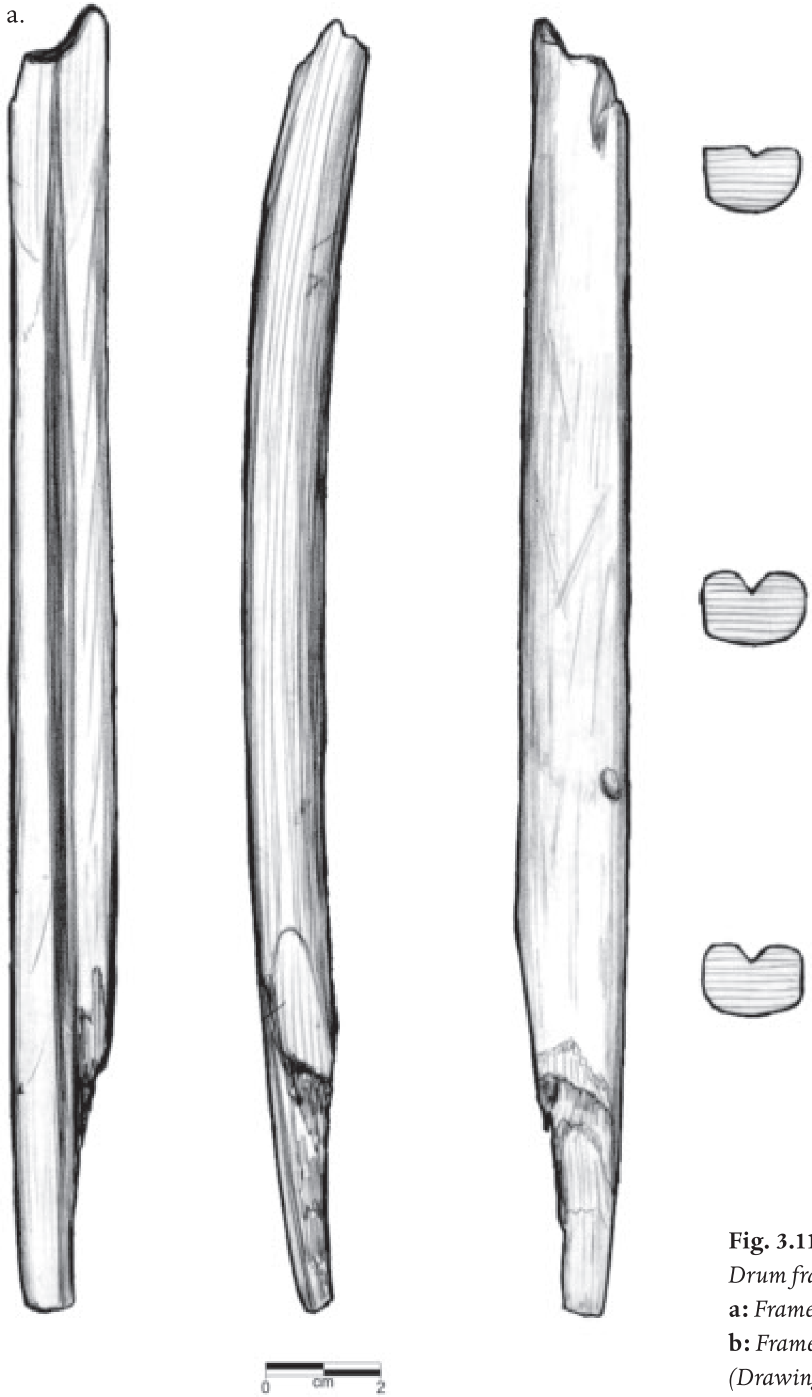
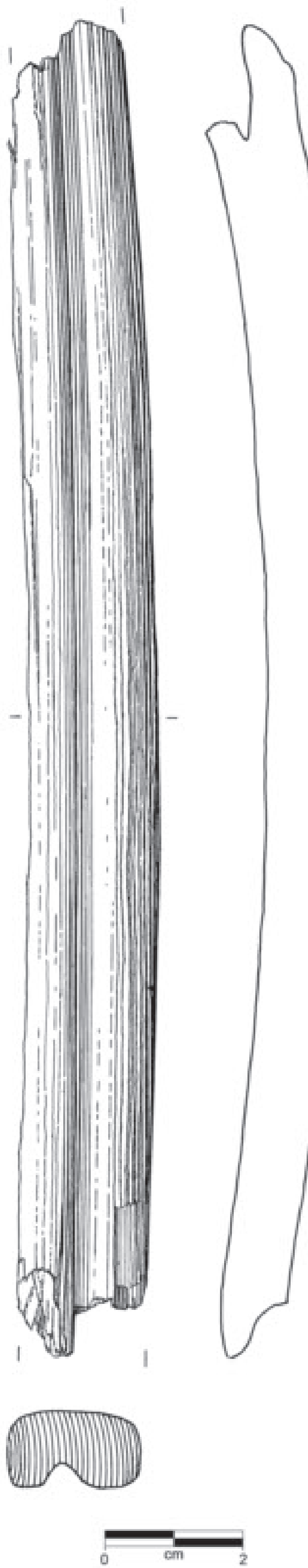


Fig. 3.111
Drum frame fragments of wood.
a: *Frame fragment from Qt (86,5/252,0: 11).*
b: *Frame fragment from Qa (F247).*
(Drawing: PB).

b.



side. This shows that the drum frame was built from several pieces. According to modern experiments this means that the find material should include some reinforcement pieces of antler or bone that were mounted on the inner side of the scarf links (Martin Appelt, pers. comm.). However, such objects have not yet been identified in a Saqqaq context.

The frame fragment was probably originally more bent than it appears now. First, there is no tension from the complete round/rounded frame to which it originally belonged. Second, the millennia in the soil may have straightened it to a certain degree. A comparison of the size and cross section of the frame fragment with ethnographic drums show that the original Saqqaq drum frame would have been about 650–750 mm in diameter (Grønnow 2012a).

14/24: 10, 25-26/2: 20, and 20/20: 122 are all possible small fragments of drum frames with parts of bevelled ends. Their curvature and cross sections are comparable to the one described above and they confirm that a drum rim was often constructed from several components linked by long scarf joints. The V-shaped groove is partly preserved on 20/20: 122 as it is on the last piece, 12/23,5: 42, which was made from *Larix* sp. and reworked into a 152 mm long peg.

Finds from Qajaa:

Five wooden pieces have been classified as parts of drum frames (A15,1; A16 and 19; C89; C99; and F247). The cross sections of these pieces resemble the ones from Qt. The inner side is flat without any detailed working and finish (C99 being the exception). The presumed upper side of the frame fragments is flat and gently curving on the outside, where the skin was stretched over the frame. Fig. 3.111b depicts the largest of the drum frame fragments, and it is almost identical to the best preserved drum frame fragment from Qt. Qa F247.4 is a 194 mm long, slightly bent piece of frame, broken at both ends, 19 mm wide and 12 mm thick. Centrally on the convex (outer) side of the curving list there is a 3.5 mm deep groove along the entire length of the fragment.

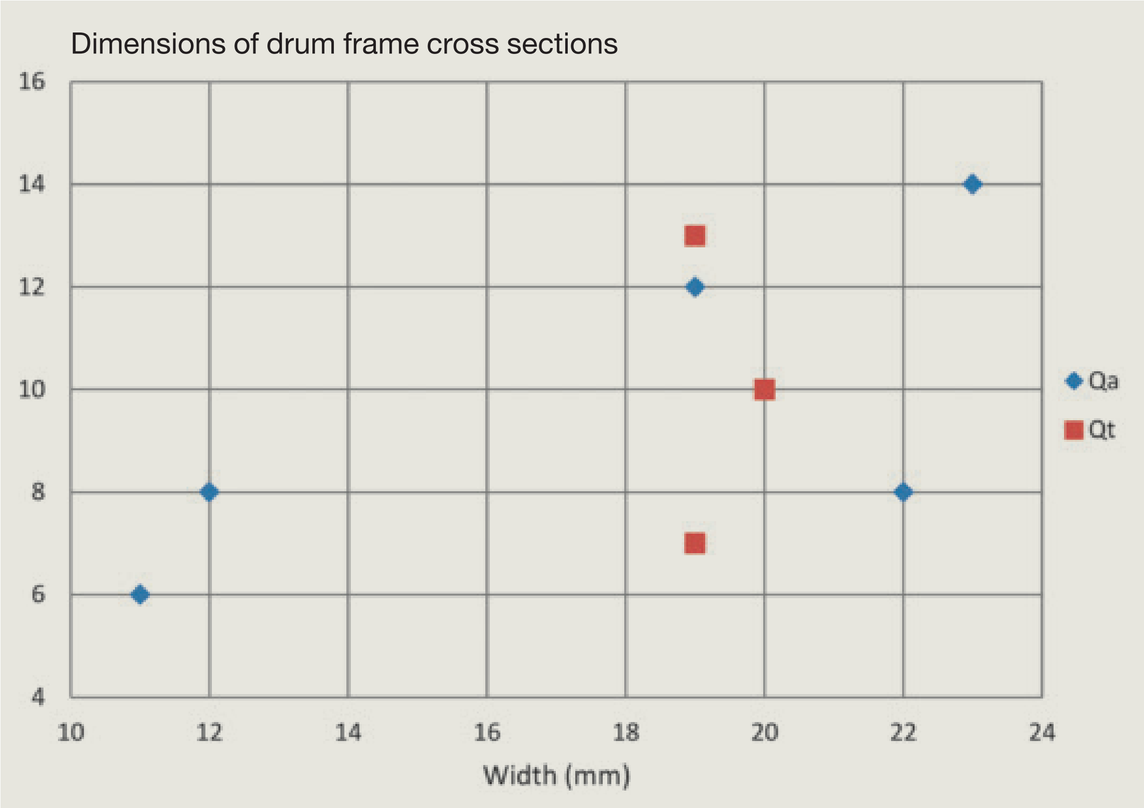


Fig. 3.112 *Thickness/width plot of cross sections of drum frame fragments. Blue: Qa. Red: Qt.*

A small fragment (A15,1), only 53 mm long and 22 mm wide, shows a 5 mm wide and 4 mm deep V-shaped longitudinal groove on its intact side.

A thickness/width scatter plot of the drum frame fragments (Fig. 3.112) shows that the dimensions cluster around a width between 19 and 23 mm and a thickness between 7 and 14 mm. In addition, there are two outliers with a thickness of 6 to 8 mm and a width between 11 and 12 mm. These two outliers might indicate that a kind of 'small drum' existed. However, the few fragments do not allow any firm conclusions.

3.6 Components of constructions: stakes, poles and pegs

A large number of stakes and poles – 147 fragments in total – were found at Qt. Stakes and poles are characterized by an irregular, rounded or often angular cross section and by a surface with clear facets from adze chopping or carving and no further surface finish. Consequently, the possibility cannot be excluded that some blanks for regular shafts are 'hidden' in these artefact classes.

Most often the stakes and poles are provided with a pointed end. The presence of several pieces with bevelled ends shows that long stakes and poles were composite: they consisted of several, selected components, which were lashed together to form, for example, long tent poles, racks and various supports. Typically, the stake and pole components, like the regular round sticks for shafts, were made from split pieces of large driftwood trunks. The species of 35 stakes and poles have been determined: *Picea* sp.: 16 (45%); *Larix* sp.: 12 (34%); *Pinus* sp.: 3 (9%); *Salix* sp.: 3 (9%); *Juniperus* sp.: 1 (3%).

Nine stake and pole components (6%) are completely preserved with both a pointed and a bevelled end (Fig. 3.113). They vary in length

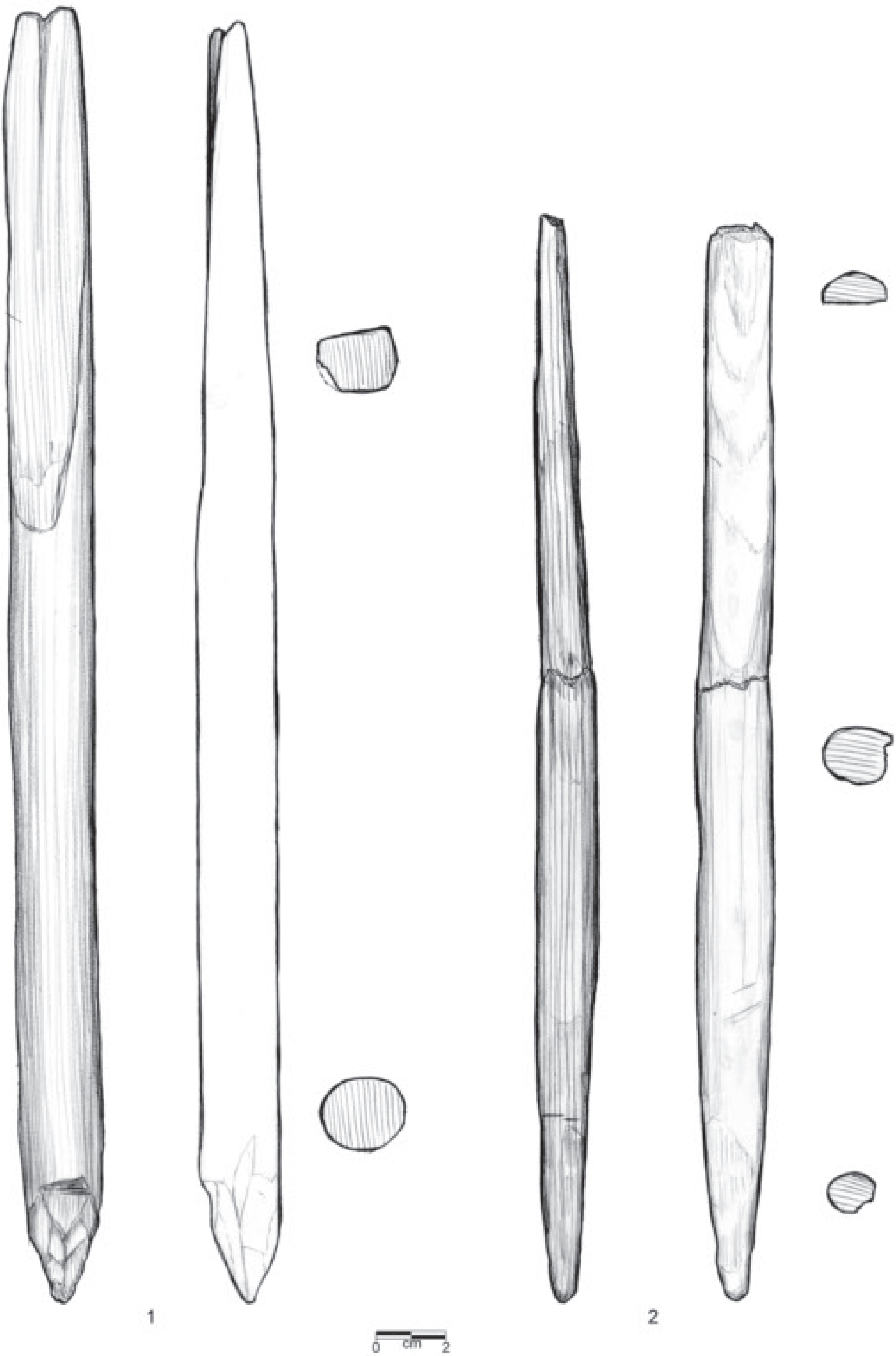


Fig. 3.113
Complete stake components with pointed and bevelled ends. 1: 85/261: 10; 2: S40

from 240 to 710 mm and in diameter from 19 to 29 mm (average: 24 mm). The longest stake (710 mm) probably had bevelled ends before they were pointed by chopping.

An additional 105 fragments (71%) of all stakes and poles are snapped, pointed ends of stakes and poles (Figs. 3.114a and 3.114b). They vary in diameter from 13 to 47 mm (average: 21 mm). Many points show wear marks from being pushed onto a hard object, e.g. a stone or frozen soil. The overwhelming number of point fragments relative to fragments without points could be due to their function as parts of constructions which were anchored in the soil. In such cases, the pointed poles and stakes were pressed into the turf layers, stopped by the upper permafrost level (at present this zone at the site begins at about 25 cm below the surface), and

a.

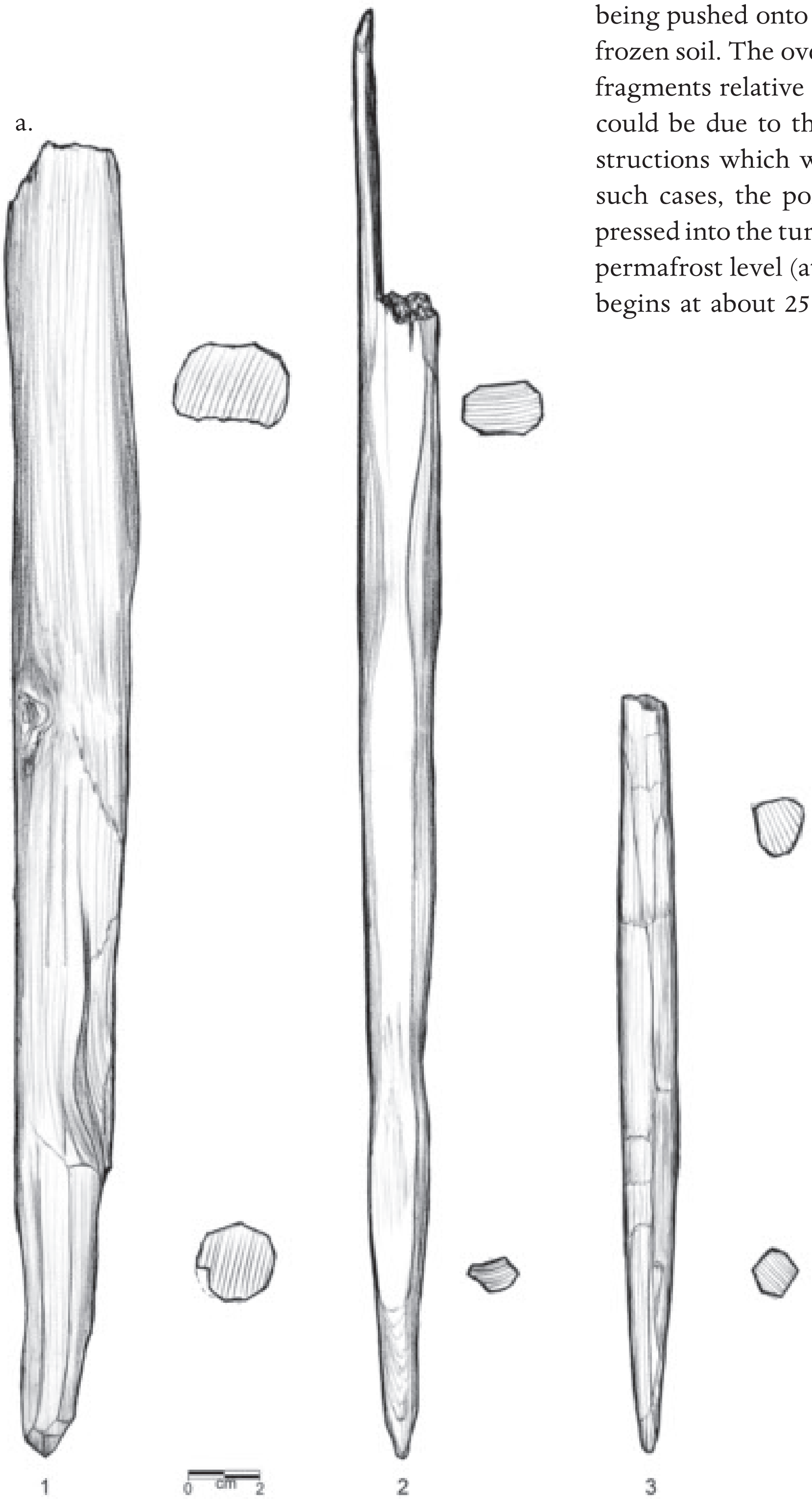


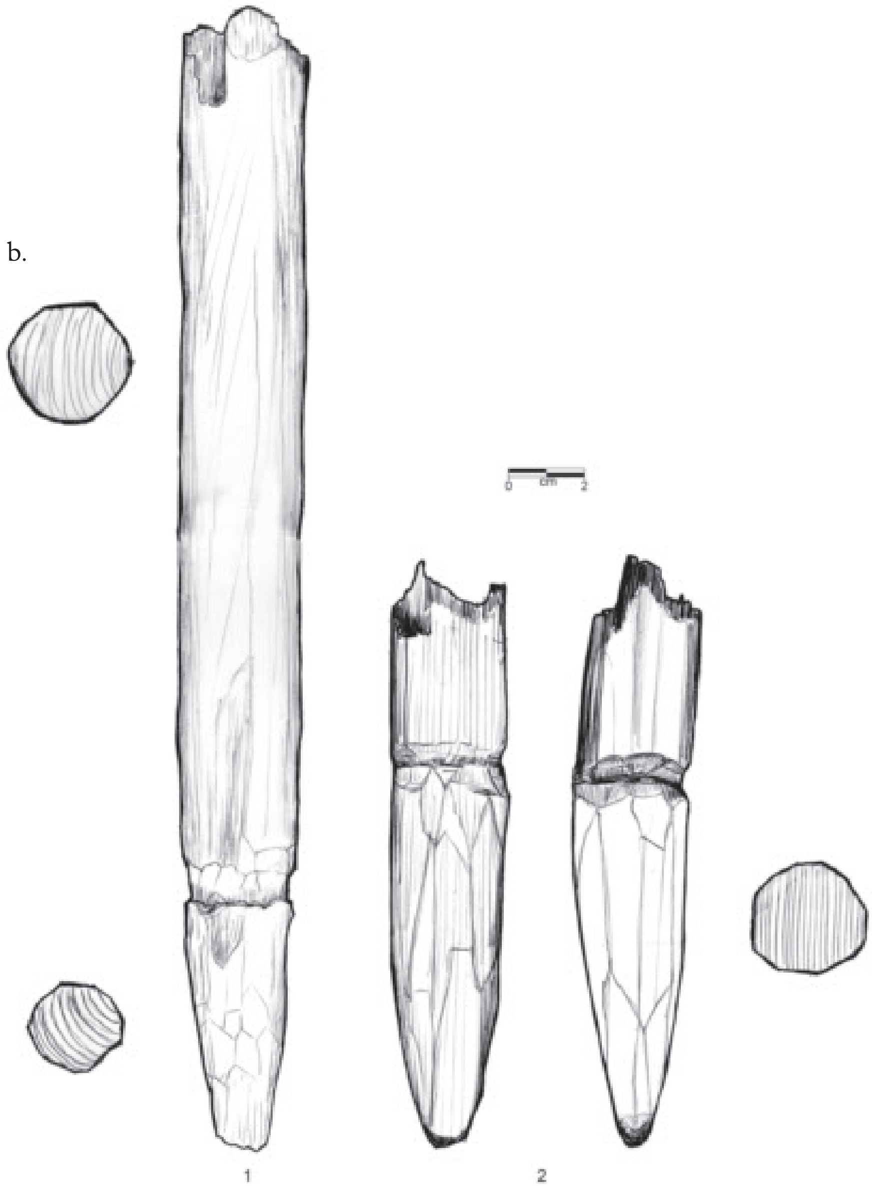
Fig. 3.114
Fragmented stakes with pointed end. (Drawings: BG)
a: *1: S85; 2: 87,5/250,0: 12*
3: 89,0/251,5: 10
b: *1: Qt 84 Profil Felt B*
2: 19/20: 145

anchored by frost in the soil at this depth during the cold seasons. The frozen point ends of the poles had to be snapped off if the poles were removed for other purposes (reworked or used as fuel), and thus the distal ends were left in the turf layer and survived in their frozen state until the present.

In this connection, it must be noted that a number of poles and stakes are provided with a deeply chopped notch some centimetres from the very point (e.g. Qt 84: nn and 19/20: 145; Fig. 3.114b – 1–2). This would strengthen the anchoring of the pole when the point froze in the soil.

A minority of the stakes and poles show a different breaking pattern: 12 specimens (8%) are snapped-off bevelled ends and 21 (15%) are mid-fragments (snapped at both ends). As indicated above, this might be due to the fact that broken stakes ended up as raw materials for other (smaller) tools or, in most cases, as fuel.

The comprehensive artefact class of stakes and poles probably contains many different functional types. As mentioned above, the majority must have been parts of standing constructions like tent frames, racks and various supports. But this category also includes a number of reused (pointed) preforms for regular hunting tool



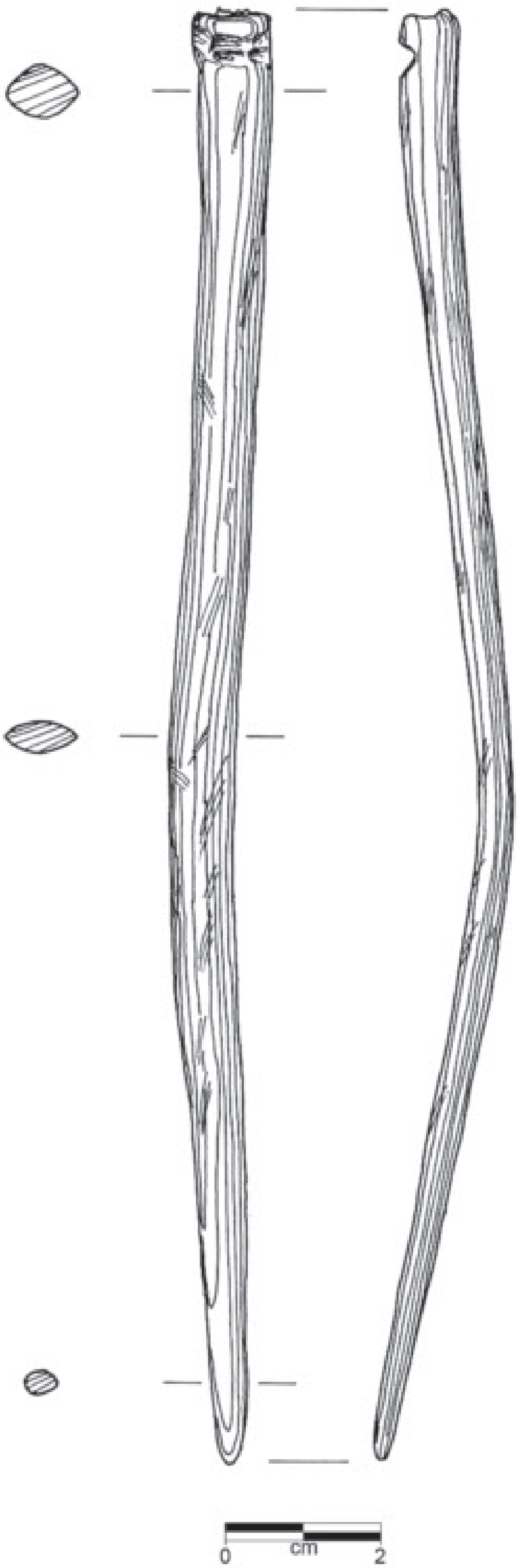


Fig. 3.115
Wooden peg with proximal notch (85/254: 7).

shafts and discarded shaft or bow fragments, which were reworked and secondarily used as stakes or pegs (e.g. 20/20: 55 and 83,5/249: 17).

The assemblage includes 18 wooden pegs. They are short and pointed and quite slender. The diameters of the pegs vary between 4 and 15 mm (average: 10 mm). Some show impact marks from hammering at the base, and a single peg shows a notch at the proximal end (Fig. 3.115).

Finds from Qajaa:
The majority of stake and pole components (54 pieces or 59%) from Qa are mid-fragments snapped at both ends; 30 fragments or 33% show pointed ends, and bevelled ends are preserved on 7 fragments or 8%. This distribution differs considerably from Qt, where only 15% were mid-fragments and the majority of stakes (77%) were fragments with points. This might reflect the fact that the majority of stake fragments recovered at Qa are from waste heaps and not from the areas where the dwellings and supports actually stood.

3.7 Worked skin

The admittedly few (15) finds of fragments of worked skin from the culture layers of the Qt site are of great importance. They are the very earliest preserved evidence of ASTt skin working and sewing. The following chapter draws to some extent on the initial analyses of the skin material conducted by the late Gerda Møller, but the re-analyses by conservator Anne Lisbeth Schmidt forms the main basis of the following text. A catalogue of the skin finds and Schmidt's re-analyses of the preserved specimens are presented in Appendix A.

First and foremost, the fragment of a stocking (20/19: 92) attracts attention (Figs. 3.116a and 3.116b). This is the only certain fragment of a piece of garment from Qt. It was originally described by Møller (1991: 146) and, taking into account Schmidt's observations, the stocking can be described as follows: Most of the foot of this sealskin stocking is preserved.

Fig. 3.116
a: *The skin stocking fragment from Qt (20/19: 92) in fresh condition. The upper part lies above the sole. (Photo: Gerda Møller).*
b: *The skin stocking fragment in preserved state and mounted for exhibition. (Photo: R. Fortuna).*

a.

b.

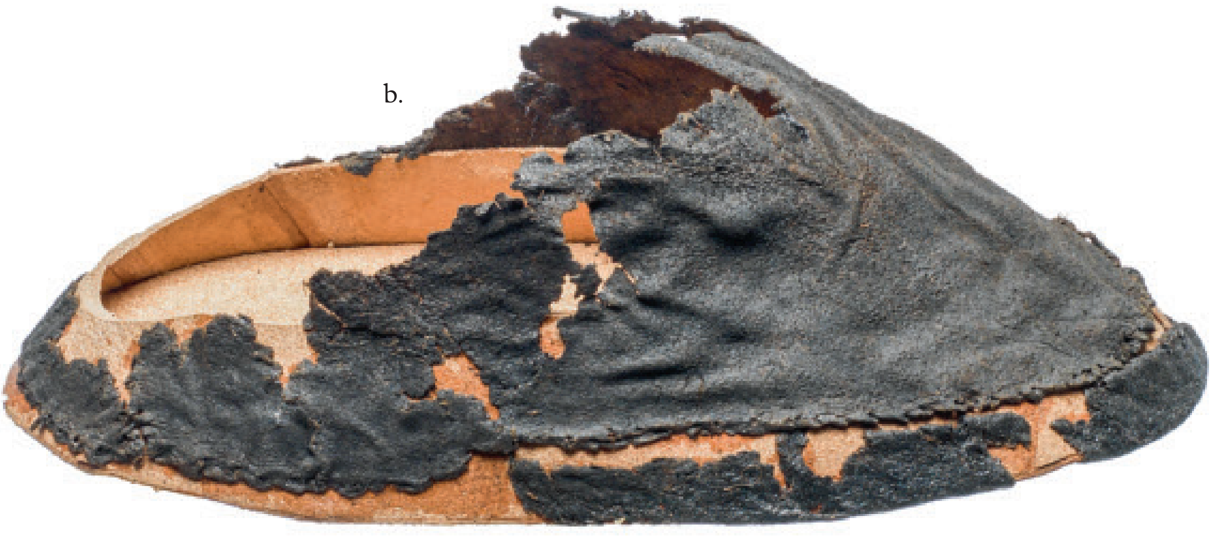


Fig. 3.117
Fragment A with seam of overcast stitches with spun sinew thread (20/19: 46).

Fig. 3.118
Sealskin fragment with seam (19/20: 72).

The sole measures 21 × 11.5 cm. Both sole and uppers have the hair side turned inwards, and the bent and tucked sole is sewn with overcast stitch (30 per 10 cm) to the uppers. A layer of vegetable material, which could have been remains of grass used for insulation, was found between the sole and the fragmented uppers. A repair of a small hole or slit is seen in the upper front, where a toenail could have worn away the stocking. The repair was made with running stitch (2 per 1 cm). According to analyses carried out by knot specialist Pieter van de Griend, the sinew sewing thread holding the sole and upper together has a diameter of 1.5 mm. It was made of two left-handed twisted strands (Z-twisted), each of which consisted of two right-handed twisted yarns (S-twisted). The anti-spiral principle increases cohesion between the fibres. This is a non-trivial way of making thread, and it shows that the seamstresses from Qt had knowledge of the 'rope-making principle'. The row of stitches terminates in a congealed knot on the exterior of the skin. One right-hand spinal section could be discerned. The knot, therefore, was most likely a right-hand Overhand Knot, but as the compact mass appears rather large, it could also be a Fisherman's Knot or an Overhand Bend.

A large piece of worked skin was recovered close to the stocking: 20/19: 46. It was considered by Møller to be a coherent sealskin measuring *c.* 150 × 50 cm with some pelage left (fragments A, B and D show black and brown guard hair from a seal). However, some parts were so badly preserved that they were difficult to distinguish from the grass turf in which they were found. Schmidt's re-analyses suggest that not all the fragments, A–G, necessarily belong to a single large piece. A seam made with regular overcast stitches, which were sewn from the flesh side of the skin forming a rolled seam, is seen in Fragment A (Fig. 3.117). The Z-twisted sinew thread is 1.4–1.6 mm in diameter and the seams were sewn with 13–18 stiches per 10 cm, a quite coarse sewing. Work traces probably, from skin scraping (long, dense parallel striations), were observed in particular in a fresh state on the flesh side of fragments B, D, E and F. The edges of Fragment C were clearly cut with a sharp tool. The seams on A and F were probably prepared by punching holes along the edges in order to ease the stitching. The skins were originally quite thick and the coarse, without waterproof seams, indicating that these fragments were not from garments, nor from a cover for a vessel. Rather, the fragments were originally parts of a tent or platform cover, or a skin bag.

19/20: 72 is a fragment of a sealskin with some black hairs still preserved (Fig. 3.118). Along one side a seam sewn with a Z-twisted sinew thread (diameter: 1.1–1.6 mm) is seen. The overcast stiches were sewn from the flesh side with a density of 13 stitches per 10 cm, and the sewing holes might have been punched with a stylus/bodkin. This piece could have been part of an item of clothing.

Finally a 'clump' of skin scraps, which was found right under the large skin described above (20/19: 46), must be mentioned (Fig. 3.119):

1: collection of de-haired sealskin straps (some with knots, see below)

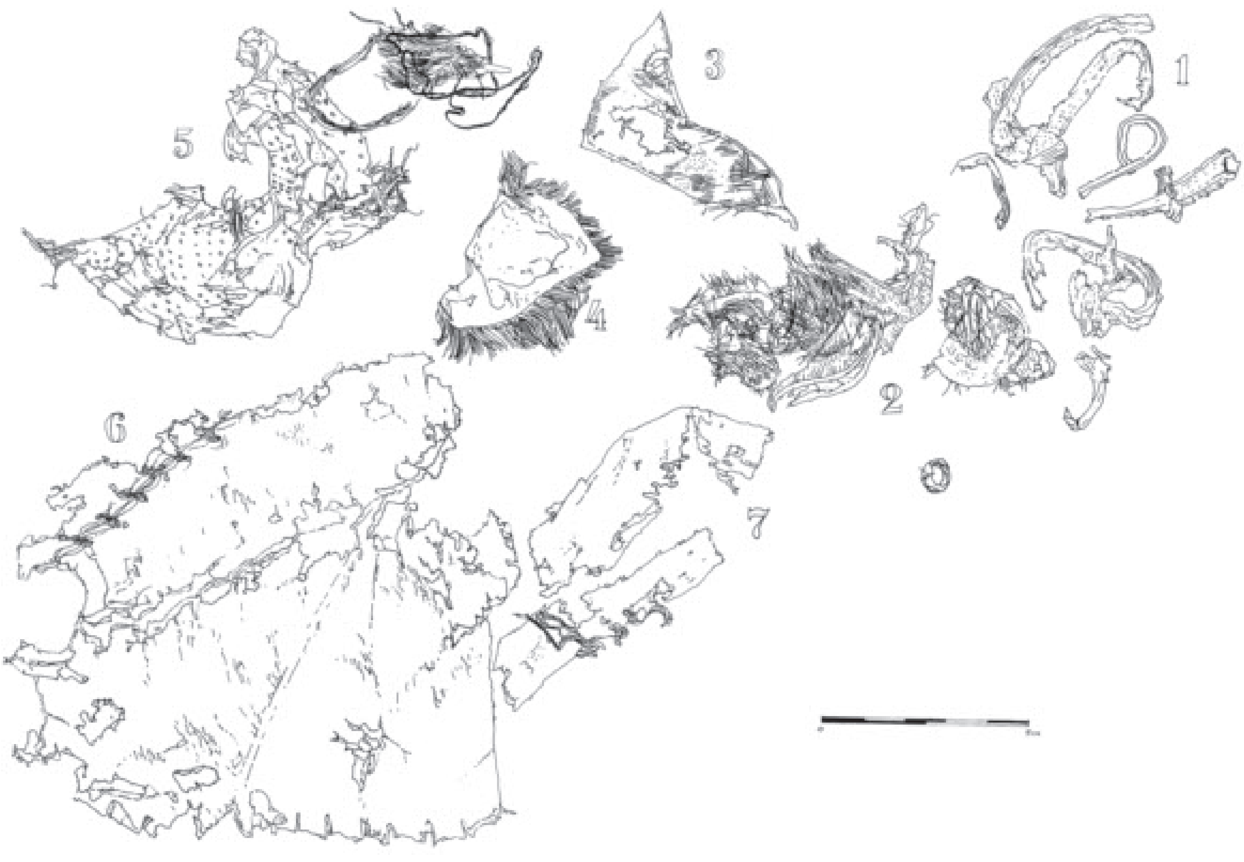


Fig. 3.119
The content of the clump of skin scraps, part of 20/19: 46. Fragments 1–7 are described in the text. (Drawing: H. Møller, 1991).

2: two fragments of sealskin with hair, one with a cut slot
3: small fragment of caribou skin with hair
4: small, triangular cut piece of polar hare skin with hair
5: bird skin fragment with a loose sinew thread, which is very thin. This thread was made of two left-handed twisted strands, each consisting of right-hand twisted yarns (supplementary analyses by van de Griend, 1994)
6: sealskin fragment with sewing and work traces. Overcast stitches sewn from hair side (thread not preserved)
7: two narrow strips of skin, possibly from caribou. Could have been used as lining on a piece of garment.

This clump probably represents a small heap of waste from the 'workshop' of a seamstress. The diversity – with respect to choice of species, function and techniques – is striking, and this material provides us with just a little glimpse of a very important part of Saqqaq material culture which is otherwise completely hidden.

Judging from the evidence of the few preserved skin and thread fragments – and obviously the fine bone needles described above – Saqqaq sewing technology was remarkably advanced and complex. The seamstresses used regular, very thin and Z-twisted threads ('rope-making technique') to sew overcast stitches and make seams of different densities. Traces of precise skin cutting, scraping and punching of skins from seal, caribou, polar hare and seabirds were documented in the material.

3.8 Strings and knots

Knots are found on several string fragments of baleen, skin and sinew from Qt. Mathematician and knot specialist Pieter van de Griend was so kind as to go through the material and subsequently to select some of the well-preserved specimens for further description and identification. The following is based on his thorough technical report on the Qeqertasussuk knots (1994).

3.8.1 Baleen string knots (Fig. 3.120)

Out of about twenty knots of baleen string found at Qt, eleven were so well preserved that they could be examined and analysed. They were identified as to knot type by means of microscope-aided visual inspection. One problem encountered during identification was that most of the baleen thongs had decayed into bundles of single fibres due to preservation conditions.

Fig. 3.120 – 1 is a fibred baleen string containing two knots. These are a Reef Knot and a Granny Knot structure. As a bend, the Reef Knot is considered superior to the Granny Knot, as it has less abject (opening) properties. The tying methods of both knots incorporate the making of two Half Knots.

85,5/252,0: 2 is fibred due to bad preservation. The string contains an Overhand Knot, which may just as well have been part of a Slip Knot or a Noose.

82/249: 7 shows the remnants of a Clove Hitch or an isotoped Granny Knot.

89/248: 2 is a right-hand Overhand Knot.

Fig. 3.120 – 2 is an adjustable loop knot based on a slipped, symmetrized Overhand Knot. The badly preserved, fibred strands form a closed loop. The construction could have functioned as a snare.

84,5/252,0: 29 is a deformed Clove Hitch or isotoped Granny Knot.

Fig. 3.120 – 3 represents a Clove Hitch made around a second string.

20/20: 76 is a string with a right-hand Overhand Knot.

85,0/251,5: 21 is quite complex. The item contains three knots K1, K2 and K3 (see also Fig. 3.54a). The three knots were very difficult to identify. Visual inspection was hampered by numerous snapped strands and concealed inner segments. The interiors of the knots were not accessible. Due to the high pH values of the soil, the originally homogeneous rectangular cross-sectioned baleen string has disintegrated into bundles of thin fibres, which were deformed as they were subjected to tension and torsion. However, the gross structures of the knots can be determined:

K1: This knot comprises a sliding attachment, since the construction consists of Half Hitches with not much longitudinal holding power (Fig. 3.120 – 4). However, if a baleen string with a rough (acid-treated) surface was used, a construction like K1 may well have resisted strong longitudinal pulling forces. The deflection of the filament caused by the gripping round-turns indicates that the structure has been tensioned with considerable force.

K2: Contraption containing a Becket Bend (Sheet Bend structure) with left-hand twist and numerous through-going strands (Fig. 3.120 – 5). The Becket Bend consists of the bight *S1 S2* and shaded Gooseneck *w1 e4*. The twist might be due to the material's topological confinement, the material's nature (flat cross section), and the Gooseneck's right-handedness. These factors induced the twist during the making of the Becket Bend. K2 is not intended to slide: the bight *b1* is too sharp (*b1* was apparently intended as a bight, taking the presence of the Gooseneck into consideration). The small loop between *w1* and *w2* indicates that it was originally an eye. The function of the numerous other strands penetrating the interior of K2 could not be determined.

K3: Judging from the numerous burst strands emanating from it, this structure is probably not a single knot but rather two intertwined knotted structures (Fig. 3.120 – 6). Reconstruction hints at two Lark's Heads. As no material is preserved outside of the knotted segment, it is difficult to assess how these Lark's Heads functioned. It cannot be determined if they carried a symmetrical load on both standing ends or merely one.

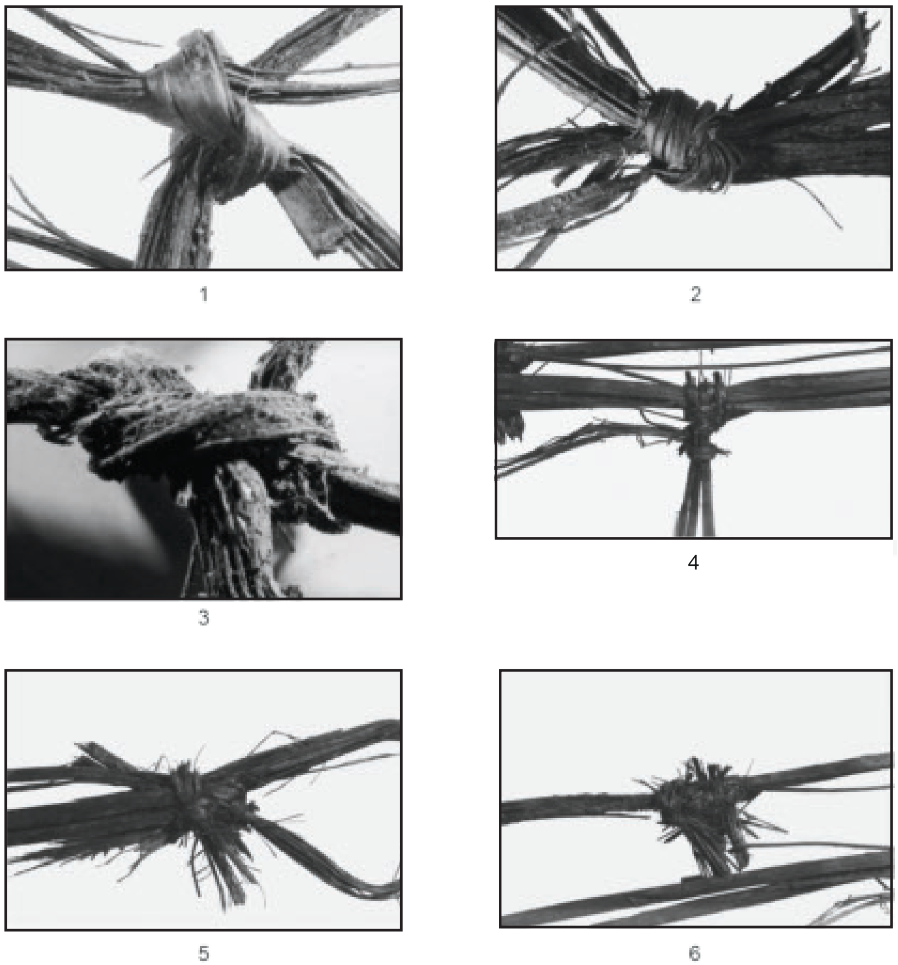


Fig. 3.120
Knots on baleen strings.
1: 85/264: 4
2: 85/265: 4
3: 19/19: 48
4: 85,0/251,5: 21 K1
5: 85,0/251,5: 21 K2
6: 85,0/251,5: 21 K3

Judging by the lack of indentation of *L1 L2,* the components of K3, unlike for instance K1, have not been subjected to any considerable stress.

It is difficult to interpret the function of this complex baleen item. It is reasonable to assume that the knot structures functioned in some way together. K2 probably represents a connection point, whereas K1 and K3 functioned perpendicular to the baleen strands around which they grip. The deflection of *L1 L2* due to the grip of K1 indicates that K1 was subjected to a force which was beyond the breaking strength of the constituent knots. Likewise the numerous snapped strands emanating from K3 indicate that it was subjected to strong pulling forces. In conclusion, the applied knot technology suggests an object like a strangulation contraption, perhaps with net-like meshes.

Finds from Qajaa:
A total of 24 baleen objects have been recovered from Qa. However, ten of these are from probable mixed layers or layers of Thule origin in Area D. The remaining 14 specimens are baleen strings, often with simple knots. One piece of string forms a little 'yarn ball'.

3.8.2 Knots (sinew thread, thongs of sealskin)

Two samples of sinew thread were examined. The sinew thread and the knots identified by van de Griend in connection with examination of the skin stocking (20/19: 92) were described above.

The sample of sealskin straps from 20/19: 46 (see 3.7 above) contained the following knotted structures:

1: one badly chafed knot, which was quite distinctly composed of two separate components. A spinal segment was observed on each of them. Judging from the emanating strands, the knot must originally have been part of a middle piece of a stitching. This suggests that it was originally a (single) Fisherman's Bend, which is an excellent bend for uniting rough and round material. Its functionality depends strongly on lateral symmetry.

2: a right-hand Overhand Knot situated at the end of a bit of stitching. Use of Overhand Knots as stopper knots is universal. Their purpose is two-fold:

Terminal knot: prevents the thread from slipping through the holes of the seam and thus

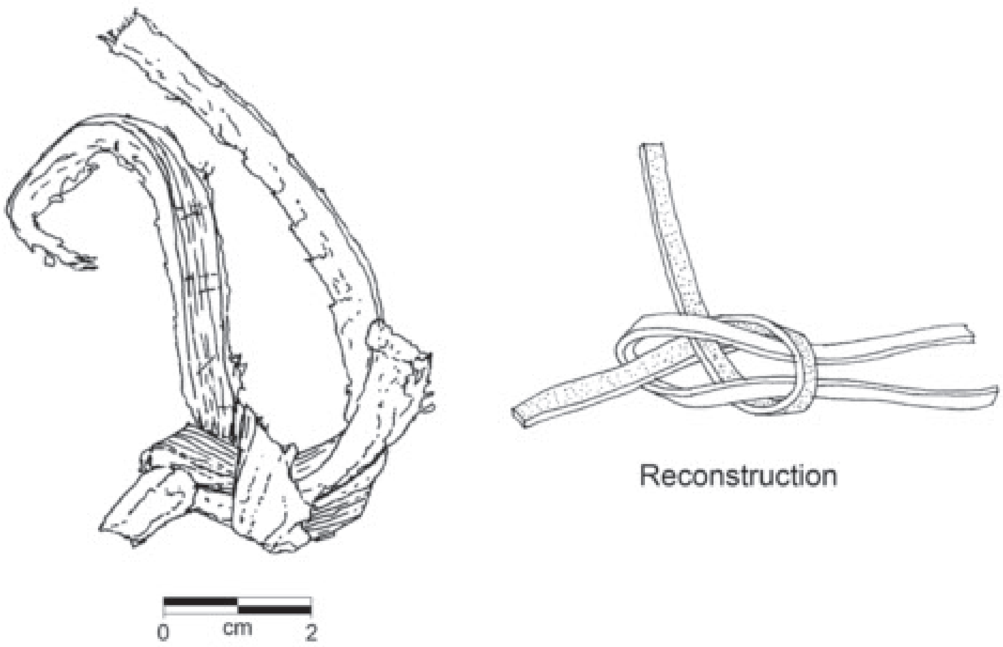


Fig. 3.121 *Sheet bend on sealskin thong from 20/19: 46. (Drawing: H. Møller).*

enables the seamstress to exert tension on the thread and pull the seam together;

Rudimentary seizing: the knot prevents the double twisted thread from unravelling.

3: an unidentifiable (stopper?) knot.
4: a Sheet Bend, which is a simple, universally used structure. It occurs extensively in netting, but considering that the Qt specimen is tied in thong, it is assumed that it functioned either as a bend or as part of a loop knot (Fig. 3.121).
5: 'debris-like' thong fragment. It can merely be concluded that it displayed a right-hand spiral section.

No rawhide splices were found, but this is probably a function of the very limited material and preservation conditions.

In conclusion, it can be stated that the Saqqaq people had a considerable knot repertoire consisting of at least nine different types of knot: Overhand Knot, Half Hitch, Clove Hitch, Lark's Head, Reef Knot, Granny Knot, Sheet Bend, Fisherman Knot and Noose. These nine knots are proper, well known and in most cases quite secure knots, and not some haphazard conglomerations of Overhand Knots and Half Hitches, to which untrained knotters would resort. The Qt knots represent a large array of functionalities as they comprise bends, hitches and loop knots, and they indicate that the Saqqaq people had accumulated a high level of understanding of the mechanical and spatial properties of the materials for strings and the knots they chose to use. Remarkably, the sewing threads of sinew show that the Saqqaq people possessed knowledge of rope-making techniques based on twisting strands together in an alternating anti-spiralling fashion.

3.9 Saqqaq raw material utilization and technologies

3.9.1 Introduction

Analyses of Saqqaq technology based on the *chaîne opératoire* approach (analysing the processing of objects from raw material procurement and utilization via production, use, repair, reuse and discard) have been presented in a recent substantial publication (Sørensen 2012a) concerning flint-like lithic raw materials. However, the assemblages from Qt and Qa open up entirely new possibilities for throwing light on the processing of organic materials like wood, bone, antler, ivory, baleen and skin. Steps of the working processes were presented in the previous chapter as an integral part of the presentation of the specific tool categories. This was motivated by the finds of blanks, unfinished, exhausted and repaired tools, etc., representing different stages of toolmaking and -use. This chapter deals with Saqqaq utilization of raw materials and working processes on a more general scale and brings into play the comprehensive material of waste products from toolmaking processes, like splinters, shavings and flakes. Information on the repair and reuse of tools of organic matter will be included as well. The following analyses of selected aspects of the Saqqaq *chaîne opératoire* concentrate on organic matter, which is a highly significant contribution from the Qt and Qa finds, but nevertheless analyses of lithic waste will be touched upon according to the standards introduced in Sørensen 2012a.

3.9.2 Driftwood utilization and woodworking

The 'carpenters' at Qt and Qa had access to quantities of driftwood. Since the onset of the warm periods of the Holocene in this part of the Arctic (*c.* 8500 BP), thousands of cubic metres of wood, primarily *Larix* sp., *Picea* sp. and *Pinus* sp. from Siberian forests, had accumulated in varying quantities on the beaches, which continuously rose due to the retreat of the ice cap (Grønnow 1996a; 2012b). When people first arrived at Disko Bay they had practically unlimited access to these huge resources of wood in the shape of tree trunks washed ashore on the contemporary coastline, as well as on the raised beaches up to a level of 80–100 metres above present sea level. These ample supplies of driftwood and the extensive use of wood by the Saqqaq people are evidenced by the conspicuous quantities of split and chopped pieces, shavings and compact layers of charcoal at Qt and Qa (Figs. 3.122a and 3.122b).

The working of driftwood began with splitting the trunks into beams or 'boards'. This was done by means of quite sturdy wedges of whalebone, antler or (rarely) ivory, described above (3.3.10). The wedges were hammered into the tree trunks to produce the large split pieces mentioned above. No fewer than 10,798 of these, ranging from entire sections of trunk to small, thin waste products from splitting activities, have been recovered from the Qt site (Fig. 3.123). Probably much wooden waste was later used as firewood.

During the following step the 'boards' were chopped into sections by means of adzes (Fig. 3.124), and crushed or knotty parts and sections damaged by holes from insects and shipworms were removed and discarded. The selection of high quality sections was crucial as many driftwood trunks show remarkably irregular growth rings and twisted parts, and thus they are unsuited for further processing into shafts, etc. However, it must be emphasized that some of the pieces with broad growth rings and irregular grain were preferred for bowls and trays.

As seen in the artefact descriptions, the Saqqaq craftsman selected high quality parts of *Larix* sp. and *Picea* sp. for tools. In rare cases, *Pinus* sp. was chosen as well, and sometimes local wood from Greenlandic 'shrubberies' of *Juniperus* sp. were used for very carefully made handles.

Analyses of shavings and work traces on blanks show that adzes were extensively used

Fig. 3.122
a: *Recent driftwood found on the beaches at Qt, summer 1985. (Photo: BG).*
b: *In situ photo of a heap of wood shavings – a 'carpenter's workshop' in Horizon 3, Area C at Qt.*

Fig. 3.123
Long, narrow splinters from splitting driftwood (86,0/251,5: 11).

Fig. 3.124
End of board section (in situ in the frozen layers of Area B) showing traces of adze chopping.

during the subsequent steps in the *chaîne opératoire*. Adzes with heads of killiaq with polished edges of different widths, curvatures and angles were in fact used throughout the entire process, from blank to finished artefact. This is seen by the fact that the great majority of blanks and shavings bear traces of 'clean' cut marks from tools with regular (polished) edges and not from serrated or bifacially fabricated edges. No fewer than *c.* 9,600 wood shavings from Qt are classified as waste products of adze chopping. Large shavings with multi-faceted cross sections are probably from the initial stages of the shaping of the board into a tool. The majority of shavings from finer adze work are characterized by a proximal end with traces of one to three clean cuts from an adze edge, an often slightly curved longitudinal profile and a feathered distal end

a.

b.

Fig. 3.125
a: *Heap of short shavings from adze chopping (87,0/249,5: 36).*
b: *Selected short shavings from 87,0/249,5: 36.*

due to the splitting off of the shaving from the blank (Figs. 3.125a and 3.125b). Traces of precise strokes are seen as regularly spaced marks on the ventral side of the long shavings resulting from adze work (Fig. 3.126).

A number of the wood shavings from Qt – at least 700 – are so small and paper-thin that they are probably the result of cutting with a razor-sharp edge. Here flakes, blades or hafted microblades were probably used for detailed wood-working and finishing (Figs. 3.127a and 3.127b).

Judging from the work traces, the final shaping of the surface of wooden objects normally consisted of either scraping with side scrapers or grinding/polishing with pumice grinding stones or a combination of these. Smooth surfaces were treated with pumice grinders with flat sides and facets with smooth as well as rough surfaces, whereas round or oval shafts were finished with pumice grinders with smooth surfaces and grooves which would fit the desired shaft diameter.

There are, however, a few traces of other finishing techniques for wooden surfaces. Some finely made round shafts and paddle fragments show finely and regularly grooved surfaces, which must have been made with a kind of serrated edge, probably edges of bifaces. It must be mentioned that the surfaces of wooden bowls show chopping marks from adzes as well as finely multi-grooved scraping marks, probably resulting from the finishing of the surface with retouched edges of end and side scrapers.

The shaping of curved objects like ribs for vessels and drum frames was prepared for by softening the wood by means of soaking, probably in boiling water as there are no traces of scorching on these objects. Taking the advanced and extensive use of boiling stones and skin bags into consideration (see Chapter 5), bending wooden objects by boiling or steaming them was certainly within the technological range of the Saqqaq. However, we need to follow up on the initial modern experiments with bending driftwood (Appelt *et al.* 2012) in order to throw light on which kinds of stone-built structure were connected to steaming and boiling wooden objects. The strong bending of

Fig. 3.126
Long shavings resulting from adze chopping (84,0/252,0: 17).

the vessel frames was made step-wise across a butt edge. Traces of this bending process are seen on the inner side of the curved parts of the frames (Fig. 3.128).

As described in detail the section on hunting gear (3.2), advanced lashing techniques were employed when composite shafts or bows were made. Here it is enough to say that the most commonly used technique for linking several wooden components was scarfing. That is, two pieces of the same diameter were provided with bevelled ends, which were linked and secured with a lashing. In order to maximize friction between the bevelled ends of the shaft components, and thus to increase the stability of the link, both bevelled surfaces were scratched obliquely. Also the part that was covered by the lashing was finely scratched to provide a firm basis for the thong.

a.

b.

Fig. 3.127
a: *Heap of small and thin shavings resulting from cutting with a tool with an even, sharp edge (82,5/251,0: 24).*
b: *Selected thin shavings from 82,5/251,0: 24.*

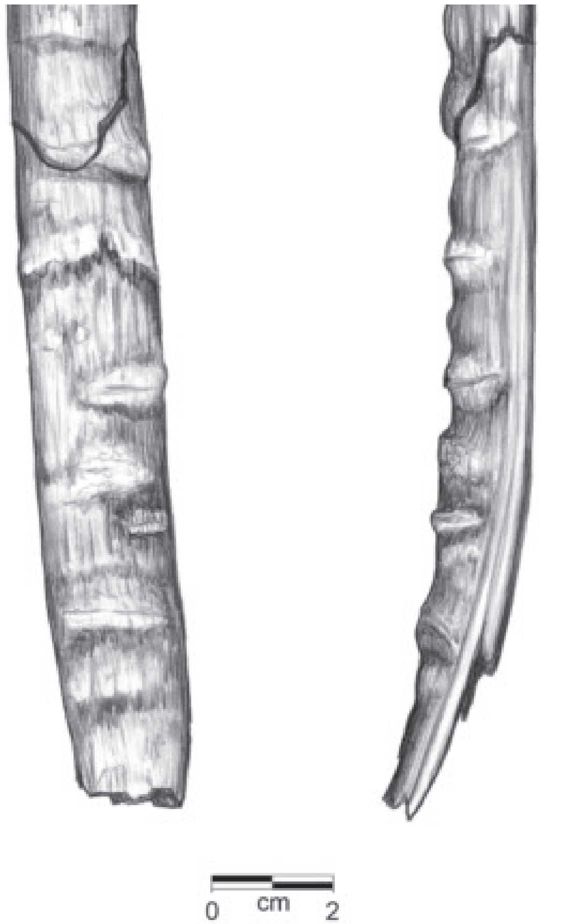


Fig. 3.128
Close-up of bent wood: vessel frame fragment 89,0/251,0: 34 with compression marks on the inner side.

This kind of link was simple and very resistant to longitudinal pushing forces (Fig. 3.129).

Another lashing technique was used for tools which were also exposed to pulling forces. This goes for lance foreshafts, which were linked to the main shaft by a wedge-shaped proximal end that would have fitted into a V-shaped socket at the end of a main shaft. No such 'swallow-tails' have yet been identified among the finds. The V-scarf was locked by a nail which was pressed through it, and finally a lashing secured the construction.

Saqqaq wood-working technology included methods of repair. Containers like bowls and spoons and flat objects like paddles tended to crack along weak growth rings or around knots.

Fig. 3.129
A simple scarf link illustrated by a detail from an ethnographic, red-painted dart shaft from a Yupik group. The shaft diameter is 15 mm and the scarf link is 150 mm long. (Anchorage Museum no. 84.9.38). (Photo: BG).

Such cracks were repaired by patching up (with baleen strings). Elongate holes were carved on each side parallel to the crack. Sometimes grooves connected the holes so that the lashing was countersunk and thus protected from wear and tear. The lashings were secured and tightened by means of small wedges of wood, which were pressed in between the lashing and the sides of the hole in the object. Occasionally entire parts of the rim of containers broke off and such fragments were affixed to the object again by means of these techniques.

Finally, it must be mentioned that the tolerance threshold of, for example, shaft cross sections and straightness, and the shape of bevelled ends, was a mere few tenths of a millimetre. This extreme precision is necessary when long, straight and flexible shafts are built from several shorter components.

3.9.3 Working of antler, bone, ivory and baleen

Numerous specimens from Qt (119) and Qa (24) are waste products from the initial stages of the *chaîne opératoire* of artefacts made from antler and whalebone, the much preferred raw materials of hard organic matter. Accordingly this section describes the techniques and working processes that transformed raw materials into blanks, which formed 'standardized' starting points for the fabrication of regular tools.

3.9.3.1 Antler (Fig. 3.130)

Antler was procured from the many caribou which were hunted in the interior of the mainland, as well as from shed antlers gathered during the inland hunting tours (Meldgard 2004: 145 ff.; see also Jensen and Grønnow, in prep.).

Sixty specimens from Qt and six from Qa throw light on the initial steps of the production of artefacts of antler.

One of the first steps involved removing the rose end of the antler (three out of four rose ends from Qt are from shed antlers). The traces show that this was done by means of an adze: typically a quite broad notch, which reached the spongious matter, was chopped all the way round just above the rose (Fig. 3.130a – 1). In some cases the notch was only chopped from two sides (Fig. 3.130a – 2). The chopping facets in the solid antler are clean and details like tiny longitudinal grooves or burrs revealing irregularities in the edge are clearly seen. This clearly indicates that antlers were softened before processing by soaking in water or urine, or by boiling. Working traces show that in a few cases, when the chopped notch was not broad enough to reach the spongious matter inside the antler all the way round, a burin was employed to deepen the notch. Next, the rose end was broken off with great force. Mostly this was a clean break, but 'failed' irregular fractures are seen in cases where the notch did not penetrate deep enough into the spongious matter. A number of waste products show that this notch technique was employed during the sectioning of the softened antler stems, as well as in the removing of the palmation ends of the antlers (Fig. 3.130a – 3). Deep longitudinal grooves at the root of the tines (Fig. 3.130a – 4) show how the burin was used along with the adze to remove the tines from the antler beam. Specimens like Fig. 3.130a – 5 are quite informative as they show a lot of variations of the chopping/burin technique, and additionally that sometimes 'expedient' work was done in hard, dry antler, as revealed by irregular angular chopping marks.

A number of finds (nine from Qt, e.g. 12/23: 37; 88,5/248,5: 18) show that an important goal of the initial steps of the *chaîne opératoire* was to produce regular fillets of solid antler. These fillets were produced by cutting longitudinal grooves into the softened antler stem by means of a burin (Fig. 3.130b – 1–2). The burin grooves were cut parallel at a distance of 15–20 mm apart (average 17 mm). The traces show that this process demanded several cuts with the burin in the same groove. This made the grooves a bit wider (2–4 mm) and slightly V-shaped as they got deeper (5–10 mm) and finally reached the spongious matter. The fillets were broken loose from the antler stem with some force, but no traces have been identified which reveal how this was done. The next step in the initial production pro-

Fig. 3.130
a: *Waste products from the first steps in the processing of antler. 1: 83,5/251,5: 10; 2: 85/257: 7; 3: 20/20: 87; 4: 85/253: 1; 5: 12,0/23,5: 81*
b: *Waste products from the production of antler fillets. 1: 12/23: 37; 2: 88,5/248,5: 18; 3: 20/20: 54; 4: 14/24: 32*

cess was the sectioning of the fillets by means of chopping notches into the softened fillet and snapping it into 'standardized' blanks of solid antler suited for the production of, for example, harpoon heads. This step is demonstrated by the specimen in Fig. 3.130b – 3. Irregular or angular fillet ends and short sections – waste products of this production of blanks – are represented by Fig. 3.130b – 4. The steps that followed, during which blanks were worked into regular tools, are described under the tool categories in the previous sections.

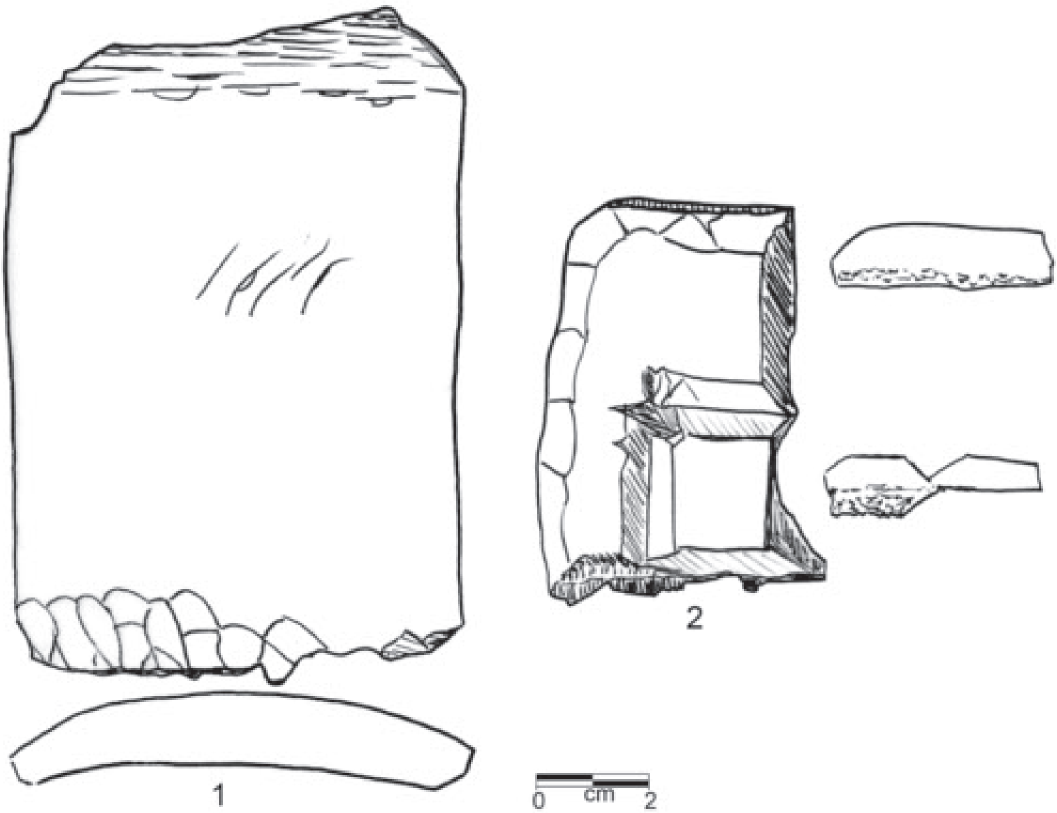
The material only includes a single fragment of a flat and thin 'plate' of solid antler (19/20: 101). This piece could be a waste product from the production of antler spoons.

3.9.3.2 Whalebone (Fig. 3.131)

Bones of no fewer than six whale species were found at Qt. Some of these whale species were hunted, whereas others – probably the largest ones, like the bowhead – were utilized when they drifted ashore as carcasses. Thus, with the addition of ancient bones from beached whales at raised beach ridges, whalebone was an abundant raw material in the Disko Bay region (as was baleen).

Forty-one specimens from Qt and two from Qa bear evidence of the techniques employed during the initial working of whalebone. Fig. 3.131a – 1–2 are typical specimens showing how large whalebones, probably most frequently ribs, were sectioned with the same technique as with antlers: a notch was chopped across the softened rib into the spongious matter; the rib was snapped and the section was then split into two flat pieces with remaining spongious matter on the inner sides; subsequently, this mat-

a.



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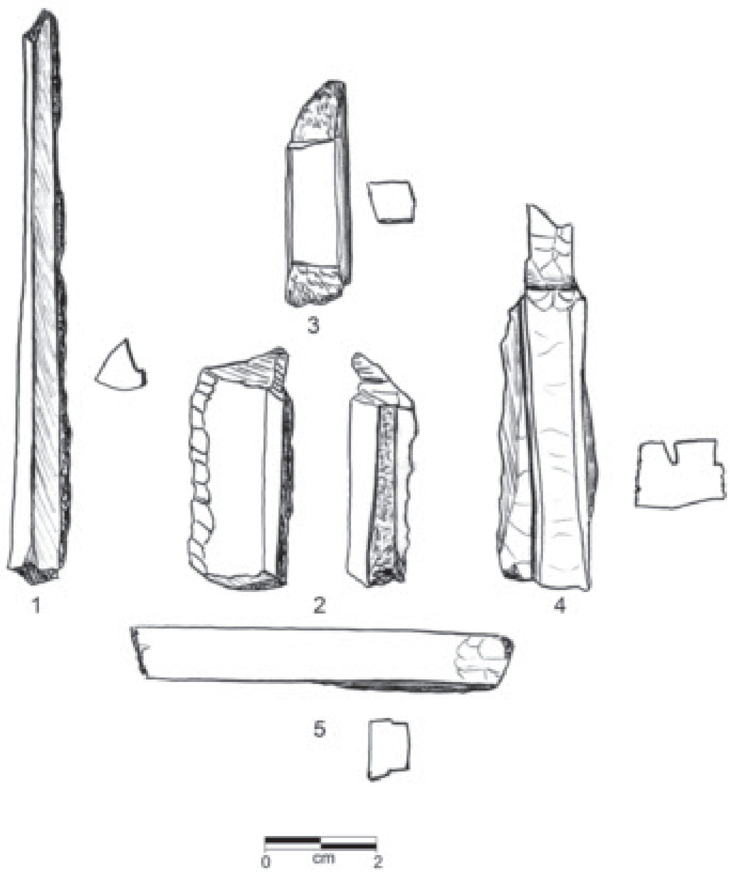


Fig. 3.131
a: *Waste from the initial working of whalebone.*
1: 11/24: 56; 2: 20/20: 14
b: *Waste from fillet production from whalebone 'plates'.*
1: 87,5/251,0: 21; 2: 20/19: 110; 3: 10,0/23,5: 43;
4: 82,5/249,0: 1 5: 12/23,5: 54

ter was removed by chopping, producing quite thick plates of solid bone, which then could be further dressed by chopping of the edges. Irregular splinters from the splitting, and shavings of spongious and solid matter from the adze chopping, are waste products of these steps.

The working traces show that often adzes with narrow, slightly curved edges were preferred for working whalebone.

Some 'plates' were made quite thin and probably served as blanks for objects like spoons and ladles, while other (long) plates were sectioned by means of burins into 'fillets', in many respects like the antler ones. Ten of these fillets show deep (5–11 mm) burin grooves along the edges. Typically they were extracted from the original plate by cutting grooves from the upper surface of the plate towards the spongious underside. Regularly spaced traces of pressure at the bottom of these burin grooves (Fig. 3.131b – 1) indicate that the fillet was split from the plate by means of narrow wedges. Sometimes the fillet was cut from thick plates by cutting with burin from opposite sides (Fig. 3.131b – 2). The fillets seem to be a 'standardized product' (like the antler ones), as they quite consistently have parallel sides and are 10–12 mm wide. They were divided into useful sections by chopping transverse notches and subsequently snapping. Almost all fillet sections/fragments in the material represent refuse – irregular removed fillet ends, etc. (e.g. Fig. 3.131b – 3–4). There are no fillets left of a size which could have served as blanks for e.g. barbed end prongs. However, among the shorter fillet sections (Fig. 3.131b – 5) there are pieces which could have been worked into blanks for a variety of smaller tools like harpoon heads or flint flakers.

3.9.3.3 Bone (other than whalebone)

In line with the very limited number of artefacts made from bones of caribou and bird, the number of specimens from the initial steps of tool production is very low. Only twelve pieces from Qt (and seven from Qa) make up this category. Four of them are fillets made of caribou long bone by means of a burin. The best preserved is 26/21,5: 18, which is a 200 mm long, 8 mm wide and very thin (3 mm) fillet. A few short, narrow fillet sections cut with burins out of bird long bones probably represent a first step leading to the production of blanks for needles (Fig. 3.132) (see also Jensen and Grønnow, in prep.).

3.9.3.4 Ivory

The access to ivory from, for example, walrus and narwhal in the Disko Bay region seemd to have been quite limited. As seen above, only a few, very carefully made artefacts were of ivory, and waste products from the working of this raw material are extremely rare in the Qt and Qa collections. Therefore not much can be said about the *chaîne opératoire* concerning ivory.

From Qt only six specimens of ivory are identified as refuse from the early stages of the production of tools. The pieces are all small, irregular waste products and they show burin grooves, chopping marks and probably traces of scraping or cutting with a sharp edge. The 'clean' and reg-

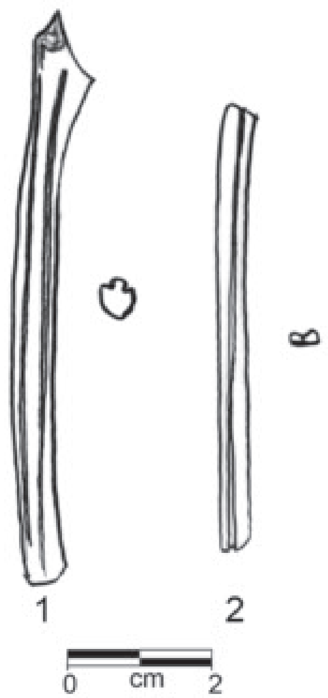


Fig. 3.132
First step in needle production from bird bones. 1: 83,0/251,0: 11; 2: 25/20: 39

ular working traces are evidence that the ivory, like other hard organic raw materials, was softened, probably in urine, during the processing.

3.9.3.5 Baleen and knotting

As mentioned above, the supply of baleen in Disko Bay was ample. Many fragments of unworked and worked pieces of baleen were recovered (more than one hundred from the two sites), but analyses of the *chaîne opératoire* concerning this useful material are hampered by the fact that baleen objects in general are poorly preserved. Typically, sections, fillets and strips of baleen have disintegrated, so that fine traces like facets from cuts have disappeared and pieces have split into bundles of thin fibres. Thus the finds are not informative about how strings were produced from the large baleen pieces. But we know that the desired end products included long, flat strips of various widths, used for many purposes where strength and stability under wet or greasy conditions were important. As seen from the artefact descriptions above, baleen strips were excellent for lashing shaft sections and endblades. Some knife handles were completely covered by baleen lashing, probably in order to provide a firm grip on the handle even if it was smeared in blubber oil during butchering. And thorough repairs – patching-up of cracked bowls and spoons – were made with baleen strings as well.

The baleen material from both sites holds valuable information on an entire technological aspect of the Saqqaq culture: the employment of a variety of knots. They were described in detail above (3.8.1) and here it suffices to state that the knot repertoire consisted of at least nine different types of knot: Overhand Knot, Half Hitch, Clove Hitch, Lark's Head, Reef Knot, Granny Knot, Sheet Bend, Fisherman's Knot and Noose. It adds to the picture of a complex Saqqaq technology that sinew thread was spun with an alternating, anti-spiralling method.

3.9.4 Lithic technology

As seen from the presentation of the many different lithic tools, the Saqqaq lithic technology is complex and extremely controlled. The designs are consistent and the metric analyses reveal that within each tool category a number of well defined types and size groups exist, finely tuned in relation to different hafts and thus to different specialized functions. This consistency permeates every step in the *chaîne opératoire* of the Saqqaq culture, from the raw material procurement to the rejuvenation procedures. Sørensen has analysed several Saqqaq assemblages from West Greenland, including a sample of the Qt material, from this point of view, and he presents two important schemes, which illustrate the consistency of the lithic tool and blade production of the Saqqaq tradition (Fig. 3.133 from Sørensen 2012a: 134, 136). His descriptions of the Saqqaq lithic production in general are combined with observations made specifically on the Qt and Qa material. They are summarized below:

Step 1 (procurement of raw materials) is, as regards killiaq, represented by large, thick bifacial cores produced at the outcrops at Nuussuaq (or Angissat) by direct percussion with a hard hammerstone. These standardized 'Nuussuaq cores' were distributed from the outcrops to sites all over West Greenland and even further, where the cores served as starting points for a systematic production of flake blanks for a variety of tools. This was done through direct percussion with soft hammers on abraded/ground platform edges.

Only in rare cases have killiaq cores survived in the shape of 'Nuussuaq cores' at Qt and Qa, even if these sites are not far from the outcrop areas (250 km and 200 km respectively as the crow flies from the Slibestensfjeldet at Nuussuaq and 30 km and 50 km respectively from the killiaq outcrops at Angissat). A surface find from Qa is a regular Nuussuaq core, but all 17 cores of killiaq from Qt are quite small and irregular. Small and irregular cores of mcq and quartz crystal are quite numerous at the Qt site (70 specimens from Qt (only one from Qa)). Together with 24 unworked nodules of killiaq, quartz crystal, mcq and pumice, they reflect gathering, testing and transportation to the dwelling sites of raw materials from a wide variety of sources distributed

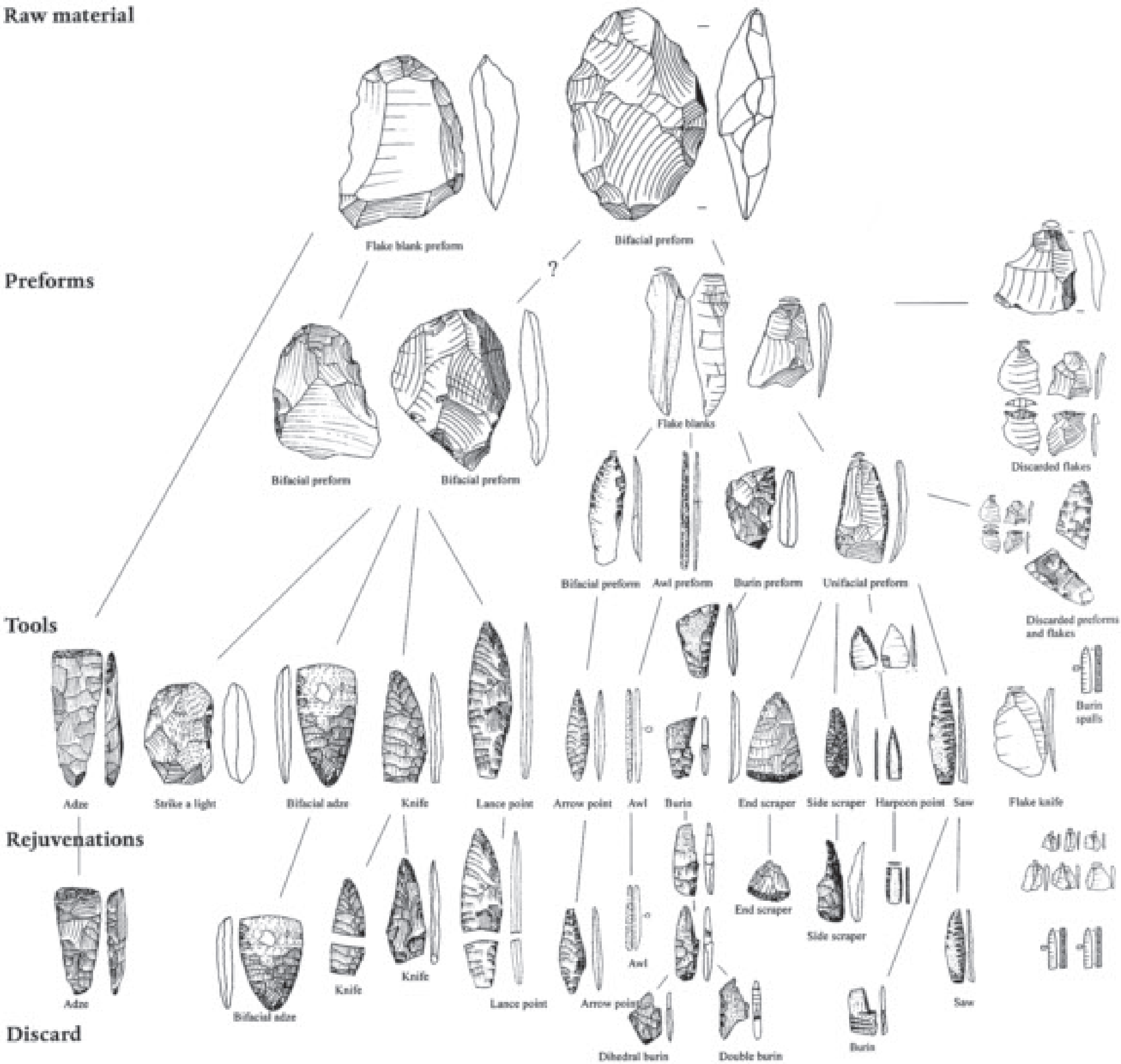


Fig. 3.133 a
Saqqaq concept of lithic production (reproduced from Sørensen 2012a: 134).

in the Disko Bay area (sources like nos. 17–22 in Sørensen 2012a).

Raw material preferences in relation to tool types were described in detail above. A more general picture of the Saqqaq priorities concerning consumption of lithic resources is provided by the flakes. Detailed analyses have been carried out on 11,035 flakes from the five well-defined chronological components of Area C: 89% of these are from killiaq. (A supplementary analysis of a sample of *c.* 600 killiaq flakes from Qt shows that about 4% of these are from the yellow patinated killiaq procured at Angissat (Jensen, pers. comm.)); 3.9% of the flakes from Qt are from mcq, 3.6% are from quartz crystal, and 3.5% are from other lithic materials including pumice. As raw material preferences change through time, the evidence from the flakes will be treated in further detail in the chapter on chronology (Chapter 5) below.

Step 2 (preforms) includes production of flake preforms, from light retouching of flake edges for ready-made flake knives to production of preforms for the large repertoire of highly curated small tools. In addition, the reduced cores served themselves as blanks for large knife blades and adze heads.

Preforms of the specific tool categories were described in detail above. The Qt assemblage comprises 135 preforms for bifacial endblades, which is quite a significant fraction (23%) of the total number of this tool category.

Step 3 (tools) includes the production of formal tools from the blanks. This was done through application of precise pressure techniques, including employment of hafted 'flint' flakers, supplemented by grinding/polishing with fine-grained sandstones. As seen at Qt and Qa, 14 main formal lithic tool types were produced from the blanks: knives, microblades, end and side scrapers, burins, saws, drills, 'strike-a-lights', arrowheads, lance and dart heads, harpoon endblades and adzes. Taking well-defined sub-types of the above-mentioned main types into account, the lithic component of the diverse and 'high-tech' tool kit consisted of no fewer than 26 different formal tool types. During Step 3 most lithic tools were mounted in slots or blade beds in specialized hafts and shafts of wood, antler, bone or ivory, as described in the sections on tools above.

The picture of Saqqaq lithic technology is not complete without describing the production of microblades (Sørensen 2012a: 118–21, 135–36). The blade concept as regards mcq consists of a unipolar, single-fronted blade produced from small, keel-shaped cores, maintained by faceted preparation of the platform. For quartz crystal, quite short, often irregular microblades were produced from complete crystals, where a platform was created by a single platform flake, which removed the end of the crystal. The microblades were detached by pressure techniques on mechanically fixed cores. As seen above (3.3.7), complete, sometimes retouched, microblades were hafted as endblades in wooden hafts.

Step 4 (rejuvenation) consists mainly of standardized resharpening procedures – typically retouching by pressure-flaking of worn or broken edges/points, pressuring off burin spalls, and grinding of worn burin sides and adze edges. Resharpening of working edges was repeated several times until the lithic tool was reduced to a size or shape that hampered its functionality (e.g. too short for its haft or too steep an edge for cutting). In rare cases the lithic blade was pulled out of the blade bed, turned around and reworked into a functional tool once more, and, exceptionally, an exhausted formal lithic tool was reworked into another type of tool (e.g. a bifacial projectile point made into an end scraper).

Step 5 (discard) includes the process whereby a completely exhausted lithic component of a tool is demounted and discarded at the site (e.g. dropped on the dwelling floor or in a waste heap). This is obviously the most common state of the artefacts found at Saqqaq sites, including Qt and Qa, as is apparent from the descriptions of the assemblages above.

3.9.5 Saqqaq utilization of organic raw materials: summary and comparisons

Obviously, the strength of the Qt and Qa materials is that they provide substantial new information on raw material selection and processing of objects of organic matter. In the following sections weight will be put on summing up the observations from the two frozen sites, and evidence from the few other Saqqaq sites which have yielded finds with relevant comparative information, Nipisat (Sisimiut area) and Itinnera (Nuuk area), will supplement the picture of Saqqaq raw material utilization and techniques.

3.9.5.1 Summary of Saqqaq wood-processing

Saqqaq wood-working was complex, systematic and precise: huge quantities of driftwood were processed at the two sites, made either simply into firewood or into components of artefacts. The processes can be followed in detail through studies of work traces, preforms, and quantities of split pieces, shavings and other debris. Important tools in driftwood processing were heavy and light wedges of whalebone and antler, adzes with killiaq heads, pumice grinders, and a variety

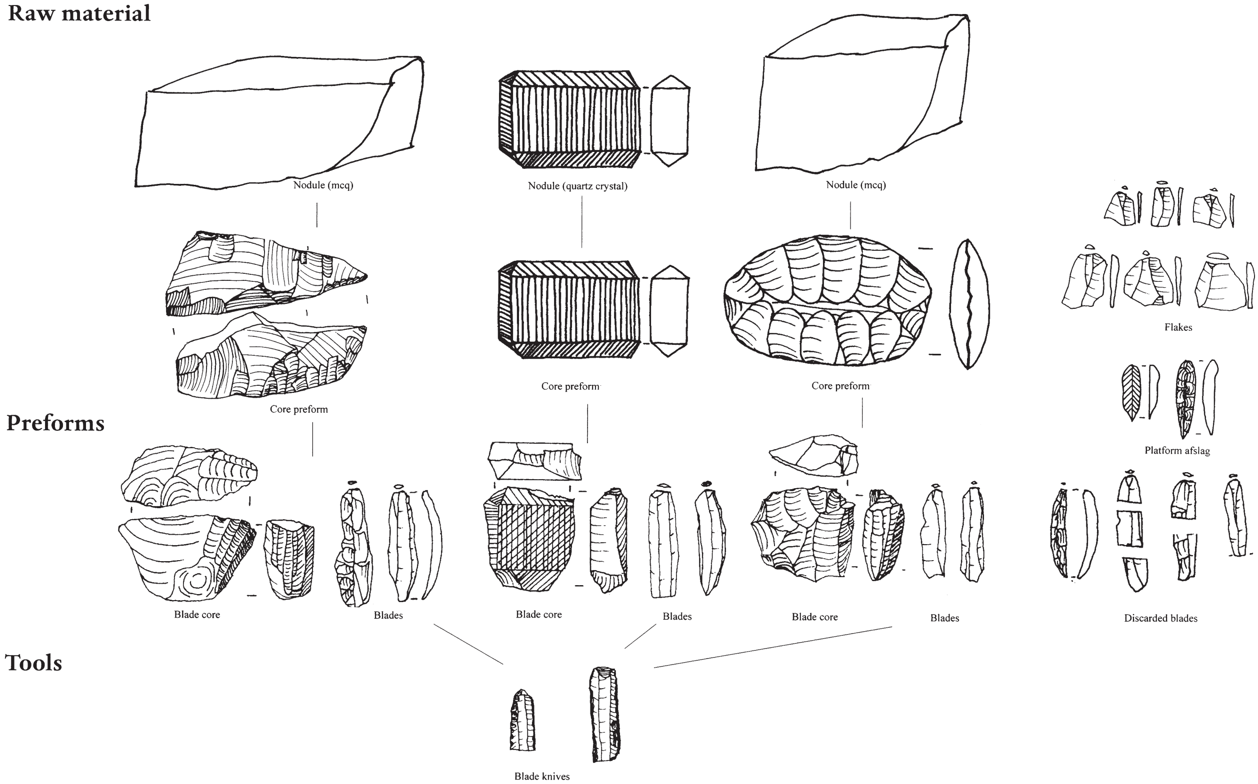


Fig. 3.133 b
Saqqaq concept of microblade production (reproduced from Sørensen 2012a: 136).

of side and end scrapers. It was observed from work traces and shavings that the adze was the dominant tool in wood-working as it was used at practically all stages of the process, from the production of boards wedged and chopped out of 'raw' driftwood trunks, via a number of steps, to the finest shaping of perfectly round shafts or thin-walled bowls, that had only to be finished by means of side scrapers and, in particular, pumice grinders.

Except for the production of bowls and trays, where irregular-grained, even knotted wood was preferred, regular- and dense-grained wood, typically sections of trunks from *Larix* and *Picea*, was selected for tool production. Large undamaged pieces of driftwood of this high quality were not common, and consequently most shafts and poles were built from several components, which were lashed together by means of simple, but precise and effective scarf links, locked by a lashing of baleen thong.

Saqqaq wood-working techniques included bending as well. The traces indicate that the wood was softened, perhaps by means of hot water or steam, before the object, e.g. a frame for a vessel or a drum rim, was bent into shape. Sharp bendings were made stepwise by pressing the inside of the object towards a dull edge while bending. Reinforcement and repair of wooden objects are seen on containers and paddles. Cracks and splits were repaired by patching up with a countersunk baleen string threaded through cut holes and locked with tiny wooden wedges on each side of the damage.

3.9.5.2 Working antler, bone, ivory and baleen

Antler and whalebone were favourite raw materials at Qt and Qa for making a rich inventory of tools and tool components. The initial processing of antler aimed at the production of standard 'fillets' and blanks. The first step in the *chaîne opératoire* probably included softening of the antler in water or urine, as indicated by the 'clean' chopping and cutting marks with fine imprints of edge damage. Next the rose end and the distal end of the antler beam were removed by chopping a notch through the hard matter with an adze into the spongious matter all the way round the beam. Following the snapping off of the beam ends, burins were applied to cut furrows or grooves in order to remove the tines and to cut deep, parallel longitudinal grooves through the solid matter of the beam. Thus regular antler fillets with an average width of 17 mm were extracted from the beam. Next the fillets were sectioned by means of an adze into blanks of a length typically suited for harpoon head production. In some cases thin antler plates were produced from the palmation of the antlers. These plates were used for production of spoons and ladles.

Comparative materials concerning antler processing are found at Itinnera in the Nuuk area and Nipisat in the Sisimiut area. At Itinnera only 15 fragments of worked antler were recovered. They were quite badly preserved, but Ulrik Møhl observed traces of 'groove incision technique', i.e. longitudinal burin-made grooves to penetrate the solid part of the antler, similar to the technique from Qt and Qa described above (Møhl 1972: 17). Gotfredsen and Møbjerg's finds from Nipisat are more informative (2004: 44–48). No fewer than 187 antler pieces show burin grooves and other working techniques (primarily adze work) and 127 pieces are classified as tools, fragments and preforms. Judging from the waste products presented in the publication (ibid.: 46) it appears that the common techniques used at Nipisat included the making of 'standard fillets' by means of deep, parallel longitudinal burin grooves in the softened antler beam and chopping the antler fillets into sections by means of an adze. This is like the process at Itinnera and at Qt and Qa.

The adze was also a prominent tool in the production of plates and fillets of whalebone, used as raw material for large artefacts, for instance ladles or end prongs for bird darts. The large whalebones were sectioned by means of an adze. These sections were split open and the spongious matter was chopped away. Burin and/or adze work, followed by breaking using wedges hammered into the deep grooves, produced the desired whalebone fillets, which were typically more slender that the antler fillets, only about 10–12 mm wide.

Potential comparative material comes from Nipisat, where eleven specimens were identified as whalebones with working traces (Gotfredsen and Møbjerg 2004: 47). They are not described in detail, and targeted studies must be conducted before comparisons with the Qt and Qa materials can be made.

Caribou bone was very rarely selected as raw material at Qt and Qa. This evidence is supplemented by observations from Nipisat, where only a small fraction (20 out of 7605) of the caribou bones were made into tools or show working traces that are not the result of marrow splitting (Gotfredsen and Møbjerg 2004: 47, 168 ff.).

As seen from the Qt and Qa assemblages, bird long bones were typically raw material for sewing needles. There is ample comparative evidence from Nipisat, where a systematic, comprehensive production of sewing needles took place. Here no fewer than 114 specimens are classified as 'needles, fragments and preforms'. The processing involved removing the long bone ends by cutting/sawing and making the narrow fillets by means of burins, just like at the Disko Bay sites (Gotfredsen and Møbjerg 2004: 54–55).

Ivory was a rare raw material at Qt and Qa, and again we must turn to the Nipisat collection: there 150 specimens are classified as 'ivory with working traces' or 'debitage' (Gotfredsen and Møbjerg 2004: 47, 144–45). This material is not described in detail, but it is seen that burin grooving and chopping was used and that the processing of walrus ivory produced waste comparable to the finds from Qt and Qa.

A number of baleen lashings and thongs with knots are preserved at Qt and Qa, and numerous traces of flat, now decayed thongs around scarfed shaft components and tool handles are also seen in the assemblages. Taken together, these finds reveal the importance of baleen as a raw material in Saqqaq technology.

4. Stratigraphy and Chronology

4.1 Qeqertasussuk

4.1.1 Sections

Together with Qa, Qt represents one of the very few Saqqaq sites containing stratified culture layers and thus it holds a great potential for studying the formation and development of the site, temporal changes of local environment, as well as material culture change through time. At Qt the culture layers cover a time span of at least 1,100 years, i.e., most of the Saqqaq era in Greenland. Consequently, comprehensive work was invested in exploring and documenting the stratified layers at the site and in documenting a considerable number of sections through the layers.

The main section at Qt, named Section C, is the west wall of a 20 metre long trench (Trench C), which runs along the Y-axis from Y = 247,0 to Y = 267,0 at X = 85,0 – i.e., from the 'dwelling area' north towards the top of the steep northern erosion bank above the northern beach (Fig. 2.9 and Fig. 4.1). Section C holds important information on the stratigraphy of the entire area containing layers bound in permafrost. It is the key to understanding the formation of the site and it forms the background for the division of the site into five horizons, Horizon 5 (H5)–Horizon 1 (H1), H5 being the earliest. The layers which make up the horizons accordingly contain five artefact components (Component 5–Component 1). Section C is supplemented with information from Section C', which covers the stratigraphy 0.55 metres behind (west of) Section C between Y = 252,5 and Y = 257,0 at X = 84,45. Section C' is thus a 4.5 metre long section.

The complex stratification of the 'dwelling area' (Area C) was further explored and documented through a number of sections (balks) running N–S and E–W across the excavation area (Fig. 4.2). The balks were removed at late stages during the excavation process. The sections recorded were: Balk I (N and S side), Balk II (N and S side), Balk III (W side), Balk IV (W side). Moreover, at the end of the excavation (the 1987 season) all four sides of Area C were recorded in the same detail as the other sections.

Fig. 4.1
Geologist Charlie Christensen describes Section C. (Photo: BG, 1986).

Fig. 4.2 *Area C during the excavation stage where balks were crossing the area. (Photo: BG, 1986).*

The main information on the stratified layers of the 'midden area' (Area B) comes from 'Section South' covering 5 metres from X = 10 to X = 15 at Y = 23 (Fig. 4.3). This cross section of the deep midden layers is supplemented by a section of the west side of Area B running from Y = 23,0 to Y = 25,5 at X = 10,0. This is a 2.5 metre long section running perpendicular to the erosion bank at the northern beach.

In order to correlate the stratification in Trench C with Area B (and ultimately the culture layers of both areas) a couple of test pits were made between the two excavations (Area B, Test pits). Furthermore, information on the northern part of the site comes from a large number of quarter square metre test pits, which were dug at 5 metre intervals along the axes X = 85 and X = 100 and a few test pits east of Area C. Finally, a 5 by 5 metre grid of very small test pits (20 × 20 cm) hold additional information on stratification.

The sections were all surveyed and drawn at scale 1:10. Section C and Section South (Area B) were described closely following the principles of Troels-Smith's system (Troels-Smith 1955; registrations by Charlie Christensen, Appendix 1 in Meldgaard 2004). Based on this knowledge, it was possible to record the other sections according to a simplified version of this system (registrations by Bjarne Grønnow). In order to provide an overview which does not repeat the published material in Meldgaard 2004 and Böcher and Fredskild 1993, the following descriptions of the layers are condensed and weight will be put on information concerning site formation and the identification and definition of the five horizons based on an interpretation of the complex stratification at the site.

a.

b.

Fig. 4.3
Section South, Area B.
a: *The section in front of the excavator, Morten Meldgaard, at an early stage.*
b: *Close up of Section South, Area B. The section is 5 m long. (Photo: Geert Brovad, 1986).*

4.1.2 The layers

4.1.2.1 An overview

Section C (Fig. 4.4) and Section C' (Fig. 4.5) form the starting point of this overview, beginning from the bottom of the sequence:

The 50–75 cm thick sequence of layers sit on top of fossil raised beaches. These beach sediments consist of a mixture of grey/yellowish gravel and coarse sand encapsulating lenses of small rounded stones and, in particular at the top, rounded cobbles, fist-size and larger.

Layer 18 covers the beach sediments. This felty layer is generally a few centimetres thick. The lowermost part consists of an almost black, decomposed sandy peat with some leaves of *Empetrum* sp. and a few roots and twigs. The layer contains a few artefacts, which probably originate from the lower part of Layer 15a due to trampling. Layer 18 is seen as a characteristic 'cover' of the beach gravel and sand all through the section except for the northernmost four metres towards the recent beach. Insect remains confirm that Layer 18 represents vegetation cover on a beach (Böcher and Fredskild 1993: 22–23).

Layer 15a is a light brown, very well preserved grass turf with some moss, broad leaves of lyme grass (*Elymus mollis*) and *Empetrum* sp. and *Betula nana* leaves and seeds. Twigs of different species of dwarf shrubs (including heather) and mats of lyme grass leaves are encapsulated in this layer as thin 'lenses' at different depths along the entire section. Artefacts, bones and stones from features are contained particularly in the upper part of the layer. Due to the permafrost, Layer 15a shows excellent preservation conditions for organic substances. The thickness of the layer varies a lot throughout the section, from a few centimetres to about 30 cm in the northernmost part of the trench. It is absent in the series of layers at a stretch of 8 metres (from about Y = 253.5 to Y = 261.5), where Layer 16 rests directly on Layer 18. Layer 15a thus illustrates how the deep sequences of the layers at Qt consist of 'turf pillows' of different thickness and size forming a complex jigsaw puzzle, probably as a result of variable growth conditions for grass and moss (humidity, nutrition from waste), site surface wear, and removal of grass turfs for constructions. A large number of insect remains, including mites, mirids, flies and mosquitos, in the layer reflect dry and warm conditions on a very richly vegetated surface (Böcher and Fredskild 1993: 24). Layers 18 and 15a form the basis of the sequence at Qt and are in most areas clearly distinguishable from the overlying soil.

Layer 16 consists of dark brown or black lenses or heaps of twigs, fruits and leaves from dwarf shrubs (mainly *Betula nana*, *Salix* and *Empetrum*), charcoal, waste (including a lot of bones and fire-cracked rocks), artefacts, and large stones from features like dwellings and fireplaces. This permafrozen layer represents dwelling floors and connected waste heaps from the clearing up of floors, platforms and fireplaces. At some places the layer consists of an upper and a lower part, depending on the concentration of twigs, which is highest in the lower part, as is the content of moss. Insect fauna analysis reveals that conditions for insect life changed from Layer 15a to Layer 16. The floor layers here contain fewer insect remains and a markedly lower diversity (Böcher and Fredskild 1993: 24). The layer is typically structured in the way described above, as heaps of variable size on top of Layer 15a, kind of 'wedged in' between Layers 15 and 15a, and it is absent at the southernmost (Y = 247–249) and the northernmost (Y = 263.5–267) parts of Section C. At some places the upper and lower limits of Layer 16 are blurred and there seem to be transitional zones, e.g. at Y = 253–254, but nonetheless the layer and its two variants (upper and lower) are distinct.

Layer 15 is a light brown layer of very well preserved grass turf – a tough mat of turf which overlies the 'loose' twig layer, Layer 16, and clings around the top of the stones of Layer 16, sealing it from the upper sequence. The permafrozen Layer 15 is a thick and almost 'clean' grass turf with a small content of moss turf, but with many seeds of *Empetrum* and a considerable content of cultural material of organic matter. Very characteristic, the layer encapsulates thin lenses of quite fresh, light wood shavings and killiaq flakes (e.g. Y = 249–250). Layer 15 is seen all along Section C and is interpreted as reflecting a rich, nutrition-demanding grass vegetation that formed on top of the dwelling remains and waste heaps of Layer 16. Throughout the period of formation of Layer 15 this area of the site was only periodically settled. Artefacts and waste are found at all levels of the layer, but in contrast to Layer 16 only a few stones of a size usable for structures are contained in the layer. The dense 'grass-mat' was quite uniform and provided living conditions for only a limited number of insects and a relatively low diversity (Böcher and Fredskild 1993: 27).

In Section C, **Layer 14** appears as a black/dark grey, quite thin, but characteristic, permafrozen layer consisting of a heterogeneous mixture of cultural remains like crumbling fire-cracked rocks, organic waste including bones (often charred), baleen, feathers, wood shavings, charcoal and quite high concentrations of lithic waste (primarily killiaq). The matrix consists of quite decomposed grass turf with a minor content of moss and silt. The layer is marked by crackled lumps of charred blubber and at some places the sediment is completely cemented by congealed blubber oil. Layer 14 clearly consists of heaps of blubber-soaked waste starting from about Y = 250. In the area east of Section C, the heaps develop into huge piles of blubber-soaked waste (primarily crumbling, fire-cracked rocks and bones), half a metre thick and several metres in diameter. Very few stones that are likely to be from constructions are found in this layer, and none of these seem to be in primary positions. Layer 14 is quite complex, and comes in several, often very local, variants. The most important of these is Layer 14a, which Section C cuts in its northernmost part (Y = 263.5–267). Layer 14a is characterized by its large grass turf content and excellent preservation conditions for organic materials like wood, bones, hair, baleen and feathers. In this respect the layer resembles Layer 15, and at places it was difficult to distinguish from the top of Layer 15. In areas east of Section C Layer 14 was divided into an upper and lower part (14aø and 14an) and a local, lens-shaped variant, 14b, with a high concentration of twigs, was also identified here. Few, but characteristic, insect remains indicate a period of low vegetation density on the site surface (Böcher and Fredskild 199: 27), which is marked by heaps of decaying organic waste, as seen by concentrations of fly pupae uncovered during excavation.

Layer 11 forms the uppermost culture layer at Qt. Permafrost was encountered in the lowermost part of Layer 11 during excavation, but the table of permafrost has varied through time, as indicated by a very characteristic features of this layer: frost cracks and heavy cryoturbation. The matrix of the light brown Layer 11, which is found all through Section C (and all over the northern, vegetated part of Qt), consists of silt with a high content of decomposed turf from a dwarf-shrub heath (roots, leaves and bark from *Betula nana* and *Ledum* sp.) with some herbs and mosses. Wind-carried silt was added in quite large quantities to the site surface during the formation of Layer 11, which is generally the thickest layer at the site. Light-coloured, thin, often undulating stripes of pure silt are seen, and they demonstrate that parts of the heath area were occasionally covered by aeolian silt probably blown in from the immediate environment – the southern side and the top of the tombolo, where Qt sits – as well as from the huge meltwater deposits and the border zone of the ice cap just 15–20 km to the south-east of the site. As already mentioned, cryoturbations provide the layer with a hummocky structure and frost cracks have left veritable hollows in the layer (e.g. at Y = 261,5–262,5). In spite of this, it was often possible to distinguish between a light yellow-brown upper part dominated by silt, a brown lower part with a relatively high turf concentration, and a thin, lowermost layer showing no cryoturbation, with a preponderance of turf (11ø, 11n and 11t, respectively). Cultural remains in the shape of structural stones, some fire-cracked rocks, a lot of lithic waste and charcoal, were found in particular in the lowermost part of this thick layer. Here, feathers and baleen, and very few, quite decomposed bones, were preserved as well.

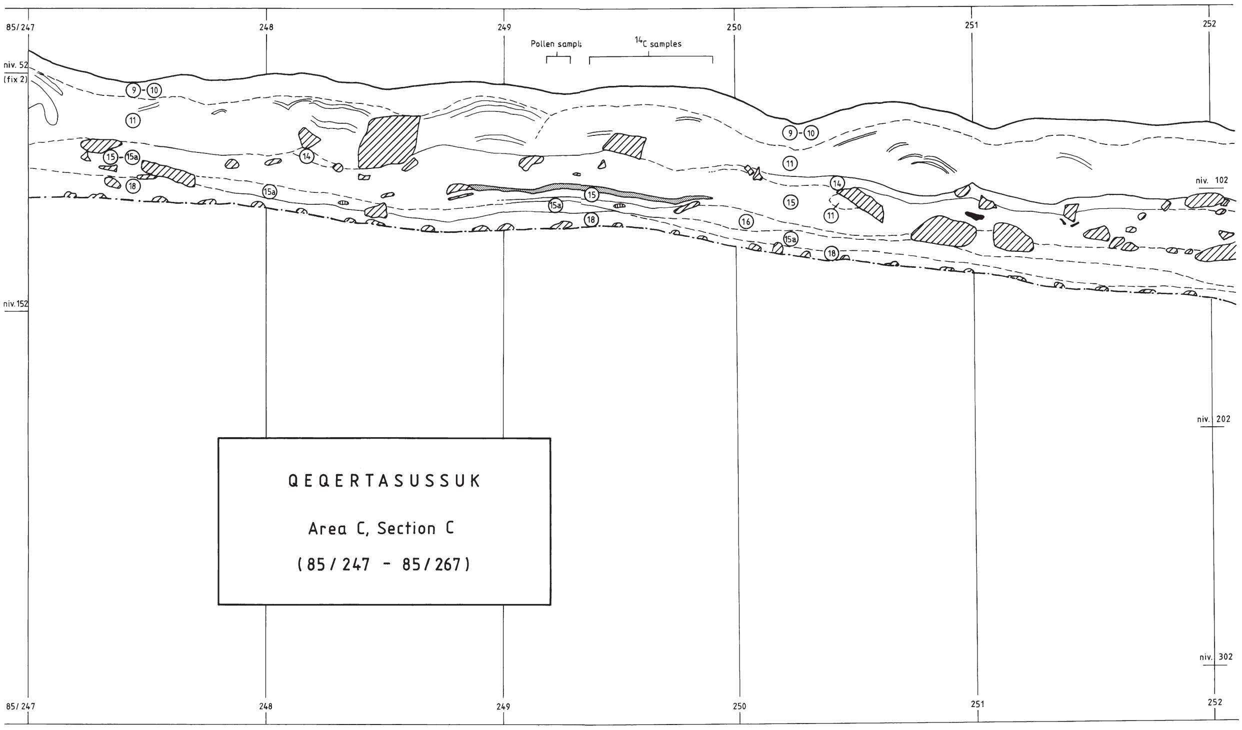


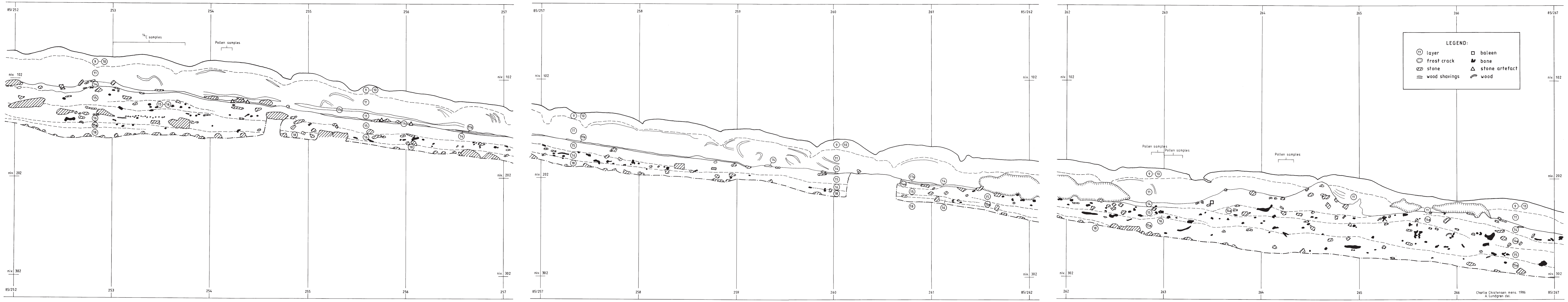
Fig. 4.4
Drawing of the 15 m long Section C. Recorded and described by Charlie Christensen. (Drawing: Alice Lundgreen)

Insect-wise, a pronounced shift from Layer 14 to Layer 11 is seen. Remains of a rich insect fauna including xerophilous and thermophilous species and a great diversity (comparable to nutritious conditions below a bird cliff) tell of the fast establishment of lush vegetation on top of the nutritious waste heaps of the layer below.

Layer 9/10 is the uppermost layer in the series. Layer 10 is a felted, dark grey-brown turf layer containing the root zone of the recent vegetation (mainly *Empetrum hermaphroditum* and *Equisetum arvense*). Its content of sand comes from erosion by wind and meltwater of the surface of the upper part of the site. No cultural remains are found in this layer. Layer 9 is defined as the recent vegetation on the northern side of Qt. As seen from Section C, the recent surface consists of hummocks with a diameter of about 60 cm divided by (frost) cracks. The structure of the surface layer is to a large extent determined by the topography of Layer 11 below. For example, a direct connection exists between the cracks on the surface and the hollows in Layer 11, mentioned above. In a few cases, lithic waste from Layer 11 is found in the lower part of Layer 10 as a result of cryoturbation.

4.1.2.2 Summary of Section C and definition of five stratigraphic horizons: H5–H1

The 20 metre long Section C running south–north through the northern vegetation- and turf-covered part of the Qt site forms the backbone of the documentation and interpretation of the general stratigraphy at the site. The turf and culture layers accumulated on top of a series of raised gravel beaches forming a tombolo on the eastern side of the island.



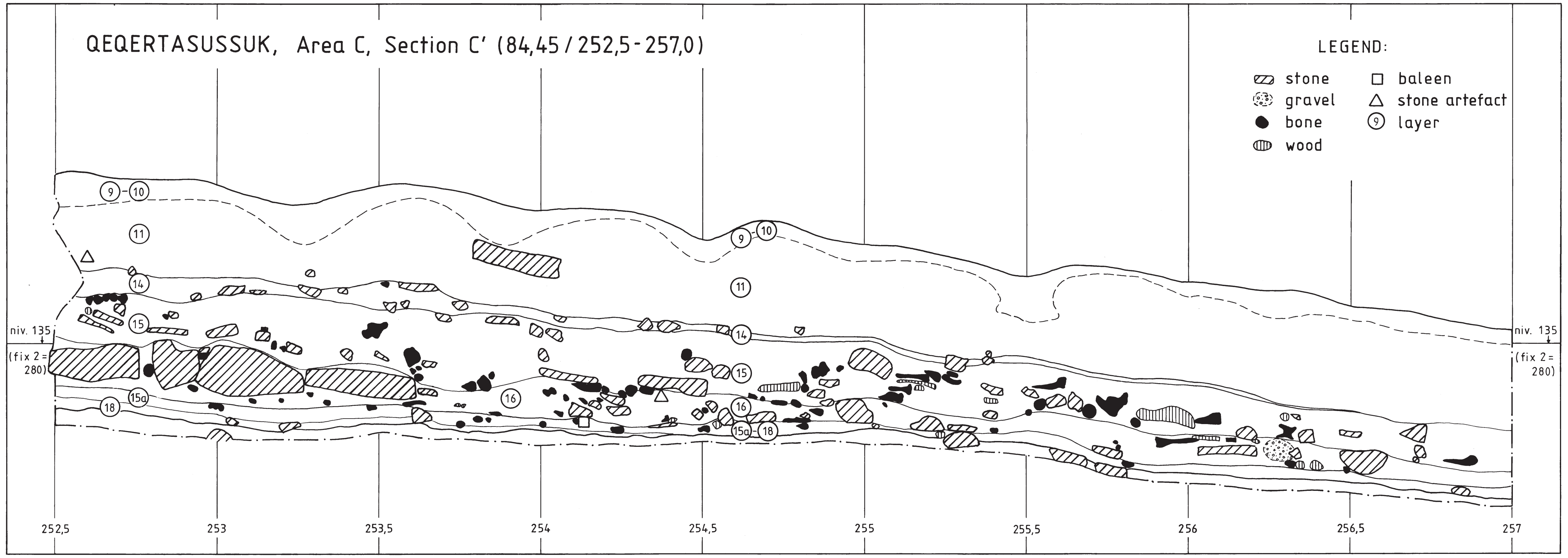


Fig. 4.5
Drawing of Section C'. Recorded and described by BG. (Drawing: Alice Lundgreen).

The lowermost layer in the section (Layer 18) shows that part of the beach, where the very pioneers settled, was covered with a thin, decomposed layer of turf on which lyme grass was growing. Soon organic waste from the first inhabitants provided nutrition for lush vegetation of grasses intermixed with mosses and dwarf shrubs. Through time, this vegetation resulted in the formation of a thick hummocky turf layer (Layer 15a) and in this and in some cases in Layer 18 as well, the earliest cultural remains on the site were embedded. It is suspected that the insignificant content of artefacts in Layer 18 is due to the trampling of the surface during the formation of Layer 15a. Layers 18 and 15a together form the lowermost horizon at Qt: **Horizon 5 (H5).** A number of local 'lenses' of culture layers identified by detailed studies of the other sections in Area C, Layers 15aØ, 15aH and 15a/18, are included in H5.

On top of this firm grass turf sits the culture Layer 16. It represents a quite well-defined series of intensive and well-preserved settlement episodes. The layer encapsulates features like stone-built fireplaces and lenses of dwarf shrub twigs, lithic and organic waste and all sorts of artefacts representing dwelling floors, waste heaps from floor and platform clearings, and various activity areas. As Layer 16 is generally composed of a large number of structures and heaps of cultural remains its internal stratigraphy is complex, and the layer is divided into a number of variants (16Ø, 16N, 16H, 16/15a, 16N/15a). However, together this series of heaps forms a well-defined **Horizon 4 (H4).**

The stone-built structures and waste heaps of Layer 16 were left and soon overgrown and almost sealed by a tough mat of grass turf, Layer 15. Clearly, the culture layers' soil once more nourished lush vegetation, which again formed a firm surface for a period for some human activity, as seen from lenses of wood shavings and, particularly in the northern part of the section, a lot of wood and bones protruding from the turf layer in the section wall. Layer 15 and its variants, 15Ø and 15N, together form a unit of culture layers at Qt: **Horizon 3 (H3).**

Layer 14 on top of Layer 15 is remarkably different from the lower series of turf- and twig-dominated layers. The layer consists of heaps of cultural remains – mainly fire-cracked rocks, bones and charred blubber – with a very low content of twigs and natural silt and turf. Both the upper and the lower limits of the layer are sharp. The background of this marked change in the character of the layers will be discussed later. Here it suffices to conclude that Layer 14, with its different variants in Area C (14A, 14Ø, 14AN, 14N and 14A/15), forms a well-defined horizon of waste heaps at Qt: **Horizon 2 (H2).**

Layer 11 on top of Layer 14 represents the next conspicuous shift in the site-formation processes at Qt. Layer 11 (including its variants, 11Ø, 11N, 11Ø/11N, 11T, 11T/14) consists of a matrix of airborne silt with a variable content of decomposed turf from dwarf-shrub heath vegetation. The richness and diversity of the insect fauna in this thick layer underline that it was formed during a period with a remarkably diverse micro-environment at the site. Cultural remains, in the shape of lithic waste (organic matter is generally not preserved in the layer), are found in large concentrations, particularly in the lower part of the layer. Heavy cryoturbation and frost cracks resulting from the variable permafrost table in this layer have 'kneaded' the sediments, and at some places caused mixture with Layer 14 below or Layer 9/10 above Layer 11. This layer and Layer 10 define the uppermost category of culture layers at Qt: **Horizon 1 (H1).**

The character and volume of the layers cut by Section C varies a lot, even between contiguous areas. This is to be expected, as the sediments typically consist of series of heaps or hummocks of limited size, sometimes overlapping within the horizons. However, the division into five horizons, H5–H1, based on observable major shifts in the stratified series of layers, which can be traced all though the 20 metre long Section C, is a key to the correlation of sediment series from different areas at the site, as will be demonstrated below.

4.1.2.3 Section C'

The 4.5 metres long Section C' was cut parallel to Section C just 0.55 m to the west of it (Fig. 4.5). Section C' covers the line X = 84,45; Y = 252,5–257,0. It was made in order to further document the stratigraphic context of the stone-built structures embedded in H4 and the position of artefacts in the series of layers. Here H5 is only a few centimetres thick, whereas H4 with the standing flagstones of a midpassage (Feature A9) is very well developed. It is clearly seen how H3 covers the stone-built structure with its tough turf 'mat', but also that this area was used during the entire formation period of this layer. Stones from destroyed stone-built structures, wooden artefacts and bones are found all through H3. H2 is only a thin, but characteristic horizon in this area, whereas H1 follows the general pattern: a thick, silt-dominated 'pillow', which protected the series of culture layers below by providing insulation and thus maintaining permafrost and moisture in H3 and below.

4.1.3 Other sections in Area C

As mentioned above, ten sections were surveyed in detail in Area C in order to document in particular the position of the preserved stone-built structures of H4 in the series of stratified layers. These sections cover the sides of four balks, which guided the excavation of the area, and all four sides of the excavation area. These sections will be presented here only as far as they add new information about the different layers/horizons on the site.

Balk I and Balk II run W–E across Area C, perpendicular to Section C. Balk II crosses the midpassage, Feature A8, in Area C. The sections, which the sides of the balks provide (filed as Section Drawings I and IIa, IIb), show that H4 with the midpassage A8 is nicely sealed on top by the turf mat of H3. This also seals a thick lens of pure charcoal next to (east of) and on top of the midpassage embedded in H4. There is no trace of the heaps of fire-cracked rocks, bones and charcoal forming H2 in Balk II, but Balk I west of it cuts through the periphery of a large pile in H2 in the westernmost excavation area. With a thickness of about 30 cm, H1 massively covers the area and it contains many large rocks and flagstones from disturbed features.

The west wall of the excavation area (filed as 'Felt C, vest og sydvest, Vestvæggen') shows how the series of layers below H1 develop from absent in the southernmost part, where the section is only 20 cm high from the beach gravel to the top of H1, to a 'full package' of all stratigraphic horizons in the northern part of the excavation area. South of Y = 251, the lower horizons are compressed, but north of this position the entire series of layers is found: H5 consists of a quite thick Layer 18 and a thin Layer 15a; H4 is a 'twig lens' containing fire-cracked rocks and the flagstones of midpassage A3; and H3 is a massive grass turf sealing this feature. Like Balk I, this section cuts the remarkable 30 cm thick heap of fire-cracked rocks and bones forming H2 in this part of the area. A massive lens of fly pupae is embedded in H2, underlining the 'midden heap' character of H2. As usual, H1 seals the entire sequence.

In this section blubber-cemented layers are found. In the lowermost part this is seen below the midpassage, where the turf of H5 and the beach gravel below is hardened by congealed blubber, which originally seeped from the fireplace. Likewise, parts of H3 and H2 are cemented by blubber coming from activities carried out when H2/H1 formed the site surface. In this connection, the section of the east wall of Area C must briefly be mentioned. Here the entire series of layers below H2 were soaked by seeping blubber. These hardened, but still greasy and to some extent still blubber-smelling, lower turf layers of H5–H3 were very hard to excavate. The drawing of the section (filed as 'Felt C – Felt C, sydøst, Østvæggen') shows that the huge waste heaps of fire-cracked rocks and bones forming H2 are almost half a metre thick in this area.

Finally, the section at the north side of Area C must be mentioned. This 7.5 metre long section crosses Section C and runs perpendicular to it at the Y = 252,5 line. The drawing (filed as 'Profiltegning V and VI') shows that the sequence is almost a metre high. The stratigraphy is fully developed here: H5 is only a few centimetres thick, but H4, containing the preserved stone-built structures and floor areas, is thick (up to 25 cm). H4 is here divided into an upper and a lower part (Layers 16Ø and 16N), of which the former contains quite a lot of charcoal. H2, above the well-developed turf mat of H3, is present all along the section, but the eastern part of it is remarkable: at the stretch X = 88–89,5 the section reveals the western part of a huge pile of fire-cracked stones, charcoal and bones (Fig. 4.6). This part of H2 is no less than 60 cm thick, and test pits immediately east of this position show that the height of this heap increases to more than a metre.

4.1.4 Sections in Area B

The main section in Area B, running parallel to the erosion brink towards the northern beach, the five metre long Section 10-15/23, has been presented in detail by M. Meldgaard (204: 76–77, 174–77). Thus, only a brief overview will be presented here:

The section is about 1.4 m high, cutting through nine main layers (Fig. 4.7). The series of culture layers rests upon a yellowish-grey beach sand with gravel and large stones (Layer 9) representing the raised beach, which was formed as part of the tombolo on which the site was established by the pioneer settlers. A few centimetres of blackish-brown felted grass turf with intact leaves of lyme grass (Layer 8) covers the beach sand: remains of the beach vegetation at the time when the first people set foot on the island.

The lowermost culture layer, Layer 6, sits on top of Layer 8. Layer 6 is a black layer *c.* 30 cm thick, and, apart from a small content of moss and herbal peat, it consists of the remains of human activities: twigs of *Empetrum*, *Betula*

Fig. 4.6
Photo of the north section, Area C, showing the thickness, more than 60 cm, of the H2 heap of fire-cracked rocks, charcoal and bones. (Photo: BG, 1987).

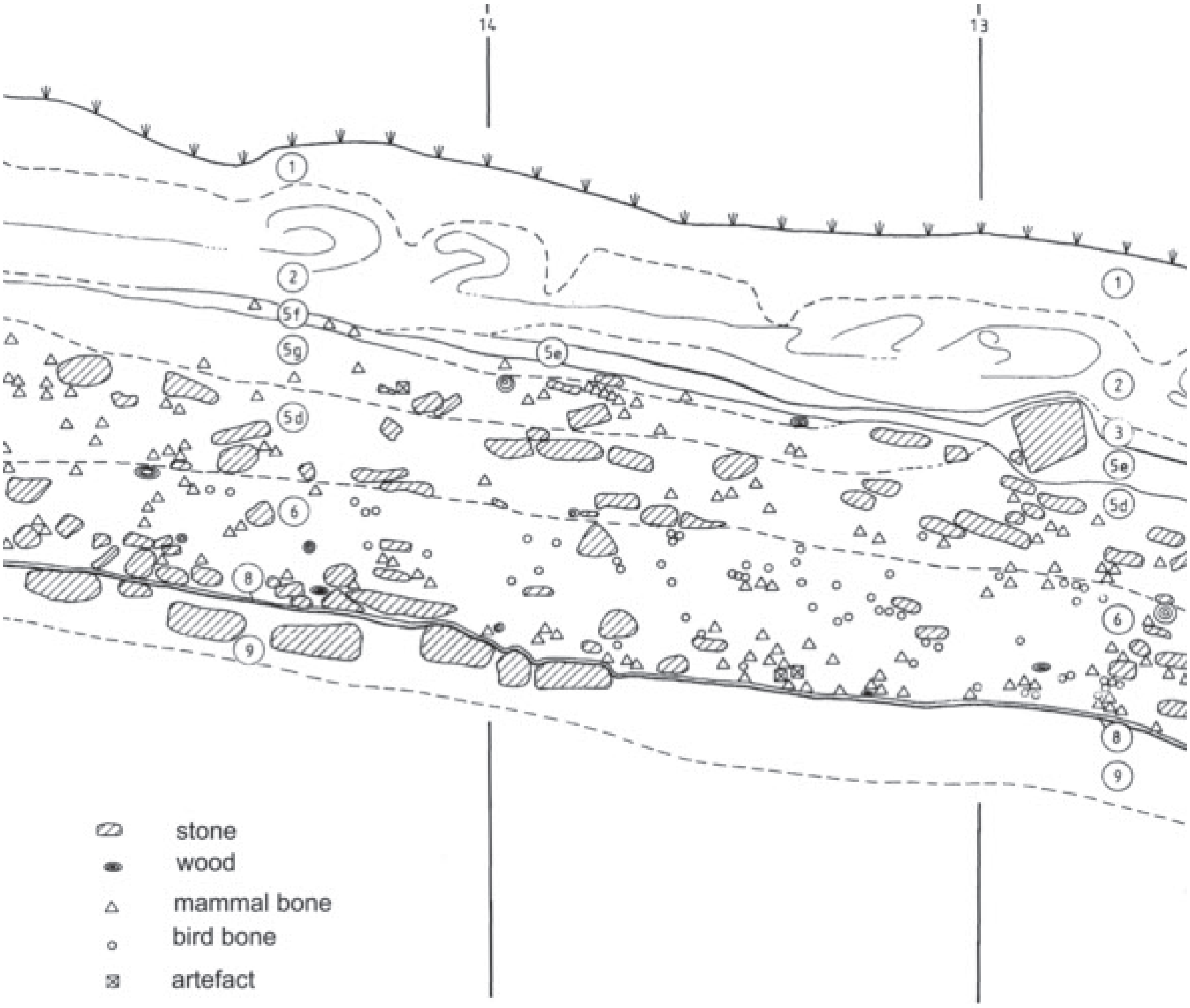


Fig. 4.7 *Part of Section B showing the most important layers. Recorded and described by Charlie Christensen. (Drawing: Alice Lundgreen).*

and *Salix* (fuel, and floor- and sleeping platform cover), bones, charcoal, burnt blubber, fragmented fire-cracked rocks, debitage and artefact fragments of stone, wood, antler, ivory, bone and other organic materials. Except for a few lenses of gravel and small pebbles (Layer 7) in the lower part, probably resulting from occasional wave activity, Layer 6 is an unstructured mix of the components mentioned above. The layer is permanently frozen and holds lenses of transparent ice. The upper limit towards Layer 5 is not sharp.

Layer 5 is quite thick (30–50 cm) and consists of a series of sub-layers, 5a through 5f. The basic matter of all sub-layers is a blackish-brown, slightly decomposed grass peat, but the sub-layers differ in relation to structure and content of cultural remains. The lowermost part is designated Layer 5d. This sub-layer includes, like Layer 6, a high proportion of dwarf shrub twigs, in particular *Empetrum*, and a high content of well-preserved cultural remains: artefacts and debris of stone as well as wood and other organic matter. The remaining sub-layers of Layer 5 appear as lenses of turf layers containing cultural remains, lenses which intersperse in different ways. The most developed series of sub-layers are found in the deepest part of the section (around X = 11), which indicates that the accumulation of cultural remains and turf growth was intense in this part of the site. The second uppermost 'lenses' of Layer 5, Layers 5f and 5b, must be mentioned. They constitute a thin layer of turf a few centimetres deep, with a remarkably high content of charcoal and fire-cracked rocks. 5f forms the uppermost part of Layer 5 at X = 14.5. Layer 5 is permanently frozen.

Layer 3 sits directly on top of Layer 5. The upper part of this layer is the upper limit of permafrost in the 'midden area'. The quite thin layer consists of a brownish-black decomposed herbal peat containing a little silt. Due to bad preservation conditions, no cultural remains of organic matter are present in the layer, but a few artefacts of stone were found.

Layer 2 is a thick, dense and insulating 'mat' of brown peat with a high content of silt. It is hummocky and folded by cryoturbation due to the fact that it is moist and rests on top of the series of permanently frozen layers. No artefacts were observed in the layer, which is covered by the recent vegetation layer of Layer 1 (root zone and 'recent' peat).

The west wall of excavation Area B, running perpendicular to the section described above, confirms the stratification of the midden layers already described. This two metre long section at Y = 23–25, X = 10,0 clearly demonstrates that the earliest midden (represented by Layer 6) was flooded on at least one dramatic occasion. Storm waves left a 20 cm thick heap of rolled shells and pebbles in the lower part of the midden. Layer 5 on top of Layer 6 is very thick here, about 50–60 cm, which is due to the fact that dense grass and moss vegetation had optimal growth conditions in this moist area, and that the settlers continued to accumulate waste in this 'remote corner' of the site over centuries.

As seen from these descriptions, Area B has the appearance of a 'veritable midden'. No intact stone-built structures were observed, either in the section or during the careful excavation of the area, and all artefact fragments and lithic and organic debris, bones and fire-cracked rocks were intermingled with large amounts of dwarf shrub twigs within the defined layers.

4.1.5 Radiocarbon dates

A series of conventional radiocarbon dates, mainly bulk dates on twigs and grass turf from well-defined columns, at places in the sections of Section C and Area B, where the stratification was clear, was made in the course of the excavations in the 1980s. These dates were presented and analysed by M. Meldgaard, and together with observations on the stratification in Area B, they supported his division of the faunal material into three fauna components. These components did not include the uppermost horizon (H1), which showed no fauna preservation (2004: 80–86). The present chapter refines upon the earlier conclusions from the absolute bulk dates. This is done partly by using the calibration by Reimer *et al.* 2004 and partly by introducing a number of AMS dates of bones of terrestrial origin (caribou bones) made recently in connection with an interdisciplinary project analysing human hair found in the stratified layers of the site (Gilbert *et al.* 2008; Rasmussen *et al.* 2010). Tables 4.1.5-1 and 4.1.5-2 list all radiocarbon dates from plant and animal materials from Qt.

4.1.5.1 Area C and Section C

As seen from Fig. 4.8a, eight datings of twigs/grass turf assign absolute conventional dates to the stratified layers in Area C. The lowermost horizon (H5) is dated by two measurements (K 4823 and K 4819), which delimit the time span to maximum period from 3980 ± 85 to 3780 ± 85 BP. The first dating mentioned is from the lower part of Layer 18, i.e. *below* the first regular culture layer, 15a. Thus absolute dates from the midden area, Area B, are more likely to 'hit' the very beginning of the settlement at the site (see 4.1.5.2 below). H4 is dated by three dates (K 4822: 3640 ± 75 BP; K 4818: 3650 ± 85 BP; and K 4821: 3760 ± 80 BP) from the lower, middle and upper part of the horizon, respectively. As can be seen, these conventional dates all overlap within

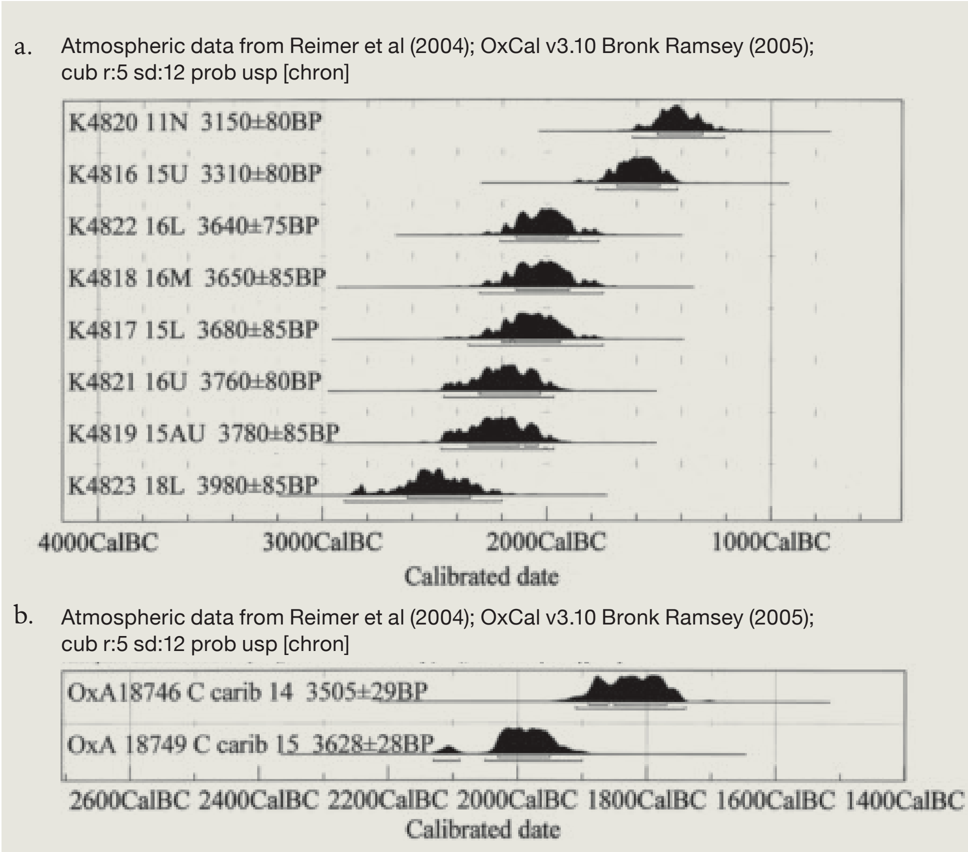


Fig. 4.8
Calibration of radiocarbon dates, Area C.
a: *Conventional dates on twigs and grass turf.*
b: *AMS dates on caribou bone.*

one standard deviation, indicating that H4 was formed within a quite short time span. H3 is delimited by K 4817: 3680 ± 85 BP and K 4816: 3310 ± 80 BP, which partly indicates that H4 was quickly overgrown by the grass turf 'mat' of H3, and partly that H3 is of very long duration. This late date of the upper limit of H3 is problematic and will be evaluated in Chapter 4.1.5.4 below.

It was not possible to make conventional datings of twigs/turf from H2. Thus datings of seal bones were carried out. Dates on such marine material do not meet the standards of modern screening of ^{14}C dates (e.g. Grønnow and Sørensen 2006). However, measurements from West Greenland of the marine effect indicate that, regarding the reservoir effect, a quite simple and stable correction factor of 410 years can be applied (Rasmussen and Rahbek 1996). Using this correction for marine reservoir effect, the temporal limits of H2 are indicated by K 5127: 3570 ± 80 BP; K 5126: 3500 ± 80 BP; and K 5128: 3400 ± 80 BP). These three dates overlap within one standard deviation, and in accordance with the interpretation of this phenomenon in H4, it is concluded that H2 was formed within a short time span. Furthermore, trusting these corrected dates on seal bone, an upper temporal limit of H3 is indicated by the earliest date of H2 (K 5127: 3570 ± 80 BP). Finally, it is possible through a single conventional bulk date on turf to get an impression of the start of the formation of the thick H1. K 4820 sets this start date to 3150 ± 80 BP. No meaningful sample of the upper limit of H1 could be extracted from the heavily cryoturbated layer. Thus there seems to be a lacuna in the stratification between H2 and H1 of at least 260 ^{14}C years, but it must be borne in mind that the data are sparse.

It is possible to qualify these time frames based on conventional datings of the five horizons in Area C by adding information from two AMS dates on caribou bones (Fig. 4.8b). OxA 18749 dates a fragment of a cranium of a caribou excavated from Layer 15 (H3) in the northernmost part of Section C (at Y = 261). The AMS date is 3628 ± 28 BP, which is in the middle of the maximum time span of H3 described above (3680 ± 85 BP to 3570 ± 80 BP). The suggested time frame of H2, based on corrected seal bone dates as explained above, is supported by an AMS date, OxA 18746, on caribou bone from Area C (excavated in Layer 14 in square 85,0/251,0): 3505 ± 29 BP. This dating of terrestrial material is within the suggested span of H2: 3570 ± 80 BP to 3400 ± 80 BP.

4.1.5.2 Area B

Seven conventional ^{14}C datings provide absolute dates for the stratified layers in the midden area (Fig. 4.9). Two datings were made on twigs and grass turf sampled at the lowermost part of Layer 6. K 4566: 3880 ± 85 and K 4563: 3720 ± 80 BP date the beginning of this earliest midden formation. They overlap at one standard deviation. A corrected conventional dating of seal bones from this level (K 5125: 3820 ± 60 BP) coincides nicely with this evidence. Turning to the recently AMS-dated caribou bones from this layer, we have a date on a bone from a sample (10,0/23,5: 76) of the lowermost part of Layer 6, OxA 18747: 3713 ± 28 BP, and a date on a bone from the same square metre, 14 cm above the lowermost level of the layer: OxA 18748: 3664 ± 28. H5 (Layer 6) at this position is 29 cm thick (see Fig. 4.7), thus these precision dates indicate a quite fast accumulation rate of midden material from the very start. Weighing this evidence it is reasonable to set the beginning of the earliest phase in the midden area to somewhere between 3880 ± 85 and 3713 ± 28 BP. There are no absolute datings of the upper limit of Layer 6 in the midden area.

Concerning Layer 5 and its variants, the lowermost part of this series of sub-layers is dated by conventional bulk samples of turf and twigs, K 4565: 3750 ± 80 BP and K 4562: 3690 ± 80 BP, which overlap at one standard deviation. The upper time limit of Layer 5 is determined by two conventional turf/twigs dates: K 4564: 3730 ± 80 BP and K 4561: 3390 ± 80 BP. The last date is remarkably late, and must be modified by a corrected seal bone date of Layer 5f (the upper component of Layer 5), K 5124: 3460 ± 80 BP. Thus,

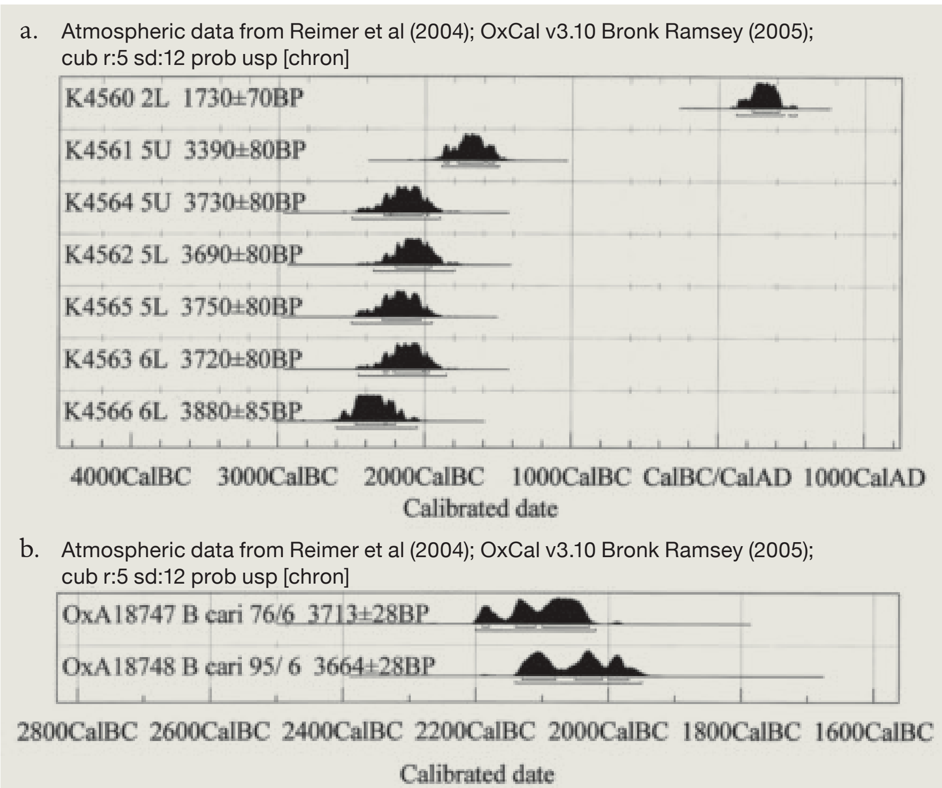


Fig. 4.9 *Calibration of radiocarbon dates, Area B.* **a:** *Conventional dates on twigs and grass turf.* **b:** *AMS dates on caribou bone.*

the most likely absolute time span of Layer 5 in Area B is *c.* 3750 ± 80 BP to 3460 ± 80 BP, which fits with the evidence from Area C/Section C.

4.1.5.3 Correlation of the stratified layers in Area C and Area B

The radiocarbon dates facilitate correlation between the stratified layers of Area A and Area B and horizon numbers can be assigned to Area B. Thus, in Area B the lowermost turf layer (Layer 8), which covers the beach gravel (Layer 9), correlates with **lowermost H5** in Area C. The twig-dominated 'midden heap', Layer 6, must be assigned to **H5**, whereas the thick and complex Layer 5, with all its sub-layers, covers several horizons: **H2/3/4**. It would demand a number of AMS dates to correlate each sub-layer of Layer 5 with a particular horizon. However, the character and position of Layer 5f correlates this with **H2**. Finally, the upper layers in Area B, Layers 3, 2 and 1, correlate with **H1**.

4.1.5.4 Conclusions on the absolute dates of the horizons

The combined evidence from the absolute dates at Qt is summarized in Fig. 4.10, which represents an estimate of the time spans of the different horizons. Some conclusions can be drawn:

1. The absolute dates support the evidence from observations of the stratified layers at Qt: there is a fine correlation between the position in the stratification of H5 through H1 and the absolute dates.
2. The initial settlement of the site dates sometime between 3900 and 3800 BP (at the earliest around 2400–2300 cal BC) and a series of turf and cultural layers – ordered in the stratigraphic horizons, H5 through H2 – is formed until *c.* 3400 BP (*c.* 1750 cal BC), i.e. within an estimated time span of six centuries. Later, probably following a lacuna in stratified series of layers, a new settlement phase begins. This happens later than 3100 BP (1500 cal BC). From the analyses presented above, taking into account overlapping calibrated dates within one standard deviation, the following estimated time spans for each horizon can be extracted:
   H5: 3880 BP–3760 BP (estimated best fit: 2350 cal BC–2200 cal BC)
   H4: 3760 BP–3640 BP (estimated best fit: 2200 cal BC–2000 cal BC)
   H3: 3640 BP–3570 BP (estimated best fit: 2000 cal BC–1900 cal BC)
   H2: 3570 BP–3400 BP (estimated best fit: 1900 cal BC–1750 cal BC)
   H1: 3150 BP onwards (later than 1500 cal BC)
3. There are probably no temporal lacunae between the lower horizons, H5–H3, whereas the dates indicate that a lacuna could exist between H3 and H2 and – with more certainty – between H2 and H1. This lacuna could have lasted from about a century to several hundred years, according to the datings, but most likely it was not that long, as the thick bone heaps of H2 are quite well preserved and thus must have been covered by vegetation, and thus protecting turf layers, quite quickly.
4. Overlapping dates within H4 and H2, which are characterized respectively by preserved structures and unstructured heaps of faunal material, artefacts and other waste, suggest that these horizons were formed within short time spans – perhaps just a few decades within the possible frames presented above. This is in accordance with the observations of the structure of the layers, which together form H4 and H2.
5. In relation to M. Meldgaard's absolute chronology (2004: 82), minor corrections have been made due to readjusted calibrations, e.g. the time span of H4 has been adjusted from 2200–2100 cal BC to 2200–2000 cal BC, and accordingly the date of H3 is adjusted from 2100–1900 cal BC to 2000–1900 cal BC.

Finally, it must be underlined that, when calibrated, the dates of each horizon come out within very broad time spans (one standard deviation). Only future high-precision AMS datings can throw further light on the absolute chronology of the Qt site.

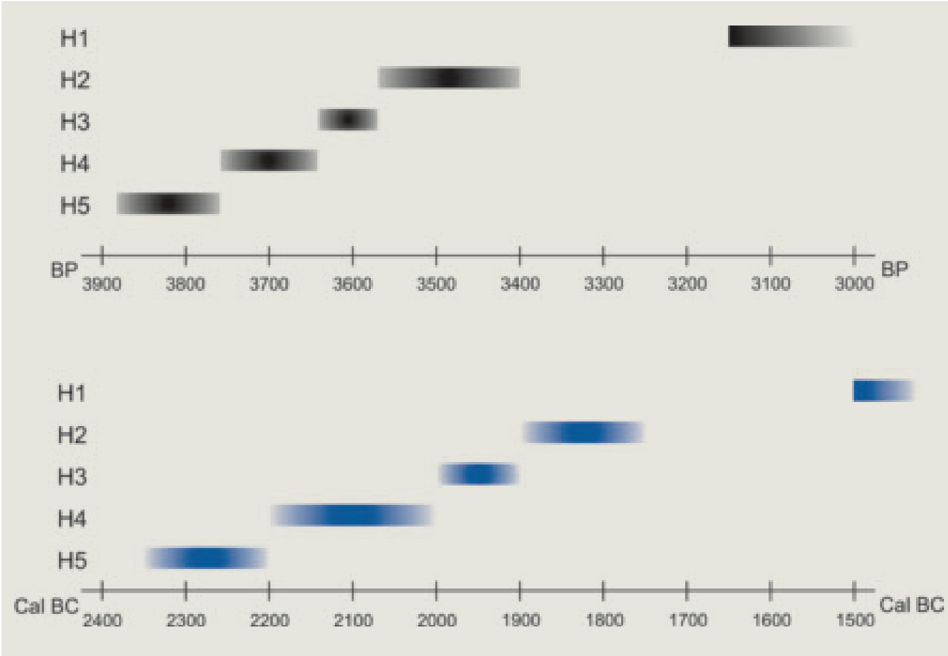


Fig. 4.10 *Overview of the absolute timing of the defined chronological horizons at Qt, shown both as BP and cal BC datings*

4.2 Qajaa

4.2.1 Sections and layers

As described briefly in Chapter 2, Jørgen Meldgaard cleared and cleaned parts of the erosion banks at Qa in order to get an overview of the sequences of layers. His team excavated a number of small areas with a starting point in the erosion banks. The results extracted from his archival material – drawings, photos, notes – are presented in the following sections (see map, Fig. 2.2).

The sections D, E, A, B, C and F (from north to south) demonstrate that the cultural layers differ in different areas of Qa. The character as well as the thickness of the stratified deposits changes considerably from one section to another. The deepest and most impressive sections are A and B, but Section B was only partially recorded. When comparing the numbers of preserved wood, bone and lithic objects from different excavation units, it becomes evident that most wooden objects are preserved in the permafrozen midden layers, in particular in Section A, where only limited excavation took place but which nevertheless is the place where wooden objects are most numerous. Objects of bone and antler are also reasonably well preserved in the excavation units E, C and F, which were chosen for excavation due to their accessibility (lack of permafrost in these particular places). The relatively thin peat layers covering the Saqqaq deposits in areas E, C and F allow the annual thawing to reach the top of the midden in these areas. Thus we see that there are varying conditions for the preservation of wood, bone and stone, which obviously affects the number and character of artefact categories present in different areas of the site.

The sections also reveal that there are great differences between the origin of layers at different parts of the site. Some layers were designated 'floor areas', usually characterized by compact cultural deposits with many artefacts, whereas other layers are dominated by natural peat mixed with a variety of discarded objects. Moreover, some layers are 'sterile' peat layers of purely natural origin. The differences in the character of the cultural deposits result from changes in the spatial location and intensity of habitations, activity areas and midden heaps through time. The differences in the natural formation of covering and insulating peat 'cushions' are probably the consequence of local variations in nutrients, drainage and insulation.

In conclusion, dwelling floors as well as hearths and midden deposits appear to have been present in all parts of the site, but based on Meldgaard's limited excavations we cannot describe in any detail the complex formation processes of the cultural layers at Qa.

In Area D the construction of a Thule culture communal house some time during the 17th or 18th centuries and a probably later trapezoid house has disturbed the older layers, resulting in a mixture of Saqqaq, Dorset and Thule objects. Great caution should thus be shown when drawing culture-historical conclusions from the sections in this part of the site. Today, the Thule common house is heavily eroded and only the rear wall is left standing as a vertical erosion front towards the sea. Below the back wall, approximately 50 cm of older, disturbed cultural deposits are found. The fact that the entire house, including the large living room and the long entrance passage of the communal house, has vanished except for the rear wall indicates that during the last 200 years approximately ten metres of soil and cultural deposits have been washed away (Fig. 2.6) by the sea.

4.2.1.1 Area D and the D sections

The northernmost part of the Qa midden is an isolated remnant of formerly more extensive cultural deposits. This 5–6 m wide strip, designated Area D, is being eroded from both south-west and north-east. To the north a rock knoll protects Area D and to the south Ruin 4, a Thule winter house, forms a large mound and constitutes the southern limit and protective breakwater of the area. Remains of the back wall of a Thule culture communal house (mentioned above), about eight metres long, cover older but disturbed culture layers (Fig. 2.6). The cultural deposits, including the longhouse back wall, show a depth of 205 cm. The layers rest on bedrock. Meldgaard's excavation units, Da and Db (3.5 m^2), were situated in the erosion bank immediately to the west of the intact Thule house, whereas Dc (1.5 m^2) was situated closer to the back wall of the almost vanished ruin. The sequence of layers in Area D is characterized by about 50 cm of mixed, mainly Palaeo-Eskimo layers overlain by turfs from the Thule winter houses.

The sections recorded in the excavation units Da, Db and Dc show, as mentioned, partially mixed Dorset and Saqqaq layers at the bottom. Meldgaard marked the lowest strata as being of 'Saqqaq? or Saqqaq?/Dorset' origin. These question marks indicate that he had trouble establishing the cultural origin of the lower layers, where Thule as well as Dorset and Saqqaq objects were found, sometimes side by side.

4.2.1.2 Area K

Area K (Fig. 2.4) is an isolated, almost 100 m^2 grass-covered 'island' of midden deposits, including a separate, small midden heap a few metres to the south, situated 40 metres to the east of Area D. Only minor surface collection and excavation along the west-facing cliff was conducted here, and no sketches of the stratigraphy exist. The cultural deposits rest on a compact substratum of gravel and stones with some clay, and the Saqqaq layers appear to be comparable to those in Areas C and F in the southernmost part of Qa (see 4.2.1.7–8 below), in the sense that there is probably no, or only minor, permafrost present due to the relatively thin covering layers of grass turf and the draining of the area. The Saqqaq layers are 60–80 cm thick and on top there is 20–40 cm of grass turf, which at places may include Thule deposits or remnants of dwellings left during the Thule period. The 'pure' Saqqaq deposits are made up of midden deposits as well as traces of dismantled structures (to judge from the abundance of relatively large stones that are also imbedded in the Saqqaq deposits). The midden deposits consist of a heterogeneous mixture of twigs from local shrubs, many fire-cracked rocks, charred blubber and large concentrations of bones, many of which seem to have been in contact with heat and fire.

4.2.1.3 Area H

Areas Ha and Hb are two separate areas, 2.5 m^2 and 2 m^2 respectively, that were excavated from the erosion front into the cultural deposits. The units are positioned immediately to the north of the meltwater gully where Areas A and E are situated. In spite of the comparatively large units excavated, very few artefacts are recorded from Area H, and no features were registered here. Presumably the units have not been excavated thoroughly, since among the 122 lithic artefacts recovered here, there are only Dorset types and a dominance of chalcedony over killiaq. Among the 122 lithic tools and flakes, 86% are chalcedony, which suggests that only Dorset layers have been excavated in Area H. However, Saqqaq layers with organic matter preserved may well be present in this area, hidden below the stones and gravel of the present beach.

4.2.1.4 Area E and Section E

Area E is situated a few metres from Section A at the northern side of a meltwater gully cutting into the cliff from the shore. Yet Section E is very different from Section A. The deepest layers closely resemble the bottom layers in Area A: in both places there are Saqqaq layers more than one metre deep, rich in artefacts and bones. However, the approximately 40 cm thick sterile peat layer covering the Saqqaq deposits in Section A is only seen as a thin sphagnum horizon in Area E. The reason for this marked difference over such a relatively short distance is difficult to explain, but it might be due to the fact that Section A faces north, and the cliff is thus in shade, whereas Section E faces south and is exposed to more thawing and drainage, which allow less growth of insulating peat. As in Section A, there are Dorset deposits on top of the sphagnum layer, which is in turn covered by more recent grass turf deposits intersected by lenses of sphagnum.

With a total area of approximately 2.5 m^2, Area E is one of the larger excavations at Qa. Flagstone platforms were recorded from a depth of approximately 60 cm, with new layers of flagstones continuing to a depth of approximately 100 cm. In one case, a flagstone had a thick layer of fire-encrusted blubber, and at other levels hearths were marked by sooted stones and charcoal.

A knapping site or dump of lithic debitage was located (Fig. 4.11) in Area E. These finds, as well as other observations, clearly show that large portions of the material excavated from Area E were deposited in activity areas or floor deposits inside dwellings. Unfortunately, the limited area excavated does not allow for a more solid determination of whether the different pavements are dwelling remains, or whether the hearths were inside or outside a dwelling. Four vertically standing wooden pegs were discovered 60–70 cm below the surface in Area E. One of the poles protruded through Layers II, III and IV. As seen from the listed finds, there are many organic artefacts in spite of the absence of widespread permafrost in Area E.

4.2.1.5 Section A

Section A is the most important and impressive of the sections at Qa (Fig. 4.12). At the north-facing cliff of a little gully Meldgaard and his team cleared a section of the eroded midden approximately two metres long. At this particular place the layers containing organic matter proved to be exceptionally well preserved due to permafrost, which had prevented the midden layers from drying, decomposing and collapsing. Bones and artefacts could readily be seen protruding from the naturally eroded cliff, making this particular area very promising. Upon removal of the stones and beach gravel below the cliff, Meldgaard realized that peat and culture deposits continued below the foreshore. A stratigraphic sequence was revealed more than 190 cm deep. However, permafrost bound the lowermost layers and this meant that the bottom of the Saqqaq sequence was not reached during the relatively short excavation sea-

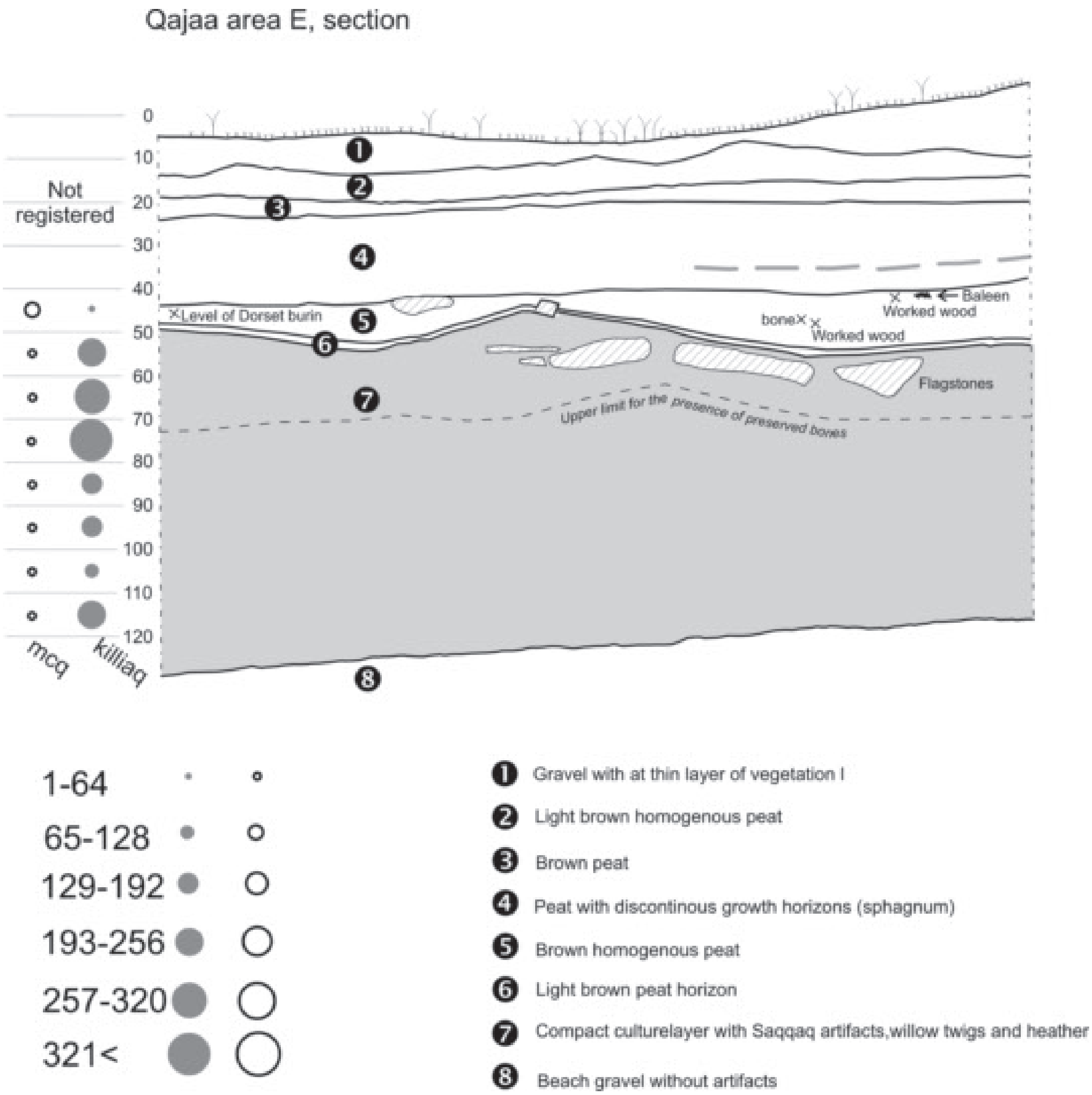


Fig. 4.11 *Section E with layers (and concentrations of raw materials throughout the layers).*

son. The stratigraphy was characterized by six well-defined layers with spectacular, massive Saqqaq deposits at the bottom (Fig. 4.13).

Permafrost prevented Meldgaard from excavation of larger units here, and Area A thus remains one of the places where least excavation based on a section was carried out. Yet in terms of finds the area is very rich, in particular in wooden objects, which in spite of the small excavation area are most abundant here (Jensen and Grønnow, in prep.). The marked differences in the recovery rate of wooden artefacts between units clearly demonstrate the positive effects of permafrost on the preservation of wood, and it also indicates that solid permafrozen culture layers probably only occur in an area of a few hundred square metres around Section A in the central portion of the Qa site.

The layers of Section A are briefly described in the caption of Fig. 4.13. Here, Meldgaard's description of the culture layer with organic preservation, Layer 15, will be presented in fur-

Fig. 4.12
Section A during excavation. (Photo: Jørgen Meldgaard, 1982).

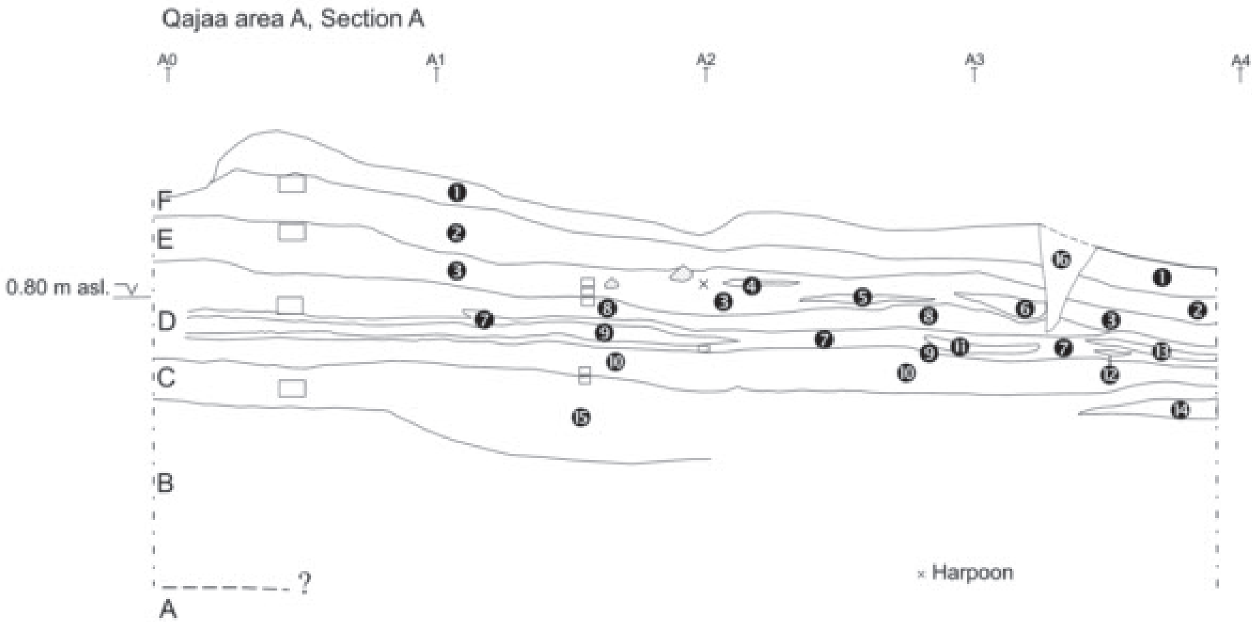


Fig. 4.13 *Section A. Description of layers: 1: Turf and grass. 2: Dark brown, slightly decomposed sphagnum with light brown, horizontal lenses of sand. 3: Dark brown to black, slightly decomposed sphagnum turf with Dorset remains. 4: Brown sphagnum. 5: Light brown to yellow sphagnum. 6: Similar to Layer 5. 7: Similar to Layer 3 but without Dorset remains. 8: Similar to Layer 5. 9: Dark brown to yellow sphagnum. 10–13: Similar to Layer 9. 14: Similar to Layer 9 but darker, maybe due to seeping from covering layers. 15: Saqqaq culture layer sequence. 16: Recent disturbance.*

ther detail (measurements from the bottom of the excavation):

Layer 15, lower part (0–17 cm): Saqqaq culture layer resting at places on supposed sterile underground and at other places on bedrock. As mentioned above, however, permafrost hampered the identification of the 'bottom' throughout the section. The layer consists of black, fibrous peat and humus with many twigs. Only a few artefacts, in the form of possibly modified pieces of wood, were found in this deepest part of the section.

Layer 15, mid-part (17–85 cm): a massive Saqqaq culture layer of black peat with bones, wood, twigs, grass fibres, lithic artefacts, debitage, modified bone, antler and wood.

Layer 15, upper part (85–100 cm): the top of the Saqqaq culture deposit. The layer consists of black peat with poor preservation of bones and artefacts of organic matter.

4.2.1.6 Area B and Section B

Area B is situated 15 metres to the south-west of Area A. At this place the grass-covered midden area slopes more gently into the sea and there is only a low vertical cliff facing the shore. The section, Section B, was excavated to a depth of 235 cm (measured from the top of the sloping cliff some metres behind the erosion bank). At the bottom, a 30 cm thick (cultural) layer of black to dark brown, decomposed, but still fibrous, peat resting on a substratum of gravel and stones was found. There were numerous bones (seal, whalebone and bird bones) as well as artefacts in this stratum. The 'bottom layer' rests on gravel and was partly hidden below gravel and stones at the foreshore. Above the bottom layer there is a 205 cm thick layer of fibrous peat with no traces of cultural activities all the way up to the present vegetation. It must be mentioned, however, that Section B was not inspected in detail by Meldgaard's team. Three test pits of 50 × 50 cm were excavated in front of the eroded cliff.

4.2.1.7 Area C and Section C

Areas C and F in the south-westernmost part of the Qajaa site are two excavation units with largely similar stratigraphy and preservation conditions (Fig. 2.2). In this part of the site the cultural deposits consist of approximately one-metre-thick Saqqaq layers covered by thin layers of 'recent' grass turf and vegetation. No Dorset layers were documented in this part of the site, and the Saqqaq deposits do not seem to be frozen here. Meldgaard chose to excavate two units of approximately 2 m^2 in this part of the site, which he named C and F. In both units the deposits are characterized by cultural layers very rich in finds, and in both areas the layers are characterized by a mixture of midden deposits and activity areas. At a depth of 50–60 cm both units thus have 'floor deposits', which in Area C are characterized by a layer of 'pea gravel', many fire-cracked rocks and some flagstones.

Section C shows that the sequence of layers in Area C rest on a sterile underground of shell gravel (Layer 1). On top of this are dark brown to black midden deposits with many bones (Layer 2). Layer 3 is a lens of sterile beach gravel imbedded in Layer 2. Layer 4 is a 'floor layer' of pea gravel a few centimetres thick. Inside or adjacent to this layer some flagstones as well as fire-cracked rocks were found, which might be the remnants of a midpassage structure scavenged for stones. On top of the floor layer is approximately 25 cm of midden deposits containing many bones and some stones (Layer 5), and above this there is a layer approximately 25 cm thick of decomposed dark brown turf with a few brittle bones but with many stone artefacts (Layer 6). On top of Layer 6 a 5–10 cm thick layer of recent grass turf is seen (Layer 7).

4.2.1.8 Area F and Section F

Area F is a small excavation area situated in the southernmost part of the Qajaa site (Fig. 4.14). The western limit of the excavated unit is delimited by the eroded brink so that well-preserved culture layers were only found in approximately 75% of the 2.35 m × 1 m excavation unit. Even though the excavated area is limited, a collapsed midpassage with hearth and adjacent platforms was excavated at a depth of 50–65 cm inside a 60–90 cm deep Saqqaq layer below the present grass peat surface layer. This midpassage structure is described in Chapter 5.2.

4.2.2 Radiocarbon dates

The sequences of layers at Qa have been dated by a total of 25 radiocarbon dates on material collected by Meldgaard in the 1980s, and four AMS dates on material collected in 2010 (Table 4.2.2). Meldgaard's dates were made on peat or twigs from local vegetation. The samples were collected from all documented sections, but the majority, ten, are from Section A, two are from Section B, four from Area D, five from Section E, three from Section C, and one from Section F. The general picture given by these sequences is in concordance with the stratigraphy: the oldest dates are from the deepest layers. It should be mentioned that it has not been possible from Meldgaard's notes to locate the exact sample area for two of the dates conducted on twigs from Section D. These two dates, supposed to be of Dorset age, came out as younger than 1400 AD. Supposedly both can be disregarded as errors due to disturbances by later Thule activities on the site.

The two oldest dates (K 3899 and K 3904) are of the same age, 3550 BP (1896 ± 114 cal BC and 1895 ± 109 cal BC, respectively), and they are closely followed by K 3906 at 3490 BP. These dates are several hundred years younger than the earliest dates from other Saqqaq sites in West Greenland (see Chapter 7.4) which could

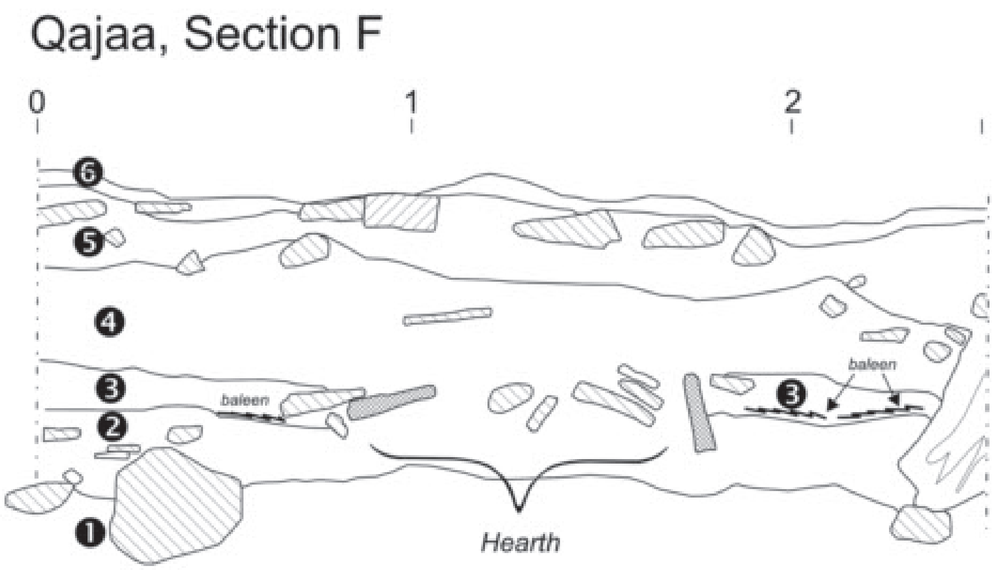


Fig. 4.14 *Section F with layers.*

1. Underground, chalkrich gravel with stones
2. Midden, dark brown to black layer densely packed with bones and wood
3. Platform of twigs and grass partly resting on sheets of baleen
4. Bone midden
5. Decomposed peat with remains of bones and wood
6. Grass turf

indicate that Qajaa was settled slightly later than many other key localities. However, this is probably not the case. It appears that Meldgaard did not sample the deepest parts of the frozen Qa midden hidden below the gravel in Section A. Furthermore, it must be considered that large parts of the midden have been washed away and we cannot be sure that the earliest parts of the midden are preserved today. In spite of such uncertainties, the presence of similar datings of the cultural layers rich in finds in the central and southernmost part of the site indicates that, at this stage of site formation, Qajaa must have been occupied by a large group of people. Their accumulated activities resulted in the spectacular and massive deposition of refuse over an area of several hundred square metres.

Following the earliest Saqqaq dates on Qa is a sequence of partly overlapping dates. The stratigraphies in Meldgaard's sections show that occasionally sterile peat layers formed in some parts of the site, but still the site must have been regularly settled. The latest Saqqaq date (K 3894) on peat from the uppermost part of the Saqqaq layer in Area A (Layer 15) is dated to 2700 ± 75 BP (920–790 cal BC), which is quite young in comparison with the majority of dates from Disko Bay, but nevertheless overlapping the latest Saqqaq phase at Nipisat near Sisimiut (Gotfredsen and Møbjerg 2004). The late radiocarbon date from Qa is supported by the finding of five fragments of soapstone vessels in the younger Saqqaq layers in Areas E, C and F.

Another indicator of human presence during the late Saqqaq period is the occurrence of bevelled points (seven), which have been located in excavation units D (one), E (two), A (one), C (two) and F (one). Four of the bevelled points are from the uppermost Saqqaq deposits, one from intermediate layers 100–110 cm below the surface in Area E, and two are without stratigraphic provenance.

The length of the hiatus between the last Saqqaq occupation to the beginning of Greenlandic Dorset is difficult, if not impossible, to establish at Qa based on the current available data, since the dates younger than approximately 2550 BP fall in Plateau E of the calibration curve (see Chapter 7.4).

It must be mentioned that Meldgaard dated six samples from Dorset layers at Qa, but some of the resulting dates are problematic. The oldest date of Greenlandic Dorset is from Area E, where the Dorset horizon was dated to 2210 ± 70 BP (K 3902) giving a date between 380 and 190 cal BC. This date is followed by an almost equally old date of the Dorset layer in Area A. Both dates hit a wiggle on the calibration curve (Wi. II, lasting from *c.* 400–200 cal BC), which is just a bit younger than the massive *c.* 750–400 cal BC plateau (Plateau E) hampering most Dorset dates (see Fig. 7.19b). The Greenlandic Dorset dates from Qa thus belong in the later part of the period, when this culture flourished. Among the Dorset, three dates from Area D are too young to be accepted as reliable. One of these (K 4102), for example, was conducted on a twig collected from Section Db, 54 cm below the surface, and 8 cm above bedrock in a layer defined as 'Dorset'. The resulting date of 420 ± 65 BP underlines the fact that, in spite of relatively clear stratification, the deposits in Area D must be considered disturbed by more recent activities. The two last Dorset dates are AD, with calibrated dates between 70–240 AD (K 3903) and 297–496 AD. These dates are intriguingly late. However, in comparison with other dates of Greenlandic Dorset they stand alone, and moreover they were conducted on bulk samples of peat.

4.2.3 Conclusions on datings and stratigraphy at Qa

The 25 radiocarbon dates on material from Qa support the relative stratigraphy recorded by Meldgaard's team. The absolute time frame for Saqqaq was thus measured at *c.* 1900 to 920/790 cal BC. However, Meldgaard probably did not reach the earliest culture layers at the site, and it is likely that the initial settling at Qa is several centuries earlier than the 1900 BC limit. It is noteworthy that the latest Saqqaq date at Qa falls just before Plateau E on the calibration curve.

The combination of the stratigraphic evidence and the radiocarbon dates shows that the site formation and depositional history of the culture layers, as well as the natural turf deposits, are highly variable and differ among the investigated areas at the site. In general, the combination of radiocarbon dates and sections indicates that at least three main depositional histories have formed the site:

In Area D, the Palaeo-Eskimo deposits were heavily disturbed by the intrusion of Thule houses. In Areas A and E there are full depositional histories covering both Saqqaq and Greenlandic Dorset, as well as younger peat deposits from the Thule culture until historic times. The relative volumes of the individual layers differ between Areas A and E even though these areas are only separated by a few metres, but the relative sequence of the layers is parallel in the two areas. Presumably Area B shows the same general stratigraphy, making sections A and E representative of an area of approximately 200 m^2 in the central part of the Qa site. In the southern part of Qa the stratigraphy and radiocarbon dates indicate that much of the deposits postdating the Saqqaq culture are missing. Whether this is the result of turf digging during Thule times or natural processes is not yet known, but considering the settlement history of the place, both factors probably play a role.

The stratigraphy at Qa reflects a history of three discontinuous settlement episodes separated by periods of abandonment. This observation is in accordance with evidence from Sermermiut and from sites in Disko Fjord at Disko Island, Ikorfat and Uummannatsiaq (Jensen 2005). The reliable Dorset dates from Qa belong to the centuries between 400 and 200 cal BC.

4.3 Relative chronology: typological and chronological trends of the Saqqaq culture

4.3.1 Chronological trends at Qeqertasussuk, Qajaa and beyond

In early summaries of the evidence from Qt the author presented selected examples of chronological trends in artefact material that, for the first time regarding early Saqqaq culture, could be documented through stratification (Grønnow 1994: 220 ff.; Grønnow 1997). (In these papers the artefact assemblages belonging to each chronological horizon, H5–H1, were designated a parallel component number: Component 5–Component 1). This chapter draws on these studies and further explores the potential for chronological studies at Qt. The results will be combined and compared with evidence from the stratified layers at Qajaa and from other Saqqaq sites in Greenland.

First and foremost the analyses of chronological trends have been based on artefacts, which are represented in relatively large numbers. Only artefact types which can be followed in considerable numbers through *all horizons* are included. In practice, this criterion excludes wooden artefacts from these analyses, as they are relatively few in numbers and absent from H2–H1. Moreover, metric variation through time is explored by means of careful selection of measurements of those properties that are independent of resharpening/reworking processes.

Only burins, microblades and harpoon heads show reliable and measurable chronological changes through time at Qt. The reader is referred to Chapter 4, where the descriptions of the artefact categories and analyses of the *chaînes opératoires* form the basis for identification of properties which are reliable as chronological indicators.

4.3.1.1 Lithic raw material preferences through time

The relative frequencies of used flint-like raw materials – simplified to killiaq, micro crystalline quarts (mcq) and quartz crystal – can be followed throughout all horizons at Qt. Calculations have been made for the total material in Area C, as well as for the defined tools (including retouched flakes) only. The results of these counts are presented in Tables 4.3.1-1 and 4.3.1-2 and Figs. 4.15a and 4.15b.

A clear trend, in particular concerning the preferred raw materials for lithic tools, is demon-

Fig. 4.15 *The frequencies of lithic raw materials by horizon at Qt.* **a:** *waste and formal tools.* **b:** *formal tools.*

strated by the graphs: the frequency of the overall preferred raw material, killiaq, increases from about 65% in the earliest horizons (H5 and H4) to over 80% in the latest (H2 and H1). This is in accordance with a decreasing preference for mcq and quartz crystal through time: about 20% in H5 and H4 and below 10% in H3, 2 and 1. The calculations are based on about 11,000 lithic objects, including over 1,300 tools, distributed in large numbers in all horizons. Thus, these trends are considered reliable for the overall chronological trend at Qt.

A related chronological indicator has been demonstrated concerning the preferences of different variants of killiaq. The outcrops in Disko Bay contain many different variants (Jensen 2006: 85–96; Sørensen 2012a: 54–59). However, for the Qt material a simplified classification was used, owing to the fact that the details of the Nuussuaq outcrop and the outcrop at Angissat were not known when the classification of the Qt raw materials was made. The classification included three variants of killiaq: a homogeneous light grey, a striped, and a spotted variant. When this was applied to the 829 killiaq tools from the well-defined horizons of Area C (Grønnow 1994: 228), it was seen that the light grey variant was by far preferred – 75–80% in the early horizons, H5–H3, and over 90% in H2 and H1 – but also that there was a corresponding chronological tendency to the utilization of a larger share of spotted killiaq (*c.* 15%) in the early horizons and a lower share of spotted killiaq (below 10%) in the late horizons.

While these tendencies in raw material preferences may hold true for Disko Bay in general, it is clear that this chronological 'guideline' cannot be applied in other areas. Kramer (1996a) has convincingly argued that the Saqqaq sites in the Sisimiut area show opposite trends to those in Disko Bay, i.e. that high-lying sites from the early part of Saqqaq culture show high percentages of killiaq, 70–100%, while the percentage of killiaq drops to 20–50% at the lower-lying later Saqqaq sites, as the use of quartzite, mcq and quartz crystal increases. This observation is supported by Møbjerg's analyses of the Nipisat and Asummiut materials from the same region (Gotfredsen and Møbjerg 2004: 195–97). In particular a high percentage of quartzite is a chronological indicator for late Saqqaq. The temporal span at Qt does not cover these later parts of Saqqaq culture (the period from 1200/1000 cal BC to about 800/400 cal BC), so the data are not directly comparable, but nevertheless it must be concluded that raw material preferences can be used as a relative chronological key at a local/regional scale, not for Greenland as a whole.

4.3.1.2 Microblades

Raw material preferences concerning microblades show systematic changes through time. From the well-defined horizons of Area C, 104 microblades have been analysed with respect to this variable (Table 4.3.1-3 and Fig. 4.16).

Mcq and quartz crystal are far preferred as raw materials for microblades, but the relative frequencies vary systematically from H5 to H1. An almost even development from about 90% mcq in H5 to *c.* 25% in H1 corresponds to an opposite trend: *c.* 10% quartz crystal in H5 and 70% in H1. Some 'wiggles' in the general trend are seen as the raw material percentages of H3 and H2 are a little outside the expected values, but the general trend is clear: the use of agates for microblades decreases dramatically through time as the use of quartz crystal increases (and thus the microblades generally becomes shorter).

Hinnerson-Berglund's finds from the Nuuk area show that quartz crystal is *the* dominant raw material for microblades, and no chronological trends in this material were identified (2004: 154). It is seen that the general trends concerning microblades at Qt are not universal, but regional.

4.3.1.3 Burins

The base of the burin was, as seen in 3.3.2 above, protected in its wooden haft, while the distal part of the burin went through several resharpening processes throughout the tool's 'life cycle'. Thus, the only stable measurement on burins independent of resharpening is the width of the

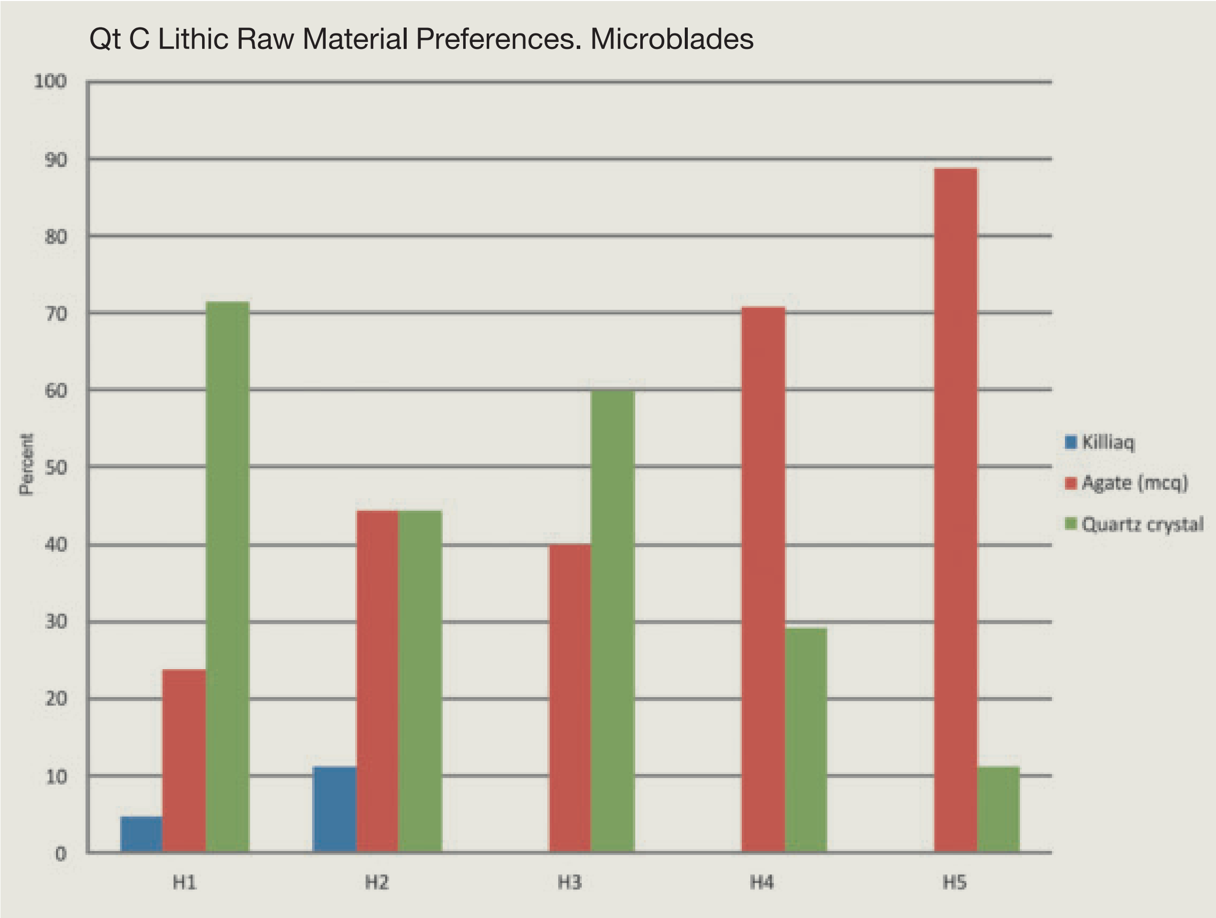


Fig. 4.16 *Microblade raw material frequencies by horizon at Qt.*

burin base. Analysis of 146 burins belonging with certainty to well defined horizons provides significant chronological information based on their metric properties (Grønnow 1994: 231).

Table 4.3.1-4 and Fig. 4.17 show the results of the burin base measurements. It appears that the mean burin base width decreases incrementally from 14 mm in the earliest horizons, H5 and H4, via 12 mm in H3 and H2, to 'a mere' 11 mm in H1, the latest settlement phase at Qt. This systematic change over several centuries corresponds to a gradual change in the shape of the burin bases: from broad, square bases to narrow, tapering bases.

Kramer's (1996b: 83–85) and Møbjerg's (Gotfredsen and Møbjerg 2004: 60–65) metric analyses of burin base dimensions in the Sisimiut area does not show a systematic development like that at Qt. The earliest burins are those from the early Saqqaq site, Akia (dated to 3790 ± 85 BP = 2390–2040 cal BC and thus contemporary with H5 at Qt), and their mean burin base width is as low as 11 mm (based on 67 specimens). The mean burin base width of burins from the latest phase at Nipisat (Phase 3, dated to 1310–810 cal BC and thus considerably later than the settlement at Qt), is 11 mm, as well. Concerning Nuuk, Hinnerson-Berglund has measured burin base widths from five sites, but they have not been dated relative to each other. A sample of 47 burins from the site Marianes Pynt reveals that the mean burin base width is only 10 mm (based on Table 10 in Hinnerson-Berglund 2004). This site is framed by radio-carbon dates of 3685 ± 45 BP and 3465 ± 50 BP (= 2115–2040 cal BC to 1880–1660 cal BC), i.e. covering H4 to H2 at Qt. Again, it is underlined that the chronologies deduced from the Qt material are applicable only on a regional scale.

4.3.1.4 Harpoon heads

In the Qt material there is only a single tool category of organic material which is at once frequent and which holds a number of typological variables: the harpoon head (Grønnow 1997). The characteristic Saqqaq harpoon heads were described and divided into types in 3.2.4 above. Here their limited chronological evidence will be summarized.

Harpoon heads of Types Qt-A, Qt-B and Qt-C were located in all horizons with preservation of osseous materials (H5–H2). However, all six heads of Type Qt-D were recovered in the two latest horizons with adequate preservation conditions, H3 and H2, and thus Qt-D was introduced to the site during the formation of H3. It is considered a relatively late type at Qt.

As described in 3.2.9.3 above, the comparative material concerning Saqqaq harpoon heads is extremely limited. Fewer than ten heads are known from Saqqaq contexts beyond Qt and Qa. Three are variants of Type Qt-A (one from Bight site and two from Nipisat) and the remainder are Type Qt-B (one from Nipisat, one from Bight Site (Feature 2), one from Qorluulasupaluk, one stray find from Disko Bay, and two from Itinnera). The temporal frames of the radiocarbon dated sites with harpoon heads show – in accordance with the observations from Qt – that Qt-A and Qt-B harpoon heads were used alongside one another during the Saqqaq period: the Qt-A head from Bight Site was recovered in Feature 2, which is dated to the earliest Saqqaq phase (3840 ± 70 BP) (Schledermann 1990: 343), and thus it is contem-

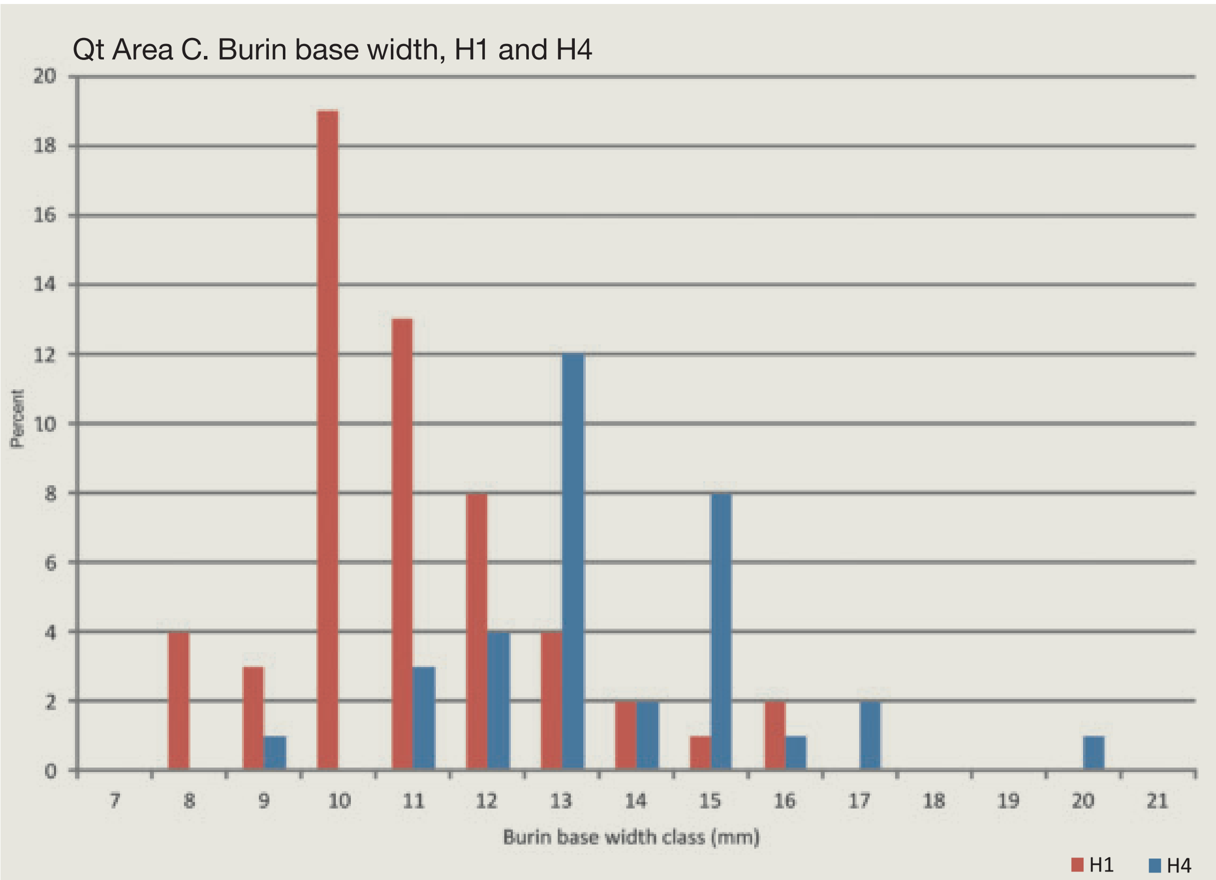


Fig. 4.17 *Burin base width frequencies by Horizons 1 and 4 at Qt.*

porary with H5 at Qt, whereas the Nipisat (Phase 1) harpoon heads of Type Qt-A and Qt-B are contemporary with H4–H2 at Qt (Gotfredsen and Møbjerg 2004: 34–37). The large Itinnera site is dated by just two radiocarbon dates on charcoal (Jensen 2006: 175). As the site is probably multi-period the date of the Qt-B heads from it is uncertain, but probably the entire site belongs to the late part of the Saqqaq culture.

4.3.1.5 Other chronological trends in the Saqqaq period

A recent paper sums up the evidence on fire-making, open fire in hearths, and blubber lamps in the Early ASTt (Grønnow *et al.* 2014). Concerning lamps it is concluded that coarsely made 'informal' lamps, like the one from Qt described in 3.3.19 above (88,0/251,0: 31), which is a heavy piece of rock with a natural or slightly worked hollow on the upper side, were part of the Saqqaq inventory from the earliest times in West Greenland. The more curated and formally designed, often perfectly circular blubber lamps made from soapstone or fine-grained sandstone belong to Saqqaq assemblages which are a few centuries later, from around 2000 cal BC. These 'iconic' Saqqaq blubber lamps with their separate wick-holders of soapstone were used alongside the group of 'irregular, flat lamps' until the latest Saqqaq period (ibid.: 413–14). This conclusion is corroborated by evidence from Qa, where fragments of circular specimens appear only in the upper part of the series of layers at the site. In accordance with this, Kramer's analyses of chronologically ordered assemblages based on beach ridge chronology in the Sisimiut region conclude that lamps made of soapstone were introduced in the late part of the Saqqaq period (1996: 59). The excavations at Nipisat support this conclusion (Møbjerg and Gotfredsen 2004: 199).

Kramer's paper discusses other possible chronological indicators in the Saqqaq inventory from the Sisimiut region, i.a. that the small triangular harpoon points of killiaq should be an early Saqqaq indicator and that bifacial arrow points with a marked tang belong to early Saqqaq, whereas the ones with a smooth transition from blade to stem or tang are from late Saqqaq. However, these chronological indicators from Sisimiut have not been confirmed by the analyses of the Qt and Qa materials, suggesting that future analyses should go into more detail concerning the possibility of regional differences.

Finally, the completely polished, bevelled endblades described by Møbjerg and Gotfredsen (2004: 81–83; 199–200) must be mentioned. These characteristic lance or missile points, along with likewise fully ground knife blades, seem to be indicators of late Saqqaq. At Nipisat they all belong to Phase 3 (*c.* 1370–810 cal BC). As has been seen, the Qt assemblage does not include bevelled endblades or knife blades, but there are seven from Qa. The majority were found in the uppermost Saqqaq cultural layers, whereas a single specimen came from a slightly lower position in Area E, dated on twigs by radiocarbon (K-3900, Table 4.2.2) to 1880–1630 cal BC (one standard deviation), that is to the middle of the Saqqaq period in West Greenland. Thus, the bevelled endblades were probably introduced already at that phase, but only became a significant missile and knife blade type in the late part of the Saqqaq culture.

4.3.1.6 Conclusions: the position of the frozen sites in the chronology of the Saqqaq culture

It is remarkable that chronological change in the material culture at Qt is very subtle. All main tool types were integral parts of the first 'pioneer tool kit', and few significant stylistic and metric variable changes can be detected in the course of the at least 800-year-long time span which the horizons at Qt cover. Systematic developments concerning general lithic raw material preferences have been documented – from high frequencies of mcq (and, to a certain degree, quartz crystal) in relation to killiaq in the early horizons to low frequencies in the late horizons. Likewise, significant changes in the selection of raw materials are seen concerning microblades. Here mcq dominated during the early horizons, while gradual changes in preference through time caused quartz crystal to dominate during the late horizons. The burin was the only tool type which could be documented to vary significantly and systematically through time as regards its metric properties. The width of the burin base decreased incrementally from 14 mm to 11 mm through the horizons from the earliest to the latest, H5–H1. Finally, one of the four main harpoon head types, Qt-D, seems to be a relatively late phenomenon at Qt, as its first appearance is in H3.

The Qa site probably covers a longer time span than Qt, as evidenced by radiocarbon-dated culture layers. The upper ones of these layers contain artefacts which, in accordance with evidence from the Nuuk and Sisimiut regions, are introduced after *c.* 2000 cal BC: the formal (circular) soapstone and sandstone blubber lamps and the bevelled endblades.

It is concluded that some chronological indicators at Qt, like the pattern of raw material preferences through time and the changes in burin base width, are probably not universal, but rather of a regional character. Thus there is not yet a firm basis on typological grounds for a division of the Saqqaq culture into separate chronological phases covering the entire geographical range.

Until further work is done along these typo-chronological lines we have to rely on an arbitrary, but also practical, division of the long Saqqaq time span into three phases, which we define here by radiocarbon dates: Early Saqqaq: 2400–2000 cal BC; Middle Saqqaq: 2000–1200 cal BC, and Late Saqqaq: 1200–800/400 cal BC. By these definitions it is seen that Qt covers the Early and Middle Saqqaq, whereas the Qa sequence of culture layers covers the Middle and Late Saqqaq. However, as it appears from the evaluation of Meldgaard's excavations and of the later investigations at Qa, this site was probably already established during the Early Saqqaq.

5. Features, Spatial Analyses and Changes in the Function of the Sites through Time

5.1 Qeqertasussuk

The test pits excavated in 1984 already revealed that the Qt site held a unique potential for studying not only Saqqaq technology in itself, but also technology and material culture in a broader sense within original spatial and architectural contexts.

The 85/250 test pit and the following excavation of Area C, which consisted of a thoroughly investigated 8.0 × 5.5 m area (Fig. 2.7), showed that stone-built structures in the upper horizons, H1–H3, were seriously disturbed by cryoturbation or by later scavenging for building materials, but they also showed that the features in H4 below were meaningfully structured and untouched by later activities.

5.1.1 Area C, H4

In Area C the stone-built structures of H4 were carefully uncovered and the artefacts and waste materials systematically mapped by means of a grid consisting of quarter-square-metre units. The positions of selected finds were exactly measured. Profile balks provided detailed information on stratigraphical relations between the features and enabled studies of sub-layers of e.g. floors, platforms and midpassages. Thus the excavators uncovered a surface which was judged in the field to be the closest that we could get to a 'settlement episode' at Qt. In short, it was our aim to uncover an original settlement floor as it appeared when the Saqqaq settlers left (this part of) the site some time within the span *c.* 2200 cal BC–2000 cal BC. We consider the H4-surface as it is recorded by *in situ* photography (Fig. 5.1) and plan drawing (Fig. 5.2) as a meaningful analytical unit and thus a firm starting point for studies of stone-built features like dwellings and hearths on a Saqqaq settlement surface. The following chapter focuses on descriptions and functional interpretations of seven well-defined features on this H4-surface, as well as on their internal relations. Later, these analyses will be elaborated through analyses of spatial distributions of artefacts and waste on the H4-surface.

5.1.1.1 Feature A1: an oval hearth

Feature A1 consists of an oval flagstone frame, which contains and is covered by a heap of fire-cracked rocks and flagstone fragments of gneiss and granite. The frame is oval and measures *c.* 65 × 50 cm (inside) (Fig. 5.3). It is built of about twelve quite small flagstones, of which only two were in an upright position. The turf layer (Layer 15a) on which the frame sits is reddish and hardened due to heat and congealed blubber. A 1–2 cm thick layer of charcoal forms the lowermost layer in the structure. This is covered by hand-sized flagstones. The soil above contains lots of charred blubber and some charcoal. Fragments of fire-cracked flags (25 stones, weight: 15,803 g) most of them showing crusts of charred blubber on one side mixed with fist-sized non-fire-cracked rocks (43 stones, weight: 16,744 g) and fist-sized fire-cracked rocks and angular fragments of these (189 stones, weight: 27,440 g) cover the oval frame and the adjacent area. This oval 'heap' covering A1 measures about 110 × 80 cm.

In total A1 contains 257 stones or 59,987 g of stone (excluding the frame).

A1 is interpreted as a regular hearth in which fist-sized rocks and flagstones were heated. The high content of charred blubber indicates that blubber was either used as fuel in combination with firewood for heating the rocks and the flags or, rather, that blubber or meat with blubber were roasted on the flagstones, as seen from the charred blubber crusts. The reddish blubber-soaked turf layer below the oval frame

a.

b.

Fig. 5.1
a: *Area C, seen from west. The stone-built features of Horizon 4 are exposed. (Photo: BG, 1987)*
b: *Area C from above. On the 5.5 m × 8 m surface the features of Horizon 4 are seen. North is upwards. (Photo: Geert Brovad, 1987).*

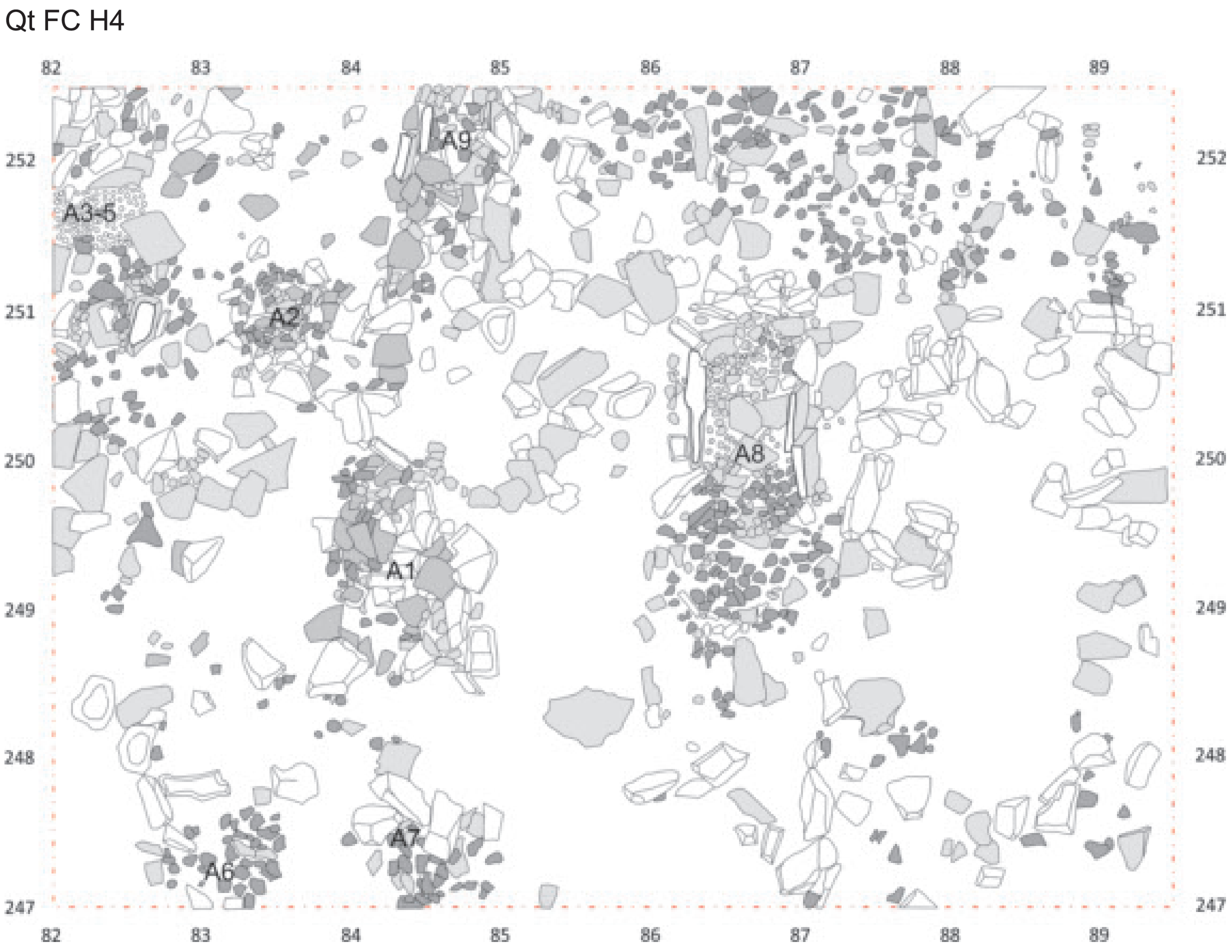


Fig. 5.2 *Plan drawing of features, Horizon 4, Area C (=FC), with feature numbers, A1–A9. (Digitized by Martin Appelt).*

shows that the heat in the fireplace was intense. As suggested by the stratigraphy inside the frame, A1 could have been used for different purposes during its life cycle. The regular layer of charcoal below the hand-sized flags forming the bottom of the structure suggests that the flagstones used for roasting were heated on top of embers. The many fire-cracked, fist-sized rocks in a matrix of charred blubber and charcoal on top of the structure demonstrate that the last use phase involved an intensive open fire to produce hot stones for boiling, heating or drying processes. Hot rocks could also have been produced in A1 intended for use in other activity areas, where they would provide smokeless heating.

5.1.1.2 Feature A2: a heap of dumped fire-cracked rocks

Feature A2 is a round heap (*c.* 80 cm in diameter) consisting of a mixture of fragmented flagstones (10 stones, weight: 7,228 g), many of them with charred blubber crusts, fist-sized, non-fire-cracked rocks (42 stones, weight: 20,792 g), and fist-sized, fire-cracked rocks including angular fragments thereof (75 stones, weight: 16,685 g), and two irregular heaps, each of three angular boulders to the south-east of the structure. The turf matrix among the gneiss and granite rocks of the feature is mixed with charcoal and some bone fragments. Furthermore, a distal fragment of a stake with the point turned upwards and a

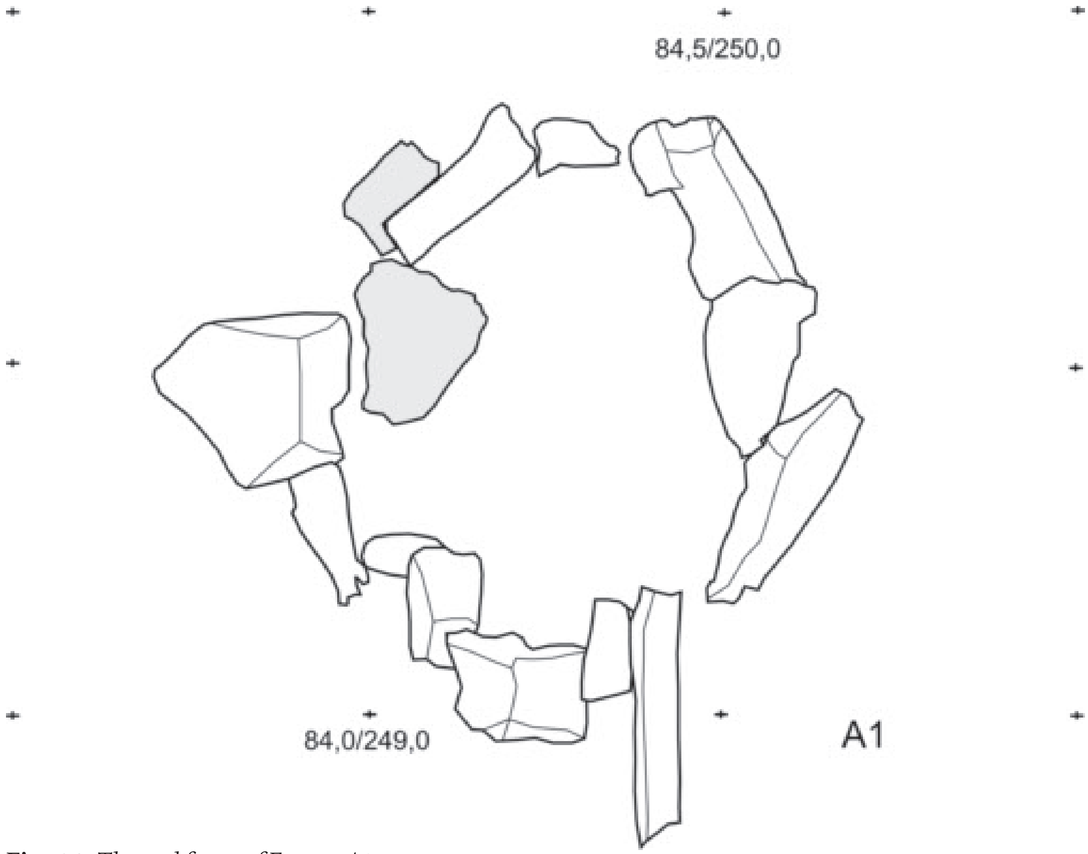


Fig. 5.3 *The oval frame of Feature A1.*

large fragment of a wooden tray with signs of repair are located inside the structure. Apparently all elements from a regular hearth are randomly mixed. It is, however, noteworthy that the total weight of 'fresh' fist-sized rocks is considerably larger than the weight of the exhausted ones. In total, A2 contains 127 stones, weighing 44,705 g.

All components are mixed, there are no direct traces of open fire within a fixed structure (there is no hard blubber-soaked soil below the feature) and there is no stone-built frame. Thus, A2 is interpreted as a dumping of waste materials in connection with a clean-up of a fireplace close by.

5.1.1.3 Feature A3–5: a midpassage structure with two fireplaces

When the upper stones of Feature A3–5 were discovered during excavation of Layer 16 they were first considered as belonging to three separate features – hence the designation. But it turned out that we were dealing with three zones of a single midpassage structure (also known as an axial feature) (Fig. 5.4). Due to the position of the feature at the north-western corner of Area C, the western edge and the northernmost part of the feature were not completely excavated. However, it is possible to describe the feature in some detail:

The longitudinal axis of the feature runs north–south. The midpassage structure is *c.* 70 cm wide (outer limits) and more than 200 cm long. The northernmost zone, A3, is delimited to the east by an upright slab, which is probably all that remains of a well-defined eastern edge of this zone. This *c.* 70 × 70 cm component of the feature contains fist-sized and bigger fire-cracked rocks of gneiss and granite (28 stones, 11,720 g), most of them angular frag-

Fig. 5.4
Vertical photo of Feature A3–5. The exposed part of the feature is about 200 cm long and 70 cm wide. (Photo: Keld Møller Hansen).

ments with charred blubber crusts, a few flagstones (4 stones, 5,900 g; one of these shows a charred blubber crust and dark purple probably iron phosphate (vivianite) precipitations), large stones (3 stones, 9,250 g), and a large flagstone on top, which shows polished areas on the upper side (probably a grinding stone). The turf sediment in the structure is mixed with charcoal and charred blubber, and the layers below A3 – including the beach gravel (subsoil) – are 'cemented' by congealed blubber. The sediment in the structure also contained many bone fragments, in particular bird bones, and a small heap of killiaq flakes.

The central zone, A4, consists of a *c.* 60 cm wide and 40 cm long flat heap of round, pea- to egg-sized pebbles, which do not show any signs of fire. The border between Zones A3 and A4 is sharp. A4 contains more than 10,000 round beach cobbles (weight in total: 17,500 g). Five fist-sized fire-cracked rocks (300 g) sit on top of the flat pebble heap and so does the distal end of a wooden pole and a root/branch of local wood. A large flagstone with vivianite precipitations on the surface overlaps a small part of the pebble heap to the east. The turf sediment in this zone contains lots of twigs and bone fragments (c. 25% bird bones), as well as flakes.

The southern zone, A5, is bordered to the east and west by two parallel upright slabs, *c.* 40 cm apart (inside). A large fire-cracked flagstone (1,300 g) with a charred blubber crust forms the floor, and on top of this, as well as in the area bordering Feature A4, several fire-cracked gneiss and granite rocks (92 stones, 15,440 g), and a few fire-cracked flagstone fragments (3 stones, 1,020 g) are found. The turf matrix in this zone is mixed with charcoal and large twigs, as well as a few flakes. The sediments below Zone A5 (Layer 15a/18) and the subsoil gravel are cemented by congealed blubber.

Immediately south of A5 a substantial number of fragmented, fire-cracked rocks (74 stones, 14,850 g) and flagstone fragments (2 stones, 650 g) with charred blubber crusts are located within an area of about a quarter of a square metre.

A3–5 is interpreted as a complete midpassage structure consisting of three linked zones reflecting different activities – two fireplaces with lots of fragmented, fire-cracked rocks and flagstones divided by a pebble 'pavement' – and an area in front of Zone A5 representing several episodes of clearing. The microstratigraphy of Zone A5 suggests at least two phases of use: during the first phase a large flagstone was used for roasting meat/blubber, and the second phase involved the heating of fist-sized rocks and a few flagstones. The vivianite precipitations on some of the stones result from a high concentration of decaying phosphate-rich organic matter inside the midpassage. The third and last phase of A3–A5 is demolition: most side stones, at least of the eastern edge of the midpassage, were scavenged.

5.1.1.4 Feature A6: a heap of dumped fire-cracked rocks

A6 is a heap of fist-sized, fire-cracked gneiss and granite rocks (13 stones, 6,300 g) and angular fragments (40 stones, 7,780 g). Thus in total the dump contained 53 stones weighing 14,080 g. The turf sediment of this feature is characterized by *not* containing charcoal and charred blubber pieces, showing that the rocks in this heap were 'clean', except for some with thin blubber crusts, when they were dumped. The heap was *c.* 80 cm in diameter and delimited to the north by a number of large angular boulders. A6 could represent a single dumped portion of rocks used for boiling water in a skin bag.

5.1.1.5 Feature A7: a heap of dumped fire-cracked rocks

A7 is comparable to A6. A7 consists of angular fragments of fire-cracked rocks (58 stones, 8,760 g), round fist-sized and larger fire-cracked rocks (7 stones, 2,740 g), and small flagstone fragments (7 stones, 1,500 g) – in total 72 stones of gneiss and granite, weighing 13,000 g. The heap is about 60 cm in diameter and like A6 it is delimited to the north by a few angular boulders. No charcoal or charred blubber is contained in the turf sediment covering the feature, which is interpreted as a dump of a portion of exhausted 'boiling stones' equal to A6.

5.1.1.6 Feature A8: a midpassage structure with a complex history

Feature A8 is situated in the eastern part of Area C. It is a complex midpassage structure showing different phases of use. Special attention was devoted to careful excavation of this complex feature. The microstratigraphy inside the feature and the position of every stone were recorded in drawings and vertical photos, and all rocks and sediments were gathered and kept for current and future analyses. A8 was later carefully rebuilt as part of an exhibition at the local museum, using the original stones.

The longitudinal axis of A8 is oriented north–south. It is *c.* 280 cm long and 100 cm wide (external measurements) and consists of two parallel rows of large, upright slabs, which in the preserved northern end are set about 60 cm apart (inner sides). The south part of the structure was obviously scavenged for slabs during the last phase of use, resulting in a scattering and levelling of the heap of fire-cracked rocks in this 'back part' of the midpassage. For analytical reasons, A8 was divided into four different zones starting from north (Fig. 5.5a):

Zone 1: This zone is delimited to the north by a row of three or four large angular stones behind which the front of the midpassage seems to have fallen in. This 35 cm wide zone consists of fist-sized and larger, mostly fire-cracked rocks (58 stones, 19,620 g), mainly of granite, and flagstone fragments (2 stones, 1,200 g). A double end-scraper handle with two small end scrapers close by was uncovered at the front (northern end) of Zone 1.

Zone 2: This zone between the large upright side slabs is characterized by a 'pavement' of light-coloured round beach-cobbles, which generally appeared fresh (not fire-cracked). These nut- to child's-hand-sized cobbles amount in total to 174 stones (weight: 10,950 g). The turf matrix among the cobbles does not contain charcoal. Two large flagstones with blubber crusts on the undersides cover a shallow pit in the central part of the beach-stone paving. The pit contained small bone fragments, a little charcoal and a few flakes. A large flagstone – a grinding stone – covers the southern part of the beach-cobble pavement. Some of the upright side stones of the midpassage are stabilized by fire-cracked rocks and flagstone fragments placed on the outside or beneath the slabs.

Underneath the pavement a heap of fist-sized and larger, fire-cracked gneiss and granite rocks,

a.

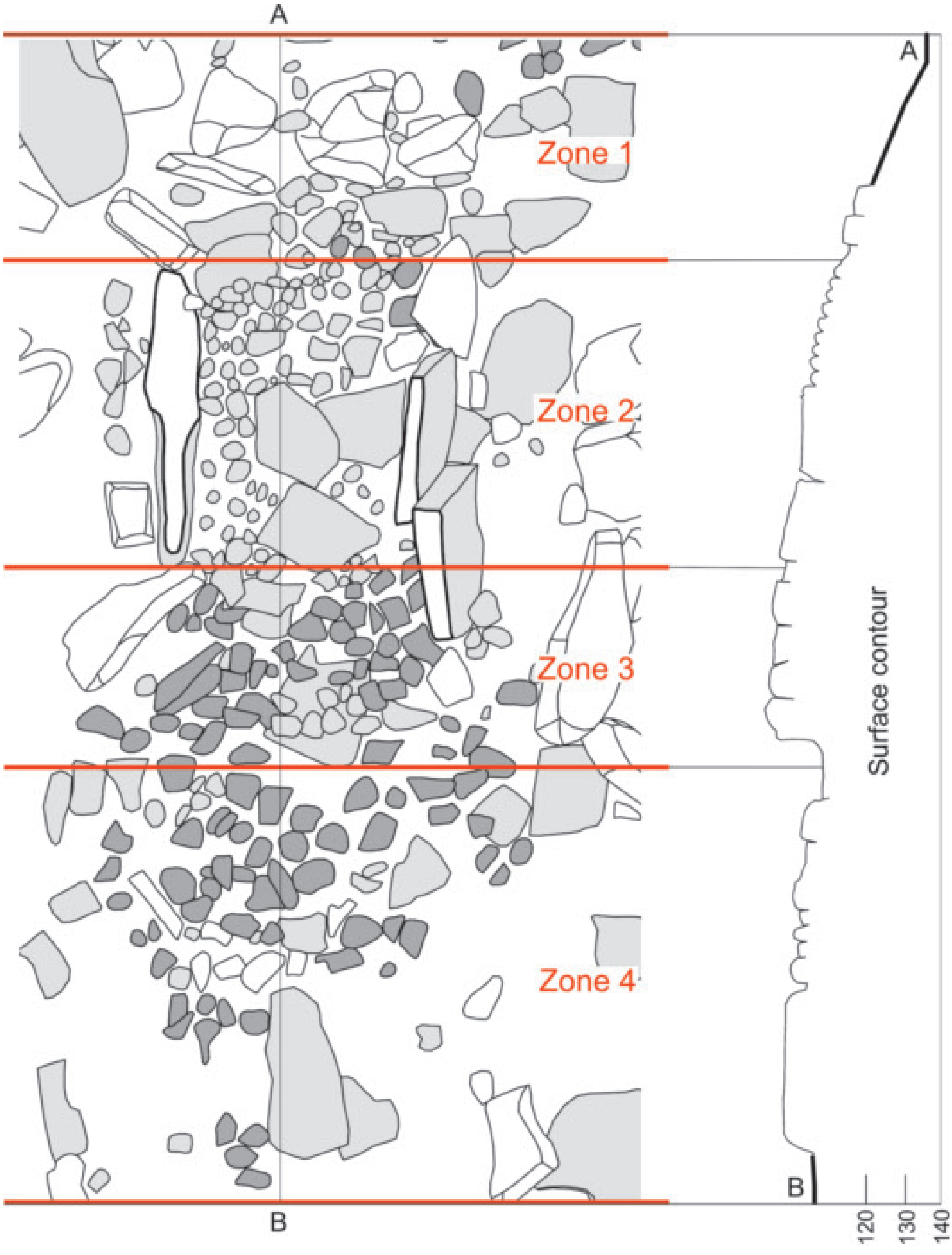


Fig. 5.5
a: *Plan drawing of Feature A8 with the division into zones.*

angular fragments, and flagstone fragments with crusts of charred blubber (78 stones, mainly of granite, weight: 23,385 g) is found. The sediment in this heap consists of charcoal-mixed turf and some bone fragments. Inside this a *thin, dense layer consisting of caribou hair*, some small feathers, and a few bone fragments is located (Fig. 5.5b).

Zone 3: This zone consists of a mixture of fire-cracked, fist-sized rocks (193 stones, mainly of granite) and flagstone fragments (12 stones) with charred blubber crusts. Total weight: 76,295 g. The matrix – as in Zone 2 – consists of turf containing charcoal and bone fragments, and below this – in the eastern part of Zone 3 – a *patch of animal hair (probably seal hair)* c. *40 cm in diameter* is located (Fig. 5.5b). The bottom layer below the hair patch consists of a charcoal lens containing hair, feathers and bones. This layer covers a complete, hafted knife with preserved baleen lashing (Fig. 3.59a1). The knife sits on the top of Layer 15a, on which A8 was built.

Zone 4: Zone 4 is a round heap, about a metre in diameter, of fire-cracked rocks and flagstone fragments (203 stones, the majority of granite, weight: 88,145 g) of the same character as in Zone 3. Zone 4 also contains five large fire-cracked flagstones with blubber crusts (weight: 11,000 g). The turf sediment contains charcoal, bone fragments and feathers, and the entire heap rests on a blubber-cemented part of the turf layer, on which the midpassage is built (Layer 15a). The top level of Zone 4 is a few centimetres lower than the top of Zones 2 and 3.

Twigs and charcoal lenses: The northern part of A8 and the area in front of it (Zones 1 and 2) was covered by a layer of twigs (mainly unburnt) several centimetres thick, containing some charcoal. Immediately north and north-east of A8, the turf was almost paved with fragmented, angular fire-cracked rocks and flagstones, and this pavement was covered with a massive charcoal 'lens' up to 10 cm thick (Layer 17), which touched the front of A8. This must be seen in contrast to the southern periphery of the midpassage, where hardly any twigs and charcoal and only a few fire-cracked rocks were located, around Zone 4.

A number of wooden stakes were found in the periphery of A8, particularly the southern part (Fig. 5.5b). Six pointed distal ends of stakes were stuck into the turf floor (Layer 15a) close to each other at the south-east border of Zone 4, and a dozen stake fragments, many with pointed distal end, were lying in a horizontal position, pointing in different directions, along the entire periphery of Zone 4.

It emerges clearly from the condition of the feature, as well as the microstratigraphy, that the appearance of A8 is a result of several episodes of use, and ultimately the scavenging of slabs and rocks, which were used in other stone-built structures on the site. Finally, natural post-depositional processes may have played a role in compressing the layers and distorting the front of the feature.

The history of A8: The following interpretation of the history of A8 is based on data collected by the excavator of the feature (Erik Brinch Petersen; see also Odgaard 2003):

Phase 1: Construction of the midpassage

A8 was constructed as two parallel rows of upright slabs stabilized with supporting stones and forming a passage which was about 60–70 cm wide and 280 cm long. The length is estimated from the slabs in secondary position to the east of Zones 3–4. The passage was probably closed by slabs and boulders at the front (north end), but no slabs or traces of removed slabs are left which could suggest a division of the passage into separate apartments or a closing of the south end of the passage. A remarkable find was made in the lowermost level of Zone 3: here a resharpened, but still usable and complete knife with wooden handle and baleen lashing, mentioned above, was located. It was covered by a layer of charred twigs, but not damaged by fire itself. This knife must have been placed deliberately at the bottom of the feature and might represent a symbolic event before or during the construction phase.

b.

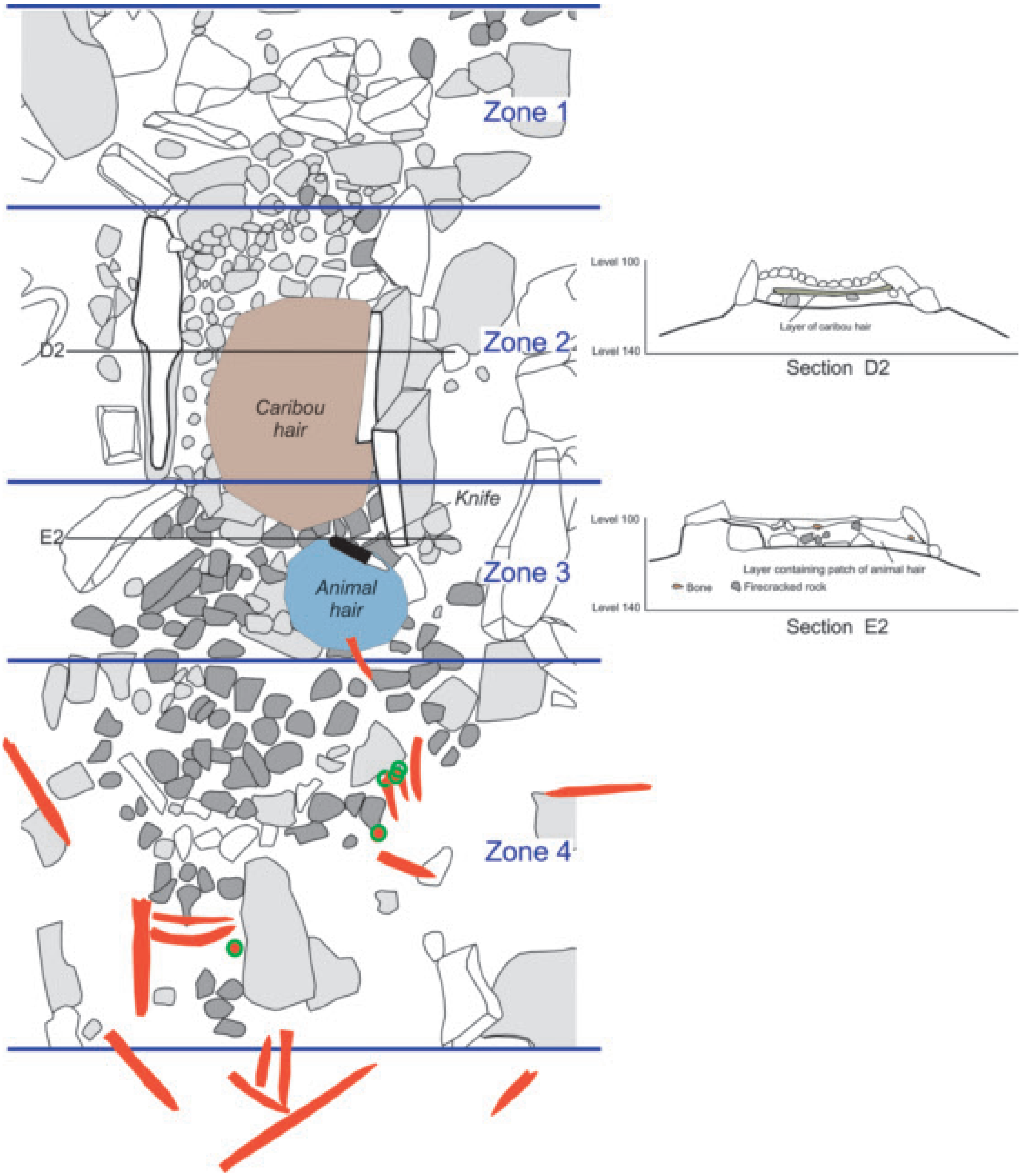


Fig. 5.5
b: *Plan drawing of Feature A8 showing the position of the patches of animal hair, poles and an intact hafted knife. A green ring at the end of a pole marks that the pole is in a vertical or almost vertical position. (Digitization based on Erik Brinch Petersen's archaeological records).*

Phase 2: Heating of rocks and boiling in skin bags

Within the passage one or more fires were lit. They were mainly fed with twigs from local dwarf scrub and some driftwood pieces. Fist-sized rocks were heated in order to be used primarily for boiling water and meat in skin bags in Zones 2 and 3. This interpretation is based on the fact that, among fragments of fire-cracked rocks and charcoal, the lower layers here contained lots of hair. In fact, each zone included a large patch of animal hair – caribou hair in Zone 2 and probably seal hair in Zone 3, which are probably remains of used and discarded skin bags. Ashes from the fires and other organic waste were swept away and covered the (sacrificial) knife in Zone 3.

Phase 3: Heating of rocks for drying activities and/or heating of the dwelling

The following phase of use is represented by a matrix of turf containing charcoal, charred blubber, bones and fire-cracked rocks covering all four zones in the midpassage. During this phase remarkable quantities of fist-sized rocks were heated in one or more fireplaces inside the passage. The major part of the more than 200 kg of fire-cracked rocks (544 stones, 207,445 g) from all zones of A8 were used during this phase, which probably represents several different events. The layer formed during this phase contained, as mentioned above, a lot of charcoal, charred blubber, angular fragments of fire-cracked rocks, bone fragments, and some hair and feathers. Based on this and the presence of congealed, blubber-soaked turf as well as blubber-cemented subsoil gravel underneath Zones 3 and 4 (in Layer 15a), it is clear that the events included the large-scale heating of rocks. Food preparation like the frying/roasting of meat containing blubber, in accordance with the many fragments of fire-cracked flagstones, and – as suggested by Odgaard (2003: 365) – the drying of meat on a rack over hot stones could explain these archaeological remains. The distal ends of slender wooden poles around Zone 4 could be interpreted as remains of a drying rack with a platform raised above the heap of hot stones in Zones 3–4. Here meat, as well as wet skin garments, could be dried. However, the main function of the huge numbers of rocks in the midpassage was probably to serve as a heat reservoir – a convection stove inside the dwelling providing a long-lasting radiation of heat (Odgaard 2003: 352). It is likely that the sweeping of used rocks and ashes from the fireplace inside the passage during Phase 3 resulted in the formation of the veritable pavement of exhausted, fire-cracked rocks in the area in front of (north east of) the feature covered by a 'fan-shaped' charcoal-dominated layer (Layer 17) immediately to the north-east of A8.

Phase 4: Construction of a 'working table'

During Phase 4 the surface of Zones 1 and 2 was levelled and covered by a carefully made paving consisting of about 11 kg of fresh egg-shaped beach stones (174 stones, 10,959g). This provided an even, clean and stable foundation for activities close to the heat sources in Zones 3 and 4. Finds of tools (scrapers, a burin, a blade) on top of the paving suggest that Zone 2 was a sort of work table. This cobble paving, including the shallow pit in the central area, would have been a perfect support for the characteristic wooden bowls with rounded bottoms. Supposing that these bowls contained soup, the platform in Zones 1 and 2 could also have been constructed in connection with food preparation, serving and consumption.

Phase 5: Frying on flagstones

The three large flagstones – two are fire-cracked and one is a large grinding stone – on top of the paving in Zone 2 represent activities during the last use phase of A8. The two fire-cracked flagstones show thick, charred blubber crusts on the underside. The easternmost flagstone rests on the side stone of the midpassage and is supported by a few cobbles underneath. Both flagstones cover a shallow pit filled with charcoal and bone splinters on top of the 'cobble platform'. Thus, the two flags could be interpreted as 'frying stones' on which pieces of blubber containing meat were prepared. After use, they ended up (probably upside down) on top of some refuse in the shallow pit. The grinding stone is evidence of the continued use of Zone 2 as a multi-purpose working table.

Phase 6: Demolition, decay and 'disappearance'
Following the last active phase of A8 the midpassage was dismantled (Phase 6). The side uprights of the southern part, Zone 4, were scavenged, probably to be reused in another structure at the site. For instance, several stones in the row north of A8 were originally used in fireplaces, as evidenced by blubber crusts on these stones. The demolition caused a spread and levelling of the heap of fire-cracked rocks in Zone 4, and several rocks which were not exhausted were probably incorporated in other fireplaces at the site. The northern front of A8 fell in during this stage. The 'ruin' of A8 must have been visible on the grass-covered site surface for several years, before it was completely overgrown by vegetation, mainly grass, forming the dense natural turf mat, Layer 15, which during a quiet period at this area of the site 'sealed' the entire H4 settlement surface. However, A8 and its neighbouring prominent structures, like A1, A2, A3–5 and A9, would have been visible as hummocks on the site surface for many years until they finally completely disappeared as they were covered by the thick waste heaps formed during the H3 period.

Fig. 5.6
Vertical photo of Feature A9, Zones 3–5 (Zone 1 and 2 towards north are still covered by upper layers at this stage of excavation). (Photo: Keld Møller Hansen).

5.1.1.7 Feature A9: a midpassage with a central chamber (Fig. 5.6)

A9 is a well-preserved midpassage structure showing a horizontal division into five zones. The structure's longitudinal axis is north–south, parallel to the other midpassages. It is *c.* 300 cm long and 88 cm wide (external measurements). From *north to south* the five zones are characterized as follows:

Zone 1: The top layer of this northernmost part of the structure consists of a layer of egg-sized rocks, both fresh and fire-cracked, as well as angular fragments of larger fire-cracked rocks in a turf sediment with a high content of twigs (upper part of Layer 16). These rocks sit on top of a thin layer of pea- and nut-sized light beach pebbles mixed with some small twigs and charcoal (Layer 16, lower part). It is estimated, from registrations in connection with the excavation of the units in front of Section C', that the fist-sized fire-cracked and non-fire-cracked rocks number about 30 (estimated weight: 4,500 g). The pebble lens in Zone 1 consists of hundreds of stones with a total weight of *c.* 5,400 g.

Zone 2: This zone consists of a frame or box constructed of nine large upright angular rocks and slabs in Layer 16 and on top of Layer 15a (see Section C' (Fig. 4.5)). The oval or rectangular chamber measures *c.* 60 cm × 40 cm (inside). The stratigraphy of this zone is identical with that of Zone 1: the top layer in this box consists of a few egg- and fist-sized rocks, some fire-cracked (3 stones, 1,100 g) and fire-cracked fragments of rocks (11 stones, 3,200 g). Below this layer the beach pebble lens or 'platform' (800–1,200 stones, 1,820 g), coherent with the one in Zone 1, covers the northern half of the chamber, and below this a layer of twigs with charcoal is found. Lots of small flakes, a couple of lithic tool fragments (a projectile point and a knife) and bone fragments are contained in the twig layer. The chamber was built on top of Layer 15a, which was characterized here by well-preserved leaves of lyme grass and mosses. The distal end of a wooden stake was stuck into Layer 15a at the eastern edge of the chamber.

Zone 3: This is a square box marked at each end by upright thin flagstones set at right angles to the side slabs of the midpassage. The box is *c.* 50 cm × 50 cm (inside) and about 15 cm deep. It is covered by a large heap of fist-sized, fire-cracked rocks (7 stones, 2,450 g) and angular fragments of these (117 stones, 16,620 g) as well as flagstone fragments, some very large (22 stones, 16,660 g) and many showing crusts of charred blubber. Below this layer, two large flagstones with charred blubber crusts on the upper side (1,300 g) and three angular, fire-cracked slabs also with blubber crusts (6,250 g) are located. They cover most of the box area. These flags sit on top of a layer of fist-sized, fire-cracked rocks (4 stones, 2,680 g), angular fragments (30 stones, 3,950 g), and a single flagstone fragment (220 g) in a matrix of twigs, lots of charcoal, pieces of charred blubber, bone fragments, wood shavings and lots of small flakes. As in Zone 2 this sequence of layers sits on a layer of lyme grass leaves and moss (the top of Layer 15a), on top of which two arrow points were found. In total the box forming Zone 3 contains 186 mostly fire-cracked rocks and flagstone fragments (weight: 50,130 g).

Zone 4: This zone of the midpassage, 40 cm × 50 cm (inside) consists of a heap of fist-sized, mostly fire-cracked rocks (5 stones, 2,200 g) and angular fragments (102 stones, 15,360 g) as well as flagstone fragments (4 stones, 6,000 g) on top of a paving consisting of five flagstones (5 stones, 1,750 g), which are characterized by the absence of the 'obligatory' crusts of charred blubber. These flags form the bottom of Zone 4 and they are sitting on top of Layer 15a. The matrix in Zone 4 consists of twigs with a content of several small flakes and a few bone fragments. In total Zone 4 contains 116 rocks weighing 25,310 g.

Zone 5: Zone 5 forms the southern, open end of the midpassage. The zone measures about 90 cm in length and *c.* 44 cm in width at the northern end and 70 cm at the southern, open end. Thus, the midpassage widens slightly towards the south. The side slabs sit on top of Layer 15a. Only a few fist-sized, fire-cracked rocks (4 stones, 1,550 g), fragments of such rocks (19 stones, 2,830 g) and three flagstone fragments (3 stones, 1,750 g), in total 26 rocks weighing 6,130 g, and some bone fragments are located here. Pointed, distal fragments of wooden stakes sit in the turf (Layer 15a) inside the passage and at the southern border of this zone.

Like A8, Feature A9 is the result of a long series of separate events. However, A9 is remarkably well preserved and does not seem to have been exposed to demolition to the same degree as A8.

The focus of activities was Zone 3, the central box hearth. Here traces of fire are found all the way through the sequence, starting with *Phase 1*: heating of fist-sized stones (lots of charcoal and charred blubber in the bottom matrix). These hot rocks could have been used (as in A8) in connection with boiling in another zone of the midpassage. This activity was followed by the heating of large flagstones showing thick blubber crusts, i.e. 'frying stones' used for meat containing blubber or fat (*Phase 2*). As indicated by the microstratigraphy in Zone 3, the last use phase (*Phase 3*) consisted of the heating of large quantities of fist-sized rocks intended either for boiling, drying activities or heating of the dwelling by convection.

The northern zones reflect this sequence of events. Here, the lowermost layer of the 'chamber' in Zone 2 and the area in front of this, Zone 1, consists of unburnt twigs with a high concentration of charcoal. This could result from a mixture of a clearing of platform cover material (the unburnt twigs) and clearing of ashes and other refuse from the initial fire of Phase 1 with the purpose of heating 'boiling stones'. The flagstone-paved area forming the bottom of Zone 5 might belong to Phase 1 as well.

The thin beach-pebble layer covered the lowermost 'ash layer' in Zone 1 and 2, and this 'platform' could thus be associated with the Phase 2, where the large flags, the 'frying stones', in Zone 3 were used. The beach pebble lens is, as with that in A8, interpreted as a platform for the wooden bowls and trays of the household, i.e. for food preparation and serving.

Finally, the last series of events, including the heating and use of large quantities of rocks (Phase 3), are detected in Zones 1 and 2 represented by the layer of egg- and fist-sized rocks (mostly fire-cracked) in a matrix of twigs and charcoal on top of the beach-pebble platform.

It is not possible exactly to correlate events connected with the open southern end of the midpassage (Zone 5) with the three phases described above. The stake ends sitting in vertical or angular positions in this zone could indicate the presence during one of the phases of a rack raised above Zone 5.

5.1.1.8 Other stone- and turf-built features on the H4 site surface

The remainder of the stone-built structures belonging to H4 consist of straight or curved rows of angular boulders or large flagstones.

Six large angular rocks and three large flagstones form a 2.5-metre-long straight row between the front (north end) of midpassage A8 and the south-east corner of midpassage A9. The random distribution of blubber patches on the upper as well as the lower sides of these flagstones indicates that they were used as 'frying stones' or side stones in different midpassages before they ended up in this row. The westernmost boulder in the row partly overlaps a side-slab of A9, indicating that the row was constructed later than A9 and that it should be connected with A8. Whatever the circumstances, both midpassages, A8 and A9, must have been visible at the time of the construction of the row.

The row is interpreted as part of a tent ring belonging to A8. It is difficult to trace other parts of this tent ring supposed to surround A8 as most of the remaining big, angular rocks, which must have been 'building materials', are lying scattered on the surface as a result of complex reuse activities. However, a curved row of quite large stones can be seen in the south-eastern- and easternmost part of the excavation area, and this row was probably part of the 'tent ring' around A8. As it appears from Chapter 5.1.1.9 below, this interpretation is supported by evidence from the distribution of preserved tent poles, waste and artefacts.

A short (1.5 m), slightly curved row consisting mostly of flagstones (eight stones, without blubber crusts) is found in the area between A1 and A8. The row does not overlap any of the stones belonging to A8 or the neighbouring features, and thus it is not possible directly to connect this construction to a specific feature.

A couple of flat turf 'hummocks' are important parts of the H4-surface as well:

At a distance of about 50 cm from each long side of the midpassage the surface is a few centimetres elevated. The outer limits of these two elevated areas (1.5–2 m in diameter) were difficult to assess and were not always identified during the early stages of the excavation. Later in the process these areas attracted attention in connection with an investigation of the transition between Layer 16 and Layer 15a. These low 'hummocks' of remarkably tough turf were described as consisting of several (five or six) very thin layers of grass turf or patches of lyme grass alternating with thin layers of twigs of dwarf shrubs. The western elevated area was characterized by quite long twigs concentrated in flat 'bundles'.

A comparable complex microstratigraphy within 'hummock' a few centimetres thick was recorded in the 1.5-metre-wide area between

A3–A5 and A9 (and thus underneath the dump of fire-cracked rocks (A2)). Here the top layer, Layer 15a, consisted (from top down) of a thin layer of moss turf, a thin grass turf 'mat', a thin twig layer and below this a tough layer of lyme grass.

These 'lamella-like' alternating sequences are obviously not natural growth horizons. They are most likely traces of low platforms, which were built from grass turf or -hay, moss, lyme grass and twig 'mats'. The complex sequences must reflect several subsequent episodes of clearing and renewal of the turf/twig platforms.

5.1.1.9 Summary of the stone-built features of H4: a complex settlement surface (Fig. 5.7)

In Area C, H4, we hoped to uncover a single dwelling floor. But we were of course confronted with a much more realistic archaeological situation: as seen from the descriptions and analyses above, the H4-surface is quite complex. It reflects a series of interwoven events and cycles of use and reuse of stone-built structures, which in turn reflect overlapping activities throughout a certain time span.

However, the efforts of careful excavation

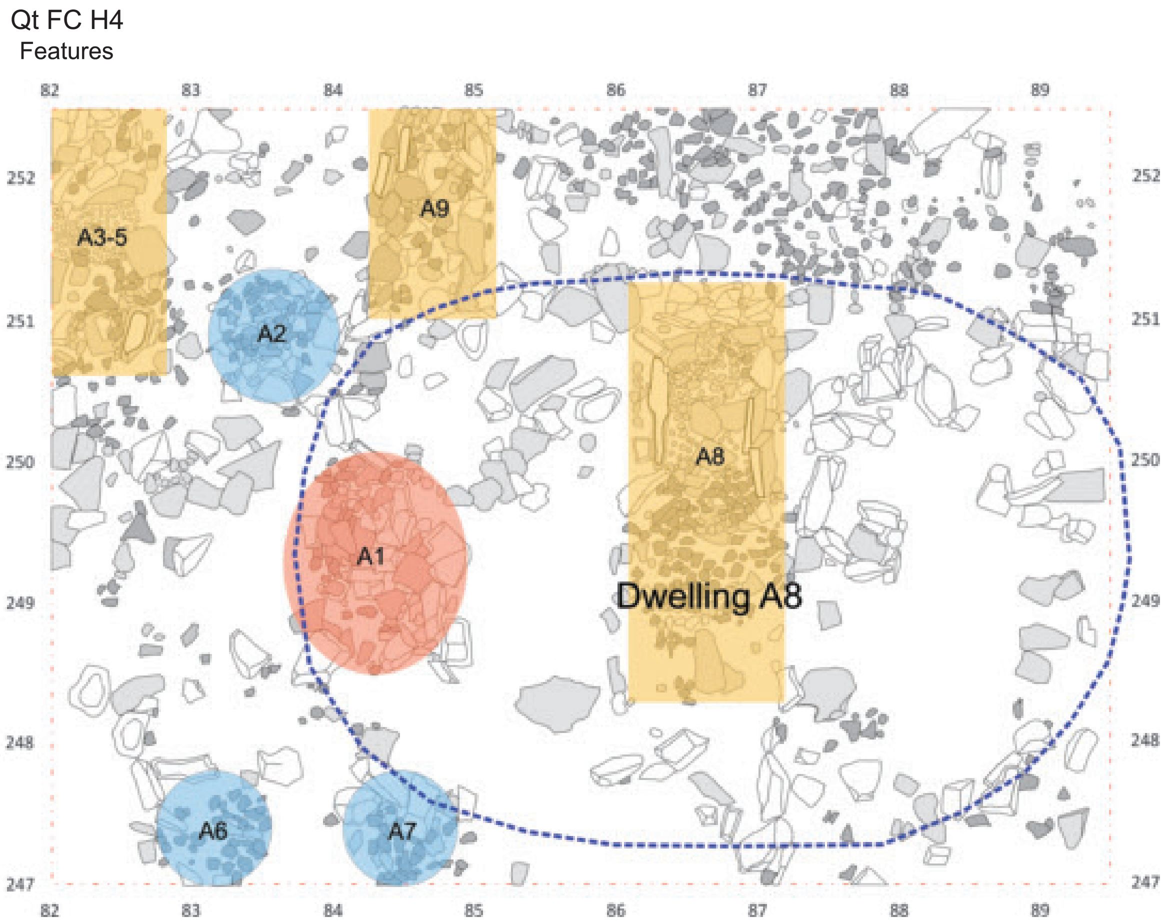


Fig. 5.7
Interpretation of the stone-built features in Horizon 4:
Blue, dotted line: the approximate outline of Dwelling A8 containing midpassage A8 and a turf-built platform on each side of the midpassage. Beige squares: midpassages.
Red oval: oval stone-framed hearth. Blue circles: dumps of fire-cracked rocks.

were not in vain. The surface, which we uncovered below the later culture layers, provides a picture of a 'typical' site surface showing a number of well-defined features, which were constructed within a relatively short time span. This is concluded from detailed studies of the formation of the culture layers. The H4-surface shows structures at different stages of active use, scavenging, decay and overgrowth, but all structures and much 'waste' must have been visible on the surface of the settlement during this phase at the site.

The midpassages:
The H4-surface contains three midpassage structures A3–5, A8 and A9, which by their microstratigraphy demonstrate complex histories of construction and use. They have several characteristics in common:

– All three midpassages are oriented along a north–south longitudinal axis (at right angles to the northern beach).
– They consist of two more-or-less parallel rows set of quite large upright slabs. The slab stone frames are about 60 cm wide (inside) and 200–300 cm long.
– The midpassages are divided, often by slabs, into three to five sections or 'zones' with different architecture and content.
– Each midpassage shows traces of one or more regular fireplaces or hearths (as seen from concentrations of charcoal, charred blubber fragments and congealed blubber in the soil below).
– They all show a zone (about 60 × 60 cm) packed or paved with fresh beach pebbles (from pea to egg size).
– All midpassages show evidence of multiple use and marked changes of activities: careful studies show that there are several 'micro-layers' within most of the zones.
– Clearings of hearths are evidenced by massive charcoal 'lenses' inside and in front of the midpassages, organic waste (small bone fragments, feathers, etc.) and large numbers of fire-cracked rocks in secondary positions.
– Very large amounts (at least 60 kg in A3–5, 92 kg in A9 and more than 200 kg in A8) of fist-sized rocks were heated and/or used as heat sources in the midpassages.
– 'Frying stones' in the shape of large flagstones and fragments thereof with crusts of charred blubber are found in each midpassage.
– Large flagstones used as grinding stones are found in all three midpassages.
– A number of fragmented wooden stakes, typically with pointed distal ends (some in a vertical or oblique position), are positioned in the periphery of the midpassages

In addition, the individual midpassages hold important information:
The detailed documentation and study of A8 demonstrated a minimum of six phases of different use: 1) a construction phase where the frame was built of large slabs. Probably as an integral part of symbolic actions, a complete knife was deposited within the frame; 2) the first use phase included the heating of fist-sized rocks and boiling in skin bags by means of these rocks. This is indicated by patches of animal hair in the lower layers of two zones, fire-cracked rocks ('boiling stones') and charcoal; 3) the second series of use involved the heating of remarkably large amounts of fire-cracked rocks (in total more than 200 kg were found inside the midpassage) probably used for convection heating of a dwelling and/or for drying of wet skin garments and/or meat. A number of pointed distal ends of stakes around the southern part of the structure are interpreted as remains of a drying rack/platform raised above the heaps of heated rocks. A massive charcoal 'lens' in front of (to the north of) A8 and a remarkably massive 'paving' of fire-cracked rocks below it were interpreted as resulting from episodes of clearing of the midpassage. The intensity of these 'heating episodes' is underlined by the fact that the turf and subsoil gravel below the southern part of A8 is 'cemented' with congealed blubber oil, which soaked the sediments; 4) during the following episode a 'work table' consisting of a paving of fresh cobbles in the northernmost zone of the structure was constructed. This table, with its shallow pit on top,

was probably connected with food preparation and serving in wooden containers; 5) the last use phase included frying of meat/blubber on flagstones. They were found upside down on top of the 'work table'; 6) finally, the structure was demolished. Most of the usable flagstones from the frame and not-yet-exhausted fire-cracked rocks were removed to be utilized in new fireplaces and midpassages on the site.

A9 showed a particularly well preserved central box hearth with evidence of at least three series of use: first a phase during which fist-sized rocks were heated. This was followed by intensive frying of blubber-rich meat on large flagstone 'pans', and finally, again, the heating of large amounts of fist-sized rocks for boiling, heating by convection and/or meat drying. These three phases can to a certain extent be identified in the other four zones of this very long (three metres) midpassage, which, in comparison with A8, contained 'only' about 92 kg of fire-cracked rocks.

A3–5 showed a particularly carefully made 'work table' or platform of fresh beach cobbles. In contrast to the other midpassages, this zone was situated in the central part of the structure, demonstrating that the components of which a midpassage consisted could be combined in different ways. A3–5 contained in total about 60 kg of rocks including *c.* 15 kg immediately south of Zone A5.

The oval hearth:

A1 was interpreted as the remains of a hearth. The oval-shaped frame of slabs (65 × 50 cm) was initially used for heating 'frying stones' (flags) on top of embers. This was followed by probably several episodes of intensive heating of fist-sized rocks. In total *c.* 60 kg of these rocks were found inside and on top of A1. It was deduced that A1 during these phases was aimed at producing 'non-smoking' hot rocks to be used for heating dwellings by convection or boiling in skin bags.

The dumps:

The H4-surface contained three regular dumps. At 80 cm in diameter and with 45 kg of stones, A2 is the largest of the dumps. It consists of a mixture of exhausted fire-cracked rocks, a lot of fragments thereof, and fragmented flagstones ('frying stones') in a matrix of turf mixed with charcoal and bone fragments. This would be a typical result of the clearing of a midpassage or a hearth like A1.

A6 and A7 represent another type of dump. Containing 14 kg and 13 kg of fire-cracked rocks respectively, these dumps did not include charcoal or charred blubber in their matrixes, i.e. these dumps originated from activities in which 'clean', fist-sized rocks were utilized. These two neighbouring dumps could reflect the dumping of rocks used for boiling water in skin bags.

Evidence of dwellings:

It cannot be taken for granted that the presence of midpassage structures is direct evidence of dwellings on the H4-surface. It is important to include other pieces of information in the analysis of site formation:

The many angular/irregular light-coloured boulders and some flagstones were no doubt used as pole supports and weights on tent skins, and thus they were originally parts of tent rings belonging to dwellings in H4.

A regular straight row of boulders/flagstones overlapping the southern part of midpassage A9 and running past the northern front of A8 can be considered a 'fragment' of a regular tent ring. This probably belonged to a dwelling, which contained A8. Likewise, a curved stone row in the south-eastern part of the excavation area, starting at the southern end of A8, is interpreted as a fragment of the same tent ring.

Additional evidence of the presence of a dwelling structure in connection with A8 – named Dwelling A8 – is found in the shape of two slightly elevated areas at each side of the midpassage at a distance of about 50 cm from the side slabs. The outer limits of these turf-built, low platforms were difficult to define. Consisting of several thin, alternating layers of grass turf, twigs from dwarf bushes, moss and lyme grass, they were in their compressed state only about 10–15 centimetres high and 1.5–2 metres in diameter. These flat 'hummocks' were interpreted as traces of man-made platforms, which were symmetrically situated as 'lobes' on each side of the midpassage. The lamella-like microstratigraphy reflects several episodes of clearing, repair and rebuilding of these indoor platforms covered by mats of twigs and/or moss and lyme grass. Remains of a platform with a comparable microstratigraphy were located in the area between the midpassages A3–5 and A9.

A rough outline of Dwelling A8 emerges (Fig. 5.7): The 280 cm long and 80 cm wide (outer measurements) flagstone framed midpassage divided the floor into two parts. At each side, at a distance of about 50 cm from the side stones of A8, a low turf-built platform, covered with heather and lyme grass, was constructed. The areas between the flagstone sides of the midpassage and the platforms are interpreted as a small floor area covering the east, south and west sides of the midpassage. The front of the dwelling and the periphery of the eastern platform are marked by the remains of a tent ring of large stones, which appears quite straight along the front (north) side and curved along the back side. The western periphery of the tent ring was scavenged and disturbed by later activities, but the outline of the turf and twig platform here indicates that the dwelling was symmetrical in relation to the midpassage. Thus the dwelling plan is 'bi-lobate'. This interpretation implies that in total Dwelling A8 was about 3.5 m wide (north–south) and about 6 m long (east–west).

In an earlier chapter (3.6) a number of stakes were classified as poles for tents and racks. As mentioned there, a few of these could be difficult to distinguish from rough-outs for dart and harpoon shafts, but it was shown that generally these poles form a distinct type. The distribution pattern of distal fragments of tent poles with pointed ends (pointed stakes) in H4 adds important information to the description of the outline of the floor of Dwelling A8 and its superstructure (Fig. 5.8):

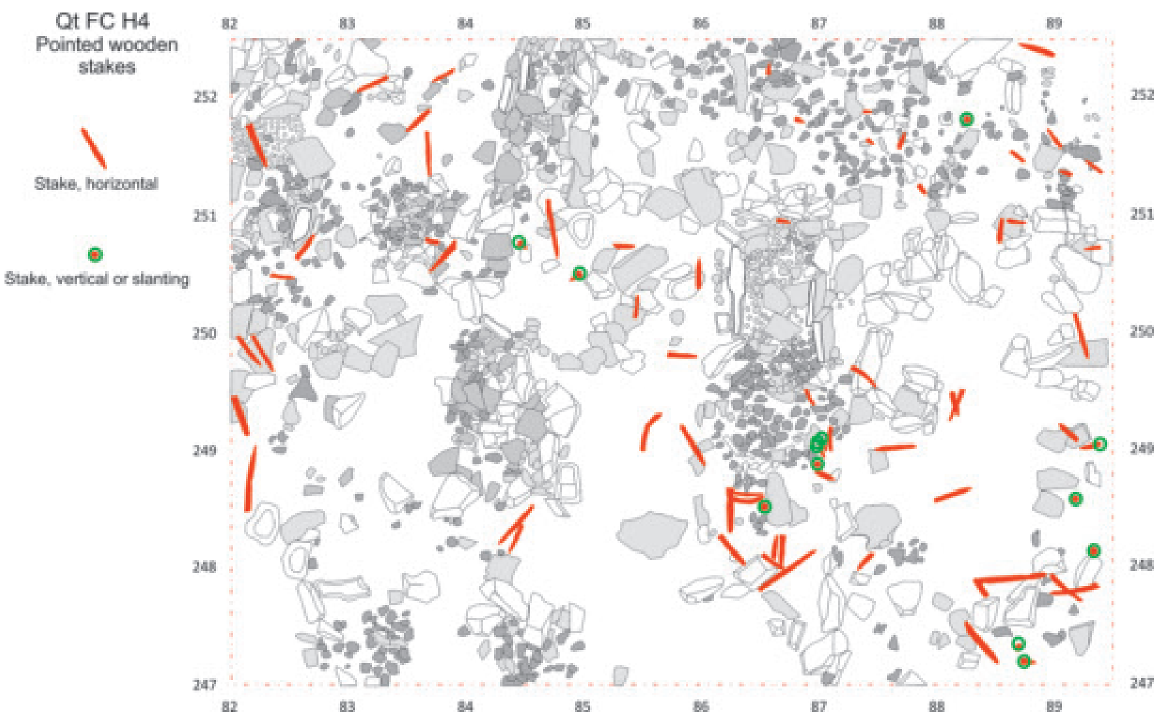


Fig. 5.8
Plan of Horizon 4, Area C, showing the position of fragments of pointed poles and stakes.

First, pointed ends of five thin stakes were located in a vertical or slanting position at the east side of Zone 4. Likewise, a vertical stake was found with its pointed end stuck from H4 into the turf layer below A8 (Layer 15a) at the southern end of the structure, where three or four pointed ends of stakes in horizontal (secondary) position are found as well. These slender poles are interpreted as remains of light wooden constructions – possibly drying racks – that were built and rebuilt several times during the 'history' of A8.

Next, a number of pointed pole or stake ends were found *in situ* in a vertical position in and along the south-eastern part of the stone tent ring supposed to belong to Dwelling A8. Exactly along this curved line several pointed pole ends in horizontal position were located as well. This distribution of vertical pole ends (primary position) and horizontal pole ends (secondary position) supports the interpretation that the outer limit of the midpassage dwelling was located right here. In accordance with this, the five or six pointed pole ends found along the prolongation of this curved line east and north-east of A8 could indicate the limit of the dwelling floor in this direction, but it must be mentioned that a number of short pointed pole end fragments in secondary horizontal positions were located in the workshop and dump zone north-east of A8, as well (see below).

The interpretation of the pointed wooden stake ends as remains of tent poles originally forming the superstructure of Dwelling A8 implies that the frame of the dwelling was quite light and consisted of slender stakes, which were each constructed of several components lashed together via scarf links. The use of such slender and flexible poles, which originally must have spanned a platform/floor area of about 6 × 3.5 m, shows that the superstructure of the dwelling was a dome rather than a cone. The frame of the large dome was thus constructed like an upside-down 'basket' of quite long, flexible stakes.

The distribution of pointed pole end fragments in the western part of the excavation area is difficult to interpret. The stakes cannot be associated with a particular midpassage. However, the round fireplace, A1, is situated in the centre of the arch-shaped pattern of pole end fragments (seen on Fig. 5.8), and it is suggested that this is a 'print' of an oval tent frame that once contained A1. A dump of partly exhausted 'boiling stones', A2, just outside its northern tent wall would then belong to Dwelling A1. In that case, the tent frame spanned a floor about 3.5 m east–west by 3 m north–south.

5.1.1.10 Evaluation of the temporal sequence of events connected with the H4-surface

As argued, the H4-surface is the end result of complex and overlapping construction, repair, dumping and scavenging activities. It is hard to distinguish the single events, which took place within a short time span. The evidence shows that even if the stone-built structures were not in use at exactly the same time, they were nevertheless visible and part of the micro-topography of the settlement surface.

The oval hearth, A1, and the large dump, A2, of fire-cracked rocks from a hearth nearby, probably Feature A1, are both placed on top of the turf platforms considered to belong to the midpassage dwelling containing A8 (Dwelling A8). Thus, A1 and A2 must represent some of the last events that took place during the H4 phase in this area.

The small dumps of 'clean' boiling stones, A6 and A7, are situated outside (south of) the western turf platform belonging to midpassage A8. This could indicate that they were established synchronous with Dwelling A8.

It is difficult to evaluate the temporal relations between the three midpassages. However, the row of stones running perpendicular to the front of A8 overlaps a side stone of midpassage A9. This, taken together with the fact that a heap of charcoal (Layer 17) originating in A8 and a 'pavement' of exhausted fire-cracked stones probably also from clearings of A8 fill in the area east of A9, indicates that A8 is the last of the midpassages exposed by the excavation.

In conclusion: the earliest stage of the brief

H4 settlement phase at Qt is represented by the midpassages, A3–5 and A9. They were probably integral parts of two, not exactly contemporary midpassage dwellings. Following a number of use phases including repair, functional changes and several clearings, they were abandoned in favour of the construction of the midpassage dwelling containing A8, Dwelling A8. After a long series of use phases resulting in repeated clearings of the midpassage, renewals and clearings of the turf platforms on each side of the midpassage and dumping of charcoal and used boiling stones in front of (north of) Dwelling A8 as well as behind the dwelling (A6 and A7), this dwelling was abandoned. Subsequently, midpassage A8 was scavenged for flagstones and fresh fist-sized 'boiling stones'.

The abandonment of Dwelling A8 was probably directly followed by the construction of an oval fireplace, A1, on top of the former western platform of Dwelling A8. Waste from the clearing of A1 was dumped close by (A2) in between the two earliest abandoned midpassages (A3–5 and A9).

However, it must be kept in mind that the 7.5 × 5.5 m Area C only represents a small 'window' in the complete settlement surface of H4. Much archaeological evidence on stone-built structures and details of the temporal aspects of H4 are still hidden below the later waste heaps and turf layers covering this quite early site surface.

The intricate series of events evidenced by the stone-built structures and the relatively small excavation area limit the range of the following investigation of the spatial distribution of artefacts and waste on the H4-surface. However, in spite of the complex situation we are able, through the spatial analyses referred to in the theoretical/methodological Chapter 3.1 above, to throw at least some light on the daily life in and around the H4 structures.

5.1.2 Spatial analyses, H4

5.1.2.1 Introduction

The particular quality of the Qt material is that organic components – wood, bone, antler

Fig. 5.9
Aappaa Magnussen excavates the eastern part of the floor of Dwelling A8. Artefacts and bones are still in situ (1985).

etc. – can be subject to spatial analyses. This opens up new insights into behaviour inside Saqqaq dwellings (Fig. 5.9) and provides a glimpse of activities in the dump- and workshop areas immediately outside the dwelling.

While analysing the distribution patterns of artefacts and waste on the H4-surface certain biasing factors must be kept in mind:

First and foremost the south-westernmost part of the excavation area did not contain a complete sequence of layers and the preservation conditions for organic matter in this area were quite bad due to absence of or unstable permafrost. Thus, the lack of finds in this part of the excavation area – roughly delimited by a line from 82/249 – 86/247 – is predominantly a result of preservation and probably natural transportation of material down slope as well, and thus not prehistoric behaviour.

Secondly, the surface formation of H4 is complex, resulting from several overlapping events – processing of materials and food and clearings – which cannot in all cases be connected solely to Dwelling A8. However, as it will appear, activities inside Dwelling A8 certainly seems to be the main contributor to the spatial patterning of tools and waste on the eastern part of the surface.

Thirdly, the excavated area only covers a fraction of the surface outside the A8-dwelling itself: one-and-a-half-metre to the north and just a small area in the south-eastern corner of Area C. Obviously, one could, as mentioned above, have wished for a much larger 'window', but within the frames of the Qt-project it was not possible to expand Area C further due to the fact that the areas outside the 'tent ring' of Dwelling A8 in easterly directions were covered both by permafrozen later Saqqaq layers (mainly the huge pile of fire-cracked rocks of H2, see Fig. 4.6) and by the 'blubber-cemented' peat layers of H3. Nevertheless, through visual inspection of the distribution patterns of the different tool and waste categories we are able to identify some significant spatial patterns.

5.1.2.2 Wood-working

Wood-working activities are directly and indirectly reflected in the distribution of wood shavings, split pieces and a variety of reworked/discarded shafts and stone tools. The wood shavings in Area C, H4, in total 6,518 stones, were mapped in a quarter-square-metre grid. They were distributed as shown in Fig. 5.10, from which it appears that a remarkable concentration was found in the area in front of (north of) Dwelling A8. Delimited to the west by the side stones of A9, this zone was, as described in Chapter 5.1.1.9 above, characterized by its 'pavement' of exhausted fire-cracked stones and the charcoal layer (Layer 17) which covered it. In between and on top of the pavement large amounts of wood shavings were found. The heap of shavings, with its 300–400 shavings per unit in and around the 87,5/251,0 unit, is described in the excavation record as a 'carpenter's workshop'. Wood shavings are soft and pleasant to walk on and thus it is inferred that the distribution pattern of these reflects the original position of the workshop in front of Dwelling A8. Very little wood-working took place inside A8, but a concentration of shavings along the tent ring in the south-eastern corner of the excavation is seen.

Split wooden pieces (4,900 pieces in total) belong primarily to the stage of tool production preceding the careful adze work that produced shavings. The distribution of split pieces confirms that the first steps in wood-working also took place in front of Dwelling A8 (Fig. 5.11). In accordance with the pattern of the shavings, a remarkable concentration of split pieces is present along the inside as well as the outside of the south-eastern and eastern part of the tent ring. This could reflect both the clearing of the eastern platform area and the working/dumping of wood debris immediately outside the tent wall. A small but distinct concentration of split pieces is seen on the west side of Zone 4 of midpassage A8, the back part of the midpassage, and there is also a small heap immediately west of the fireplace, A1. Split pieces are potential firewood, and the

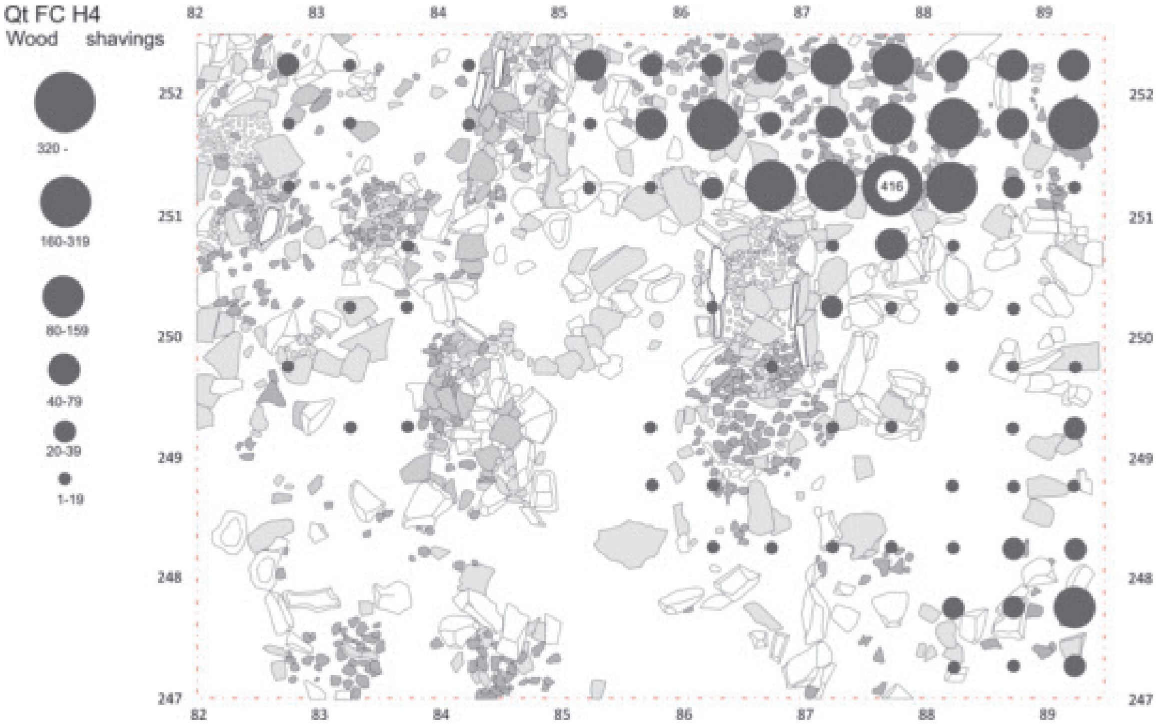


Fig. 5.10
Spatial distribution of wood shavings, Horizon 4.

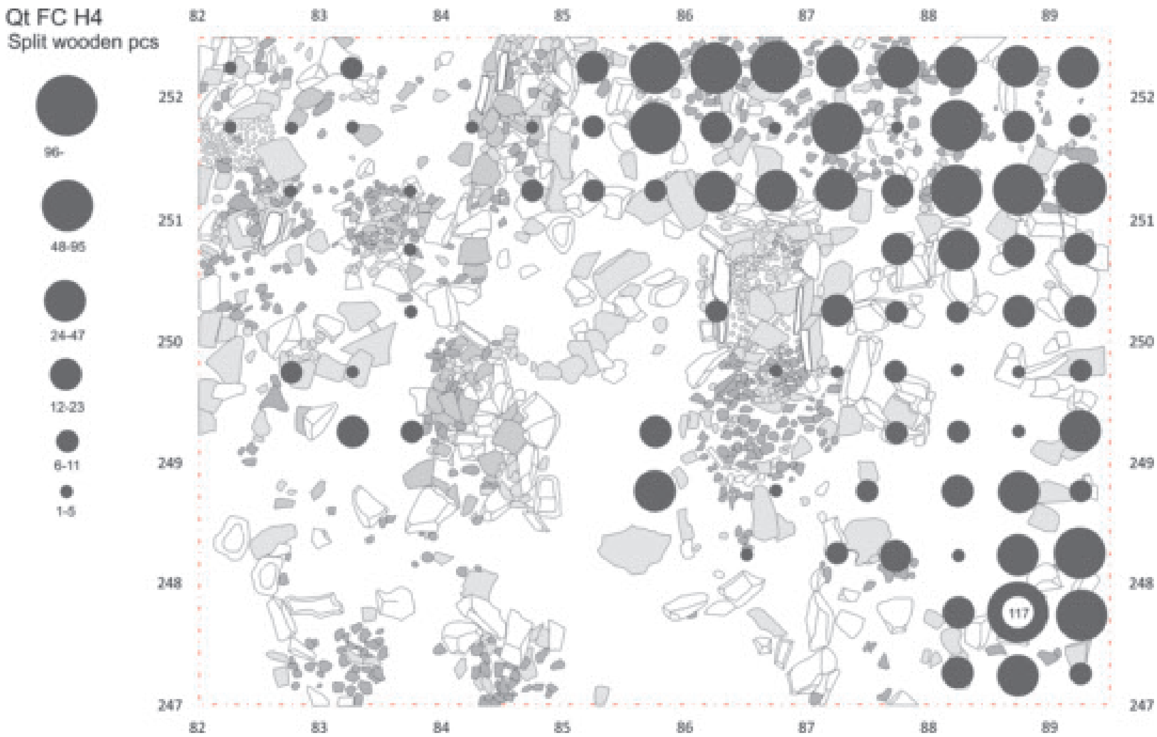


Fig. 5.11
Spatial distribution of split wooden pieces, Horizon 4.

distribution of these inside the dwelling, where only a few wood shavings or none were found, might show that small piles of firewood were placed right next to the fireplaces.

Lithic adzes, bone and antler wedges and chisels, and pumice graters are connected to Saqqaq wood-working. Based on work traces on wooden implements and indications from microwear analyses it is assumed that lithic end as well as side scrapers were used to work driftwood into wooden tools like shafts, bows, bowls and scoops. The spatial distribution of these tool categories (Fig. 5.12; Fig. 5.13; Fig. 5.14) reflects where they were ultimately discarded and not necessarily where they were used for wood-working. However, some patterns can be detected:

Four out of six pumice graters, probably used for the final surface treatment of round shafts, are located inside midpassage A8, partly on top of what was interpreted as a 'work table' (Zone 2) and partly in the back part of the passage. None were found in the wood-workshop area in front of Dwelling A8. Pumice graters are indeed represented only by a few specimens, but the distinct distribution pattern of these might indicate that the delicate process of finishing the surfaces of wooden tools mainly took place inside the dome next to the fireplace.

This evidence is supported by the side scrapers, which are assumed to have been used in the process preceding the final polishing of round shafts with pumice graters. The side scrapers are, like the pumice graters, concentrated inside and along the sides of A8 and are not found in the workshop area in front of Dwelling A8. A couple of side scrapers ended up together with lots of other tools and waste along the eastern part of the tent ring of Dwelling A8.

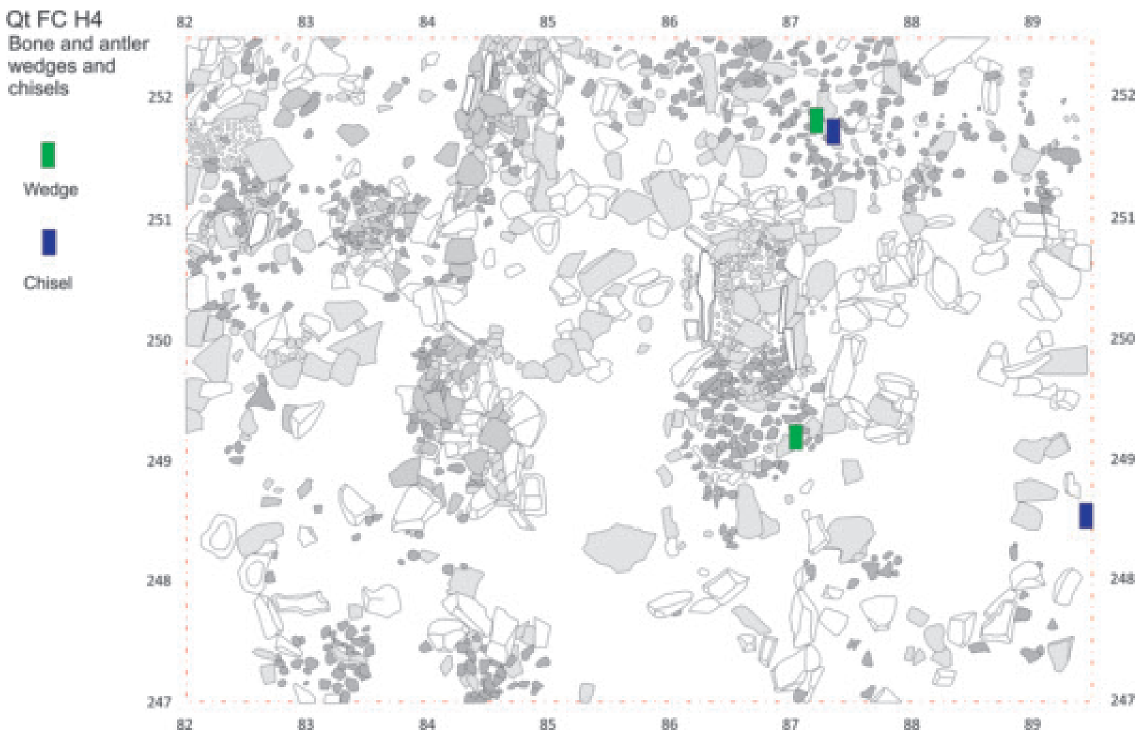


Fig. 5.12

Spatial distribution of bone and antler wedges and chisels, Horizon 4.

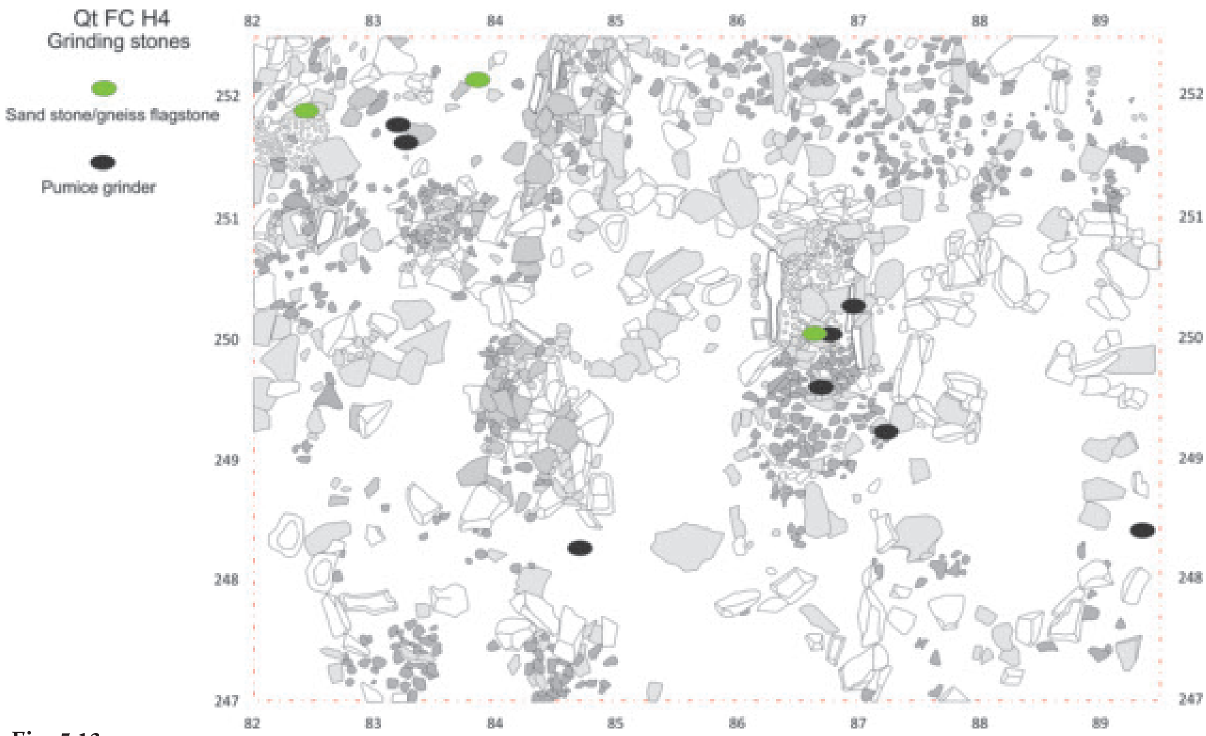


Fig. 5.13
Spatial distribution of grinding stones and pumice graters, Horizon 4.

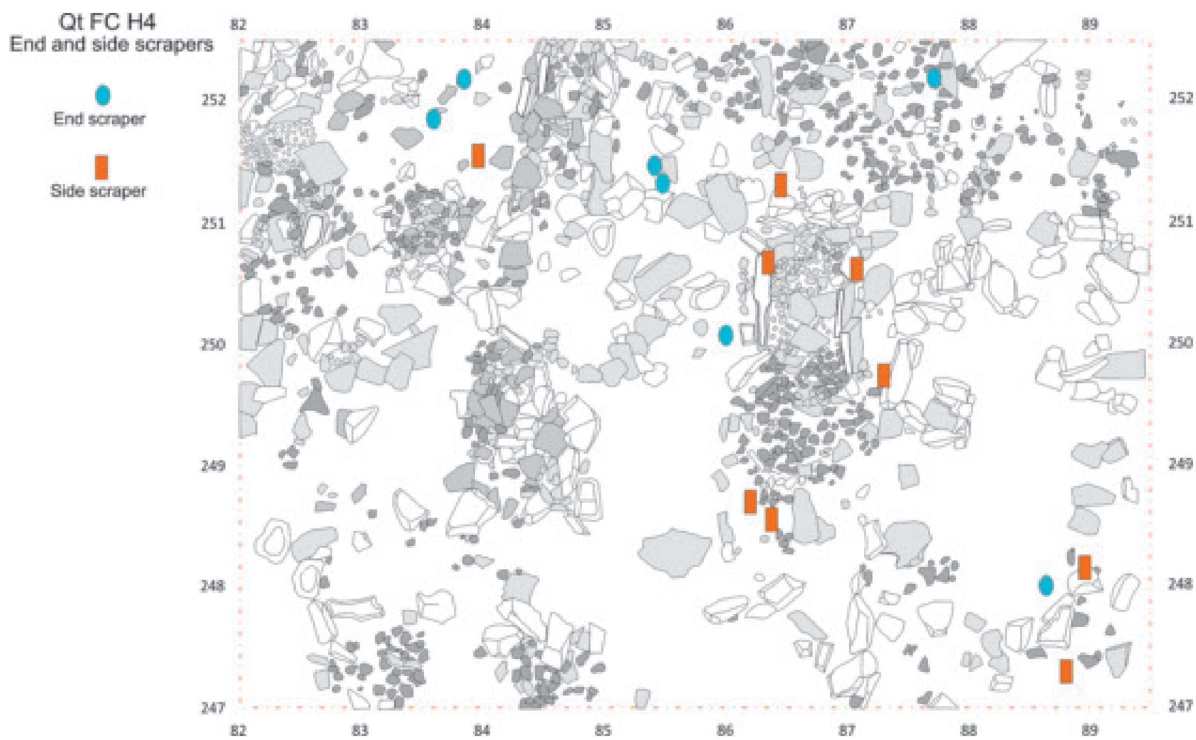


Fig. 5.14
Spatial distribution of end and side scrapers, Horizon 4.

The spatial distribution of the two adze heads, two chisels and two wedges, as well as seven end scrapers, is not significant. These tools are located both inside and outside Dwelling A8. But again, they are almost exclusively found in the eastern part of the dwelling – on the floor next to the midpassage or in the fringe of the eastern platform along the tent ring, but never on top of the platform itself. A few end scrapers were located in the wood-workshop in front of Dwelling A8 and in the area next to the midpassage A9.

5.1.2.3 Bone and antler working

Bone and antler processing is reflected in the presence of preforms/blanks, split pieces and shavings of these raw materials. According to work traces on blanks and objects at different stages of finishing and resharpening, the burin was an indispensable lithic tool for working these hard organic materials. Thus the spatial distribution of waste from production of bone and antler tools and burins – and the products of the resharpening of the burins, the burin spalls, were mapped (Fig. 5.15; Fig. 5.16).

Bone and antler waste in H4 is quite sparse (20). Most of the pieces are found in front of Dwelling A8 and in the fringe area of the eastern platform. The burin spalls (21) are very small and, in line with other micro-debitage, they are considered to have been dropped and largely remained at the spots where the working processes originally took place. Thus the distribution shows that intensive bone-working took place close to the south-eastern side of the midpassage A8, to some extent in the area in front of Dwelling A8, and right next to the midpassages A9 and A3–5.

The distribution of the burins themselves (34, including a hafted specimen, plus two wooden burin hafts) partly confirms that working of bone and antler took place in the 'workshop area' in front of Dwelling A8 and inside, to the east of the midpassage. However, several exhausted burins, including a wooden haft and a hafted

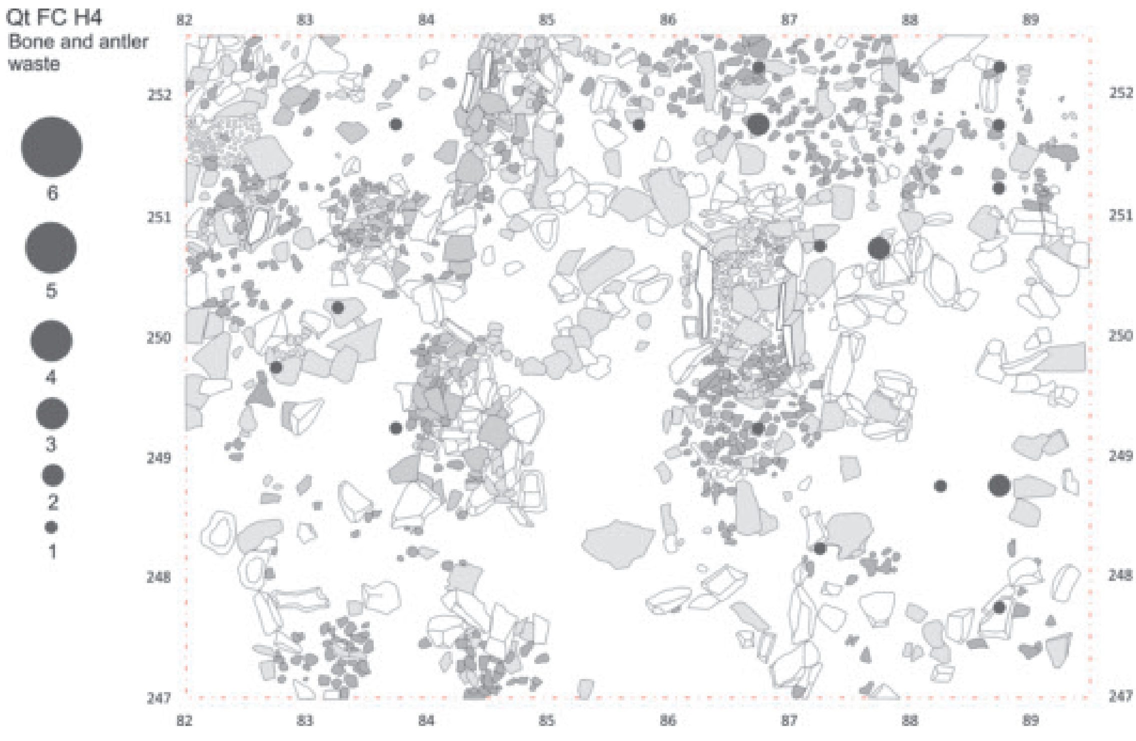


Fig. 5.15
Spatial distribution of waste from bone and antler tool production, Horizon 4.

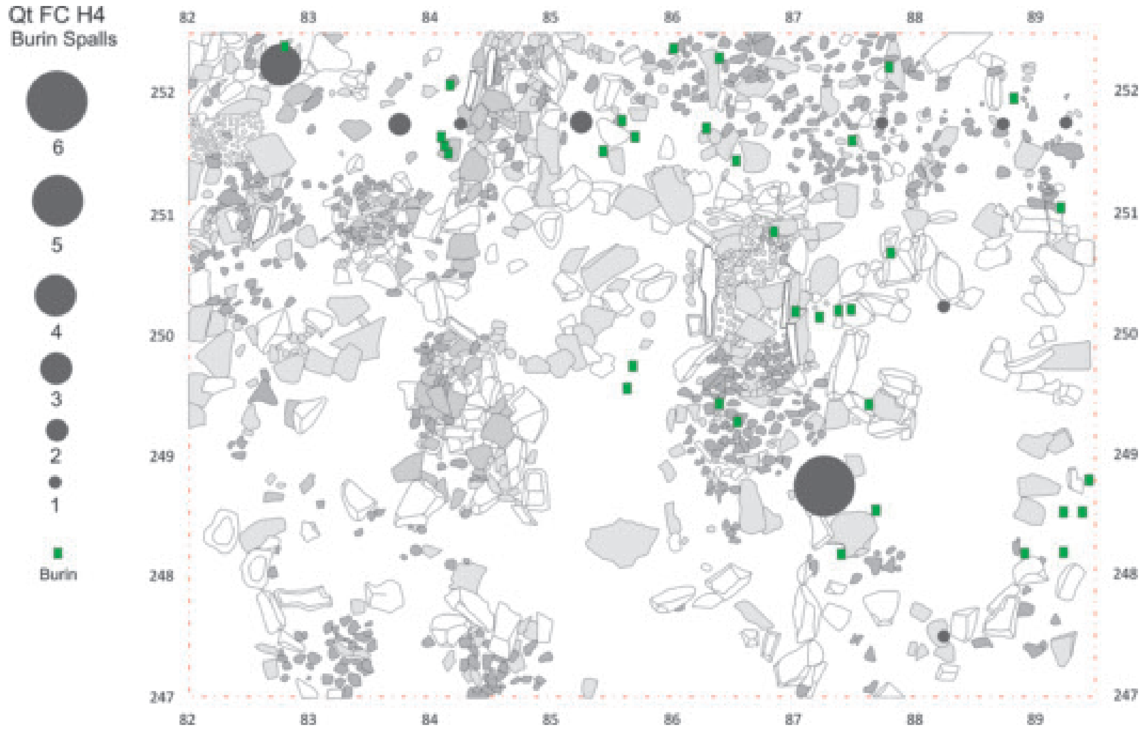


Fig. 5.16
Spatial distribution of burin spalls and burins, Horizon 4.

burin, were 'swept away' into the inner tent wall zone along the periphery of the south-eastern platform of Dwelling A8. Except for two burins, the general pattern of a 'clean' western platform inside Dwelling A8 is confirmed.

There are significantly few burin spalls compared to the number of used and resharpened burins. This is probably due to the fact that most of the sediment was carefully excavated, but not sieved. Moreover it must also be taken into consideration that some of the burins might have been discarded in connection with re-hafting rather than actual bone and antler working.

5.1.2.4 Stone knapping/resharpening of lithic tools and clearing of the dwelling floor

The distribution of lithic flakes results partly from knapping (tool production, reworking and resharpening), and partly from the clearing of the settlement surface, including the platforms inside the dwellings. The great majority of lithic waste consists of small flakes from late stages in the bifacial lithic reduction processes. The 1,498 flakes in H4 are distributed per unit as seen in Fig. 5.17.

It is seen that lithic reduction, mostly resharpening, took place on the eastern platform of Dwelling A8, in particular right next to the south-eastern part of the midpassage, which coincides with the concentration of burin spalls mentioned above. This indicates that lithic tools like scrapers and knives were resharpened and used along with burins for bone and antler working at this particular place inside the dwelling.

The highest concentrations of lithic debris are found in the south-easternmost corner of the excavation area. Here, in the fringe of the eastern platform of Dwelling A8 and along the tent wall, lithic waste accumulated as a result of platform clearing in line with the distribution of organic waste. One might speculate whether this heap, covering the inside as well as the outside of the presumed tent wall, was a result of sweeping the dirt away after the tent skin had been lifted up a bit.

Compared to the amount of wood shavings and split pieces, lithic waste is quite sparse in the workshop area in front of Dwelling A8. There is a heap of flakes next to A9, which could belong to this midpassage rather than A8. The general picture, that the western platform of Dwelling A8 is almost 'clean', is confirmed by the distribution of flakes.

Pressure flakers are connected with the production and resharpening of lithic tools (Fig. 5.18). Three of the eight exhausted and discarded flakers of antler in H4 are found on the eastern platform of Dwelling A8, adding to the picture of multiple craft activities in this area. Likewise, two pressure flakers are situated in front of Dwelling A8. If not the result of retooling, they add to the conclusion, based on the flakes, that a moderate degree of lithic (resharpening) processes took place in the 'workshop zone'.

Analyses of the distribution of common lithic raw material categories show no significant pattern (Fig. 5.19), but four small quartzite nodules (not mapped) must be mentioned. They were located close to each other immediately west of Zone 2 of midpassage A8 and might represent a small cache of lithic raw materials kept inside the dwelling. The overall distribution of the discarded lithic artefacts (Fig. 5.20) follows the pattern of lithic flakes in many respects (compare with Fig. 5.17): for example, the concentrations of tools and flakes coincide along the eastern platform periphery and tent wall, reflecting the clearing of the midpassage and platform area. However, the two distributions are very different in the vicinity of the midpassage: where only few flakes remain inside and immediately around the midpassage, high concentrations of dumped (and fire-cracked (see below)) tools are found there. This tendency also goes for the eastern platform of Dwelling A8: here about a hundred flakes but only very few lithic tools are located. This is interpreted as follows: resharpening and use of hafted lithic tools took place on the eastern platform, whereas replacement

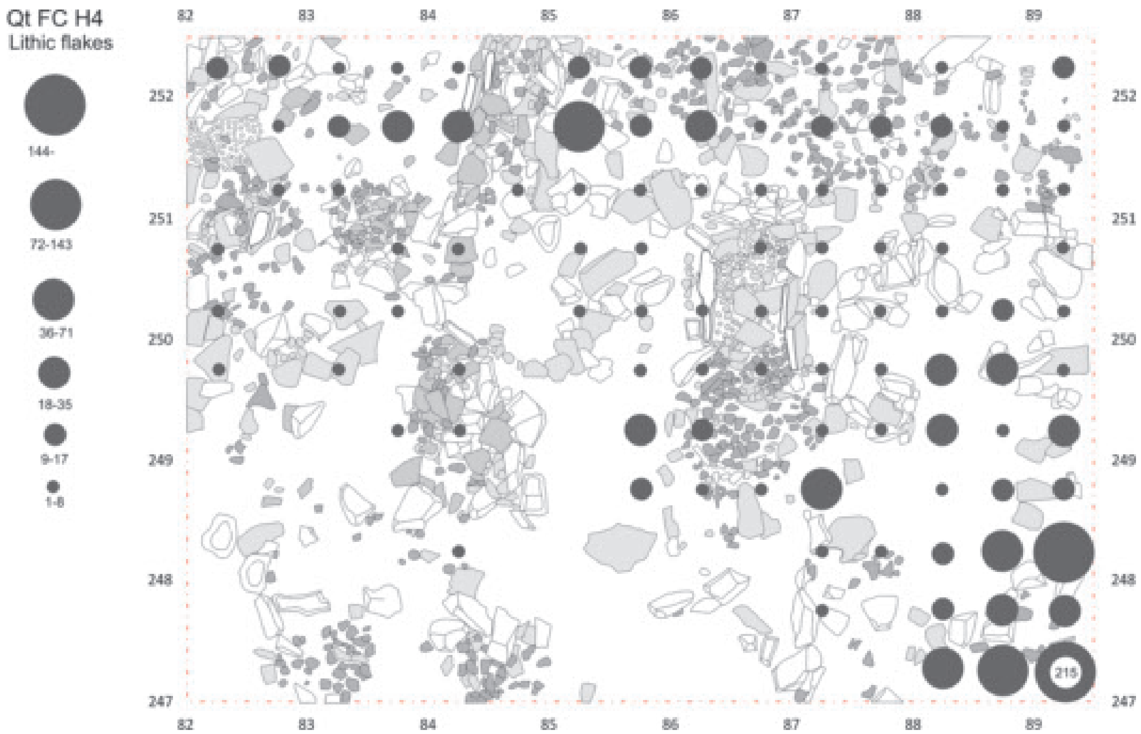


Fig. 5.17
Spatial distribution of lithic flakes/lithic waste, Horizon 4.

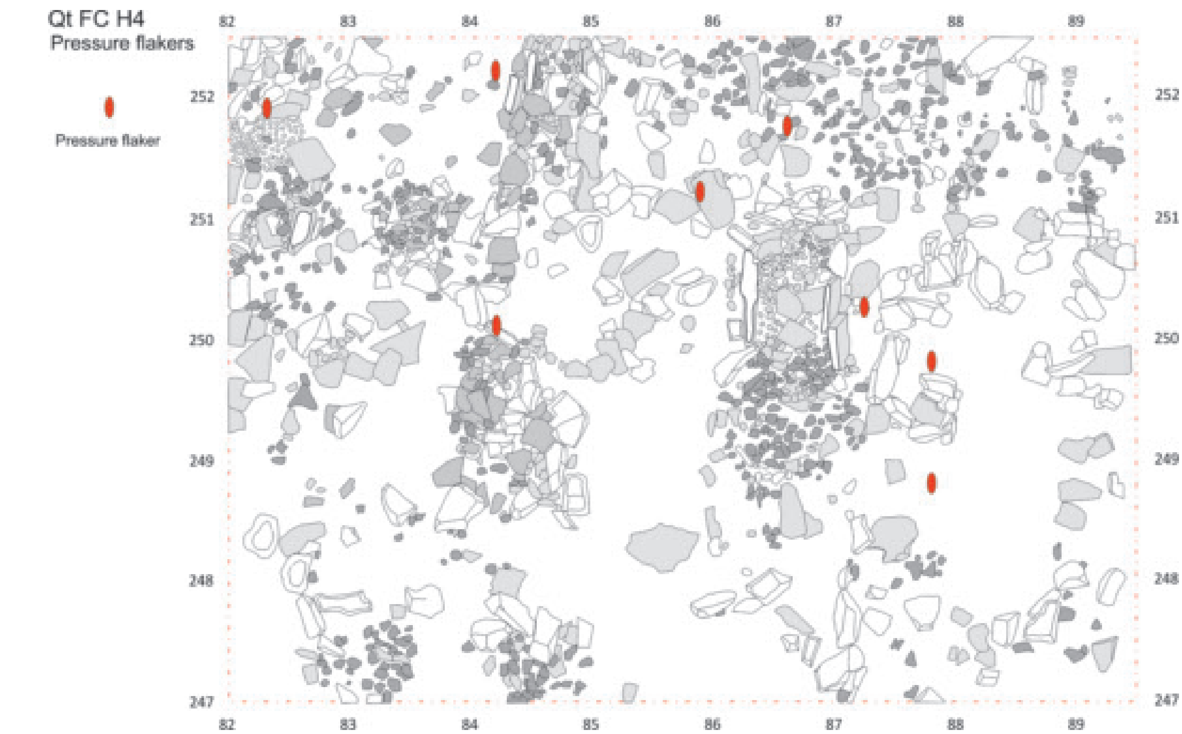


Fig. 5.18
Spatial distribution of pressure flakers, Horizon 4.

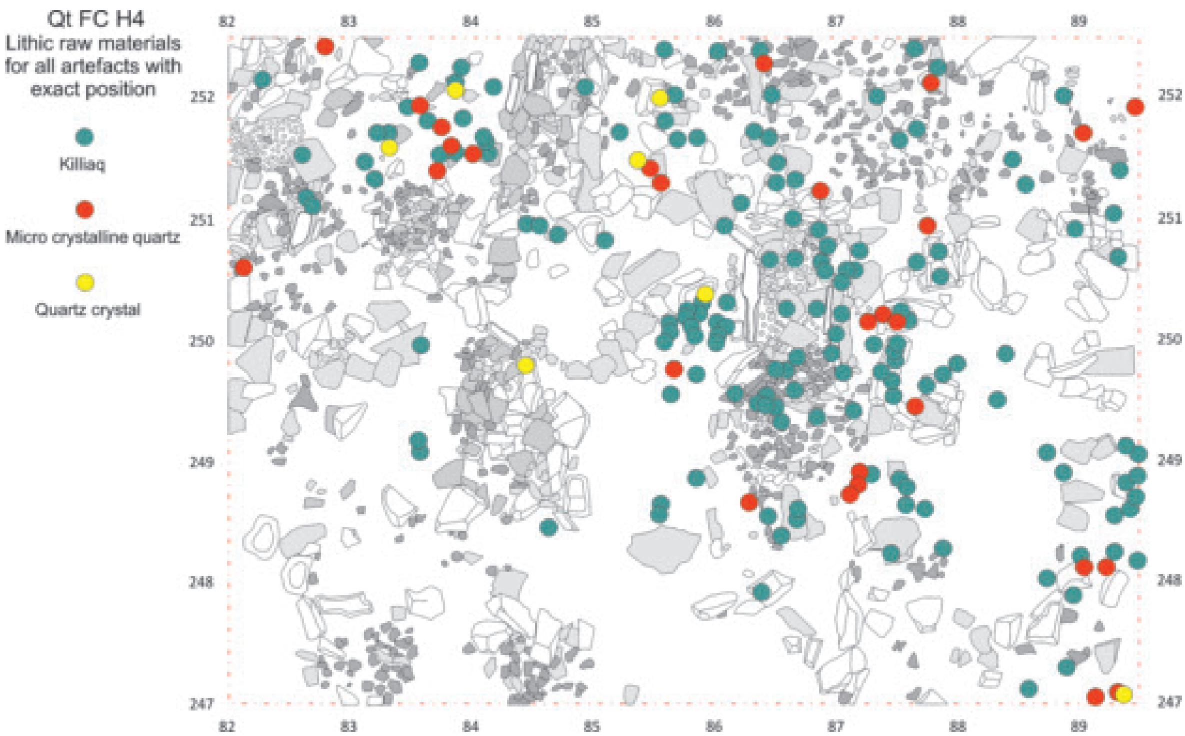


Fig. 5.19
Spatial distribution of lithic raw materials as seen by the exact positions of tools, Horizon 4.

of exhausted lithic tool components with fresh ones was carried out close to the midpassage. All sorts of lithic refuse follow the general pattern. It was swept away from the eastern platform into the periphery of this platform and into the tent ring zone, and the western platform was generally kept clean.

The distribution of fire-cracked lithic tools is quite informative concerning clearing processes (Fig. 5.21). Of the 34 fire-cracked tools, 33 belong to Category 2 (light cracking, no colour change: an indication of dumping in the periphery of an open fire) and only one belongs to Category 3 (heavy cracking and colour change: dumping into the centre of an open fire) (Fischer *et al*. 1979). Thus lithic tools were used near the hearth in the midpassage, but they were not dumped directly into the fire. It is characteristic that fire-cracked tools were swept along with other refuse from the hearth area into the eastern platform periphery/tent wall zone (eleven specimens) and sometimes dumped along with charcoal and other refuse from the hearth in the workshop zone in front of the dwelling (three specimens). Again, the western platform area is completely 'clean' as no fire-cracked lithic tools were found there.

5.1.2.5 Repair of hunting gear

Fragments of hunting tools follow the general distribution pattern on the site surface. Fifteen fragments of arrow shafts, discarded from repair processes rather than from primary production, are concentrated in the workshop area in front of Dwelling A8 (Fig. 5.22). Here two bow fragments are situated as well. The remaining three arrow shaft fragments are found inside Dwelling A8: two next to the midpassage and the third in the tent wall zone. Only two lithic arrowheads were found in H4. One is located in the south-eastern platform area of Dwelling A8 and one inside the central part of midpassage A9.

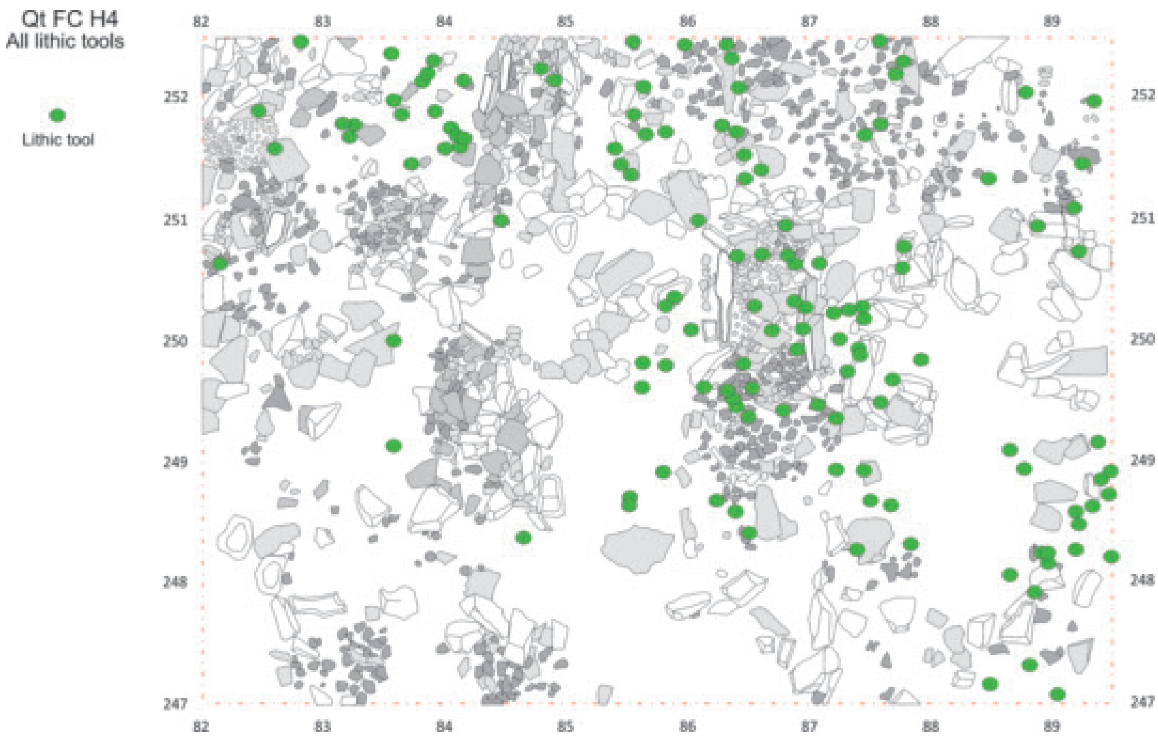


Fig. 5.20
Spatial distribution of all formal lithic tools, Horizon 4.

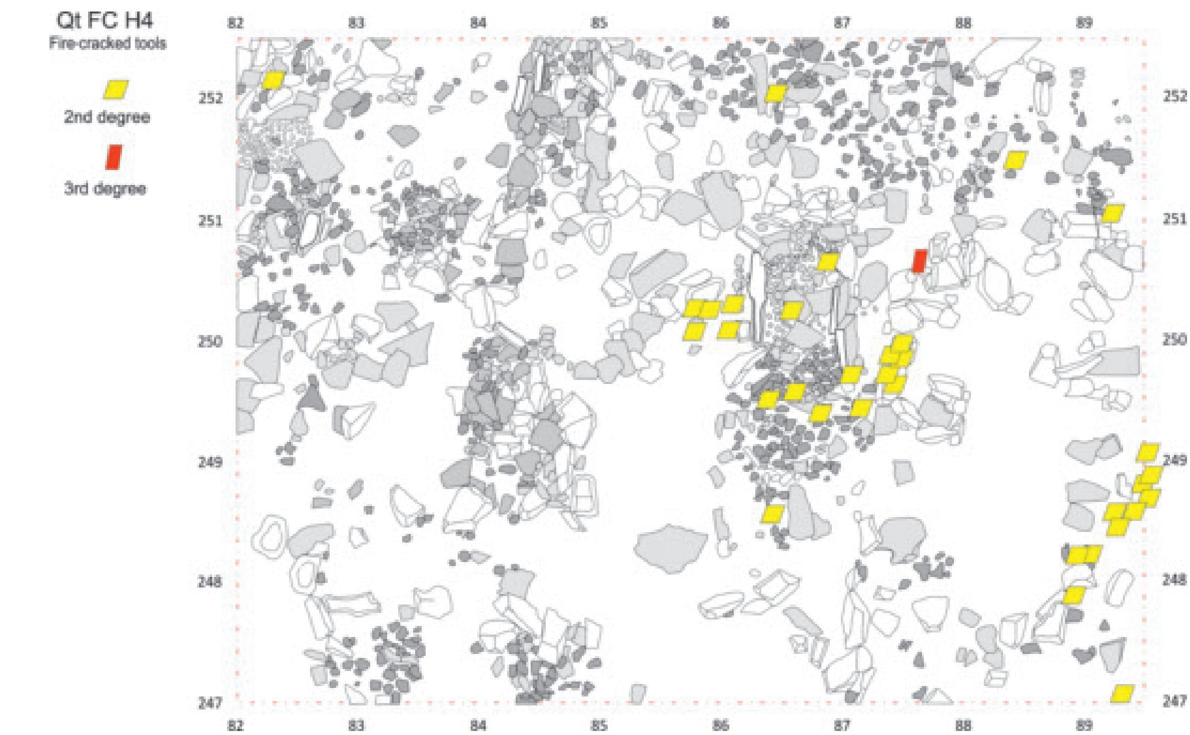


Fig. 5.21
Spatial distribution of fire-cracked lithic tools, Horizon 4.

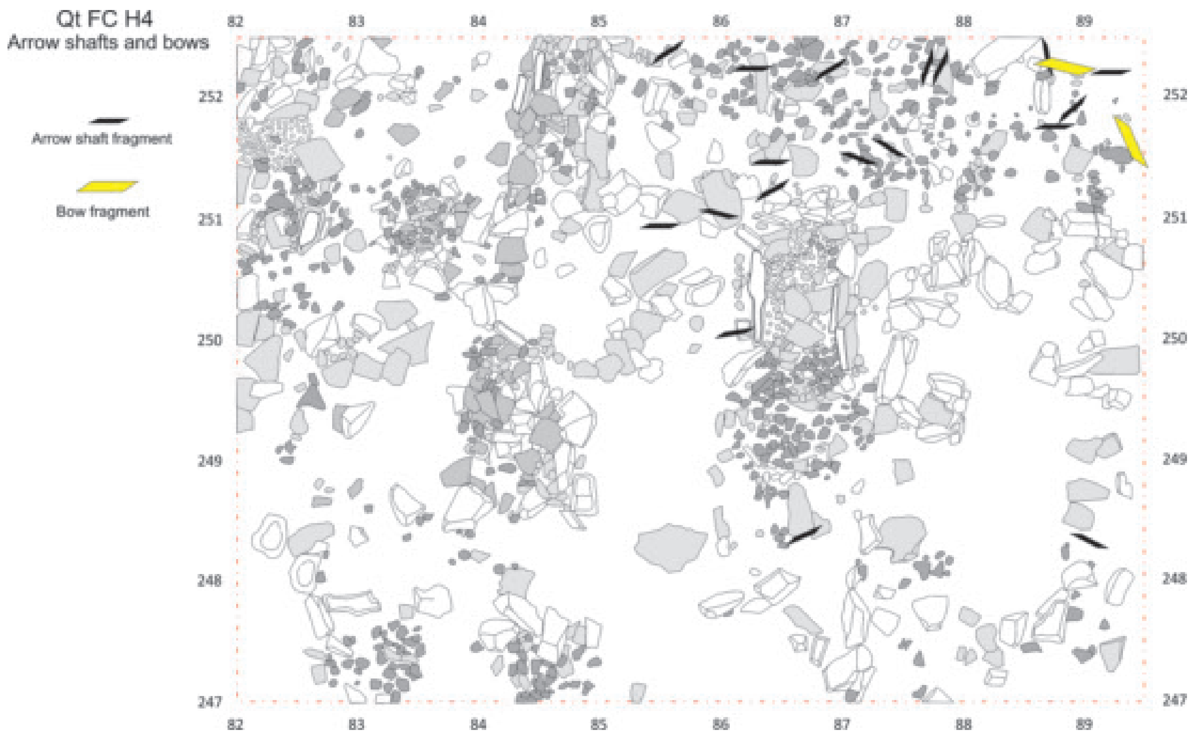


Fig. 5.22
Spatial distribution of fragments of arrow shafts and bows, Horizon 4.

Thus repair of arrows and bows was mainly carried out in the workshop area in front Dwelling A8 and, in a few cases, indoors.

A comparable pattern is seen in the distribution of shaft fragments and foreshafts of light lances/darts and bird darts (Fig. 5.23). Six out of fourteen light shaft fragments are located in the workshop area, and moreover a concentration of shaft fragments and foreshafts is seen along the south-eastern platform periphery and tent wall zone and close to the midpassage A8. The whalebone end prongs for bird darts are few (five), but their distribution on the eastern platform and in the workshop area is in accordance with the overall picture of spatial position of repair/retooling activities in the 'workshop area' and, to a lesser degree, inside, in the eastern part of Dwelling A8 (Fig. 5.24).

Seven out of eleven harpoon heads of antler were located in the workshop area, and only two were found inside Dwelling A8 (Fig. 5.25). Thus repair and resharpening of this hunting tool for marine mammals was mainly an outdoor activity. It is noteworthy that the harpoon heads are found in two concentrations, as if they were connected with two distinct, separate events.

Interestingly, the distribution of harpoon points (eleven specimens) seems to contrast with the harpoon heads (Fig. 5.26). The small triangular points are mainly located inside Dwelling A8 (eight specimens), as if they were either made there, or the harpoon heads were armed there. Alternatively, these points were brought into the dwelling embedded in the meat and blubber parts, which were prepared for food inside.

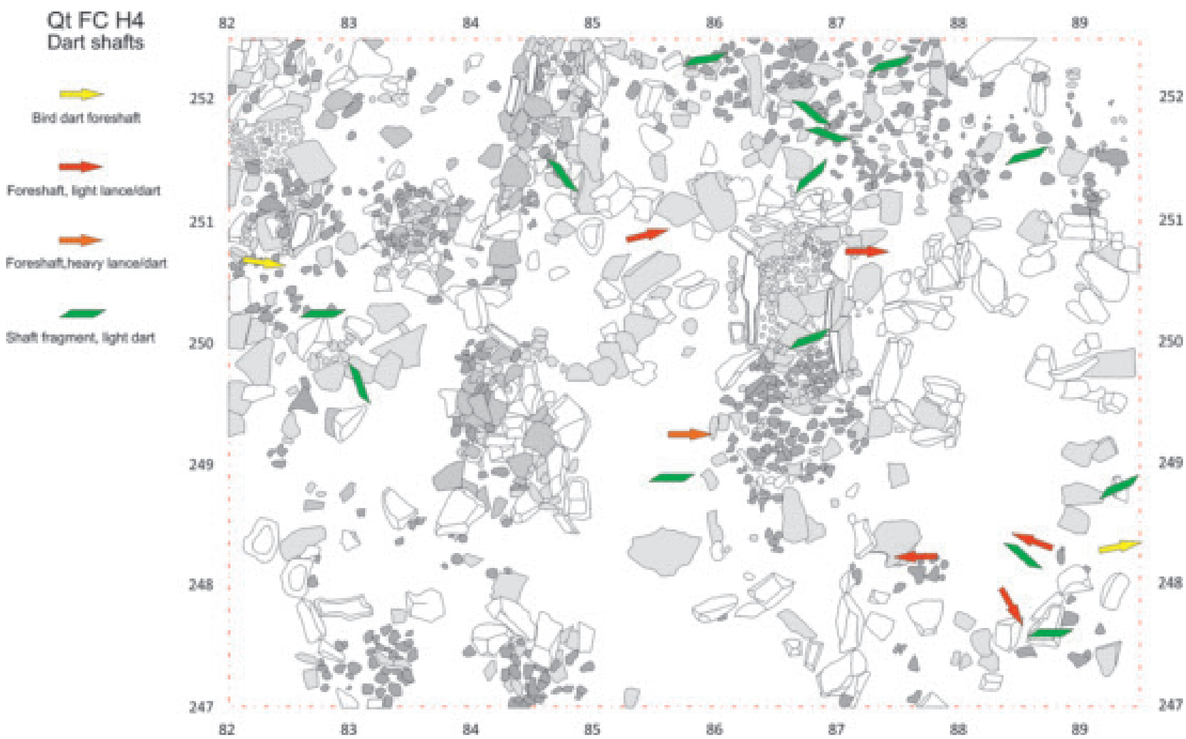


Fig. 5.23
Spatial distribution of dart shaft fragments, Horizon 4.

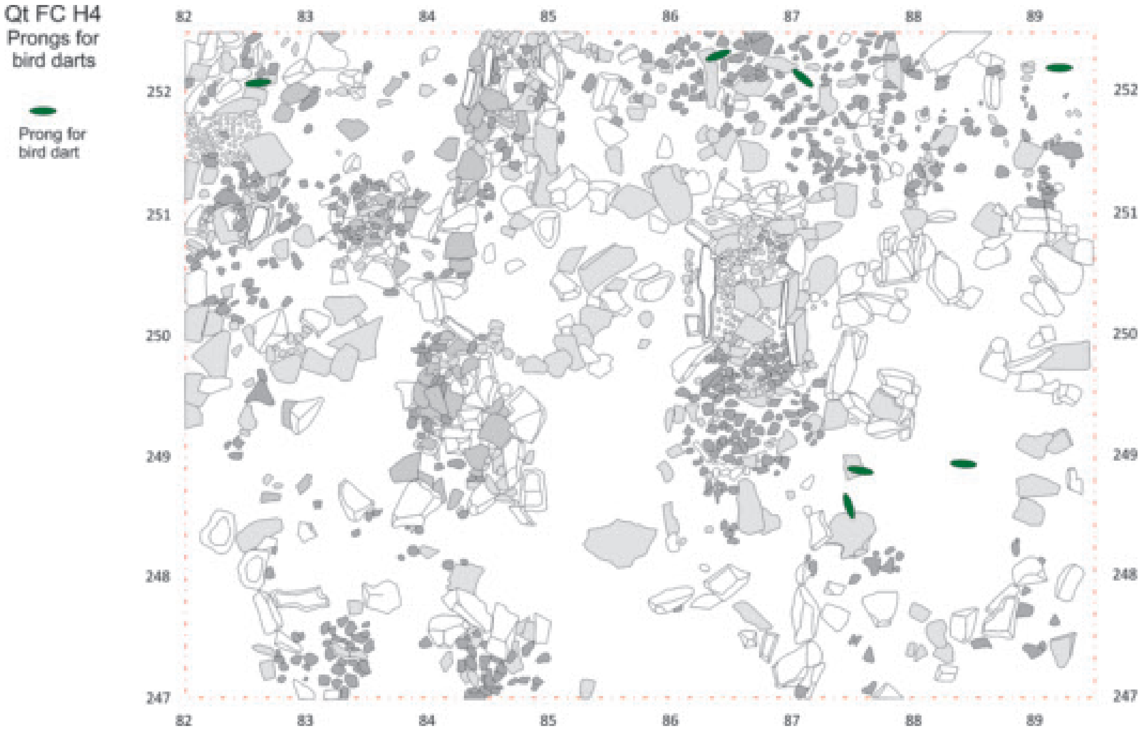


Fig. 5.24
Spatial distribution of prongs for bird darts, Horizon 4.

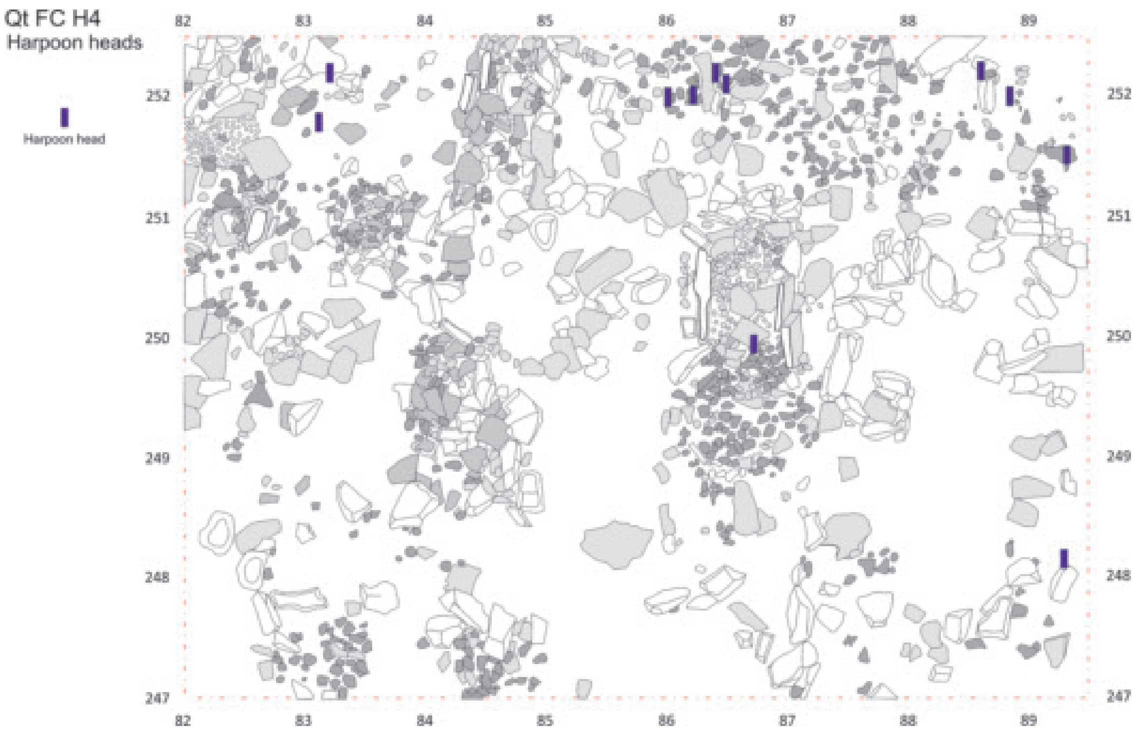


Fig. 5.25
Spatial distribution of harpoon heads, Horizon 4.

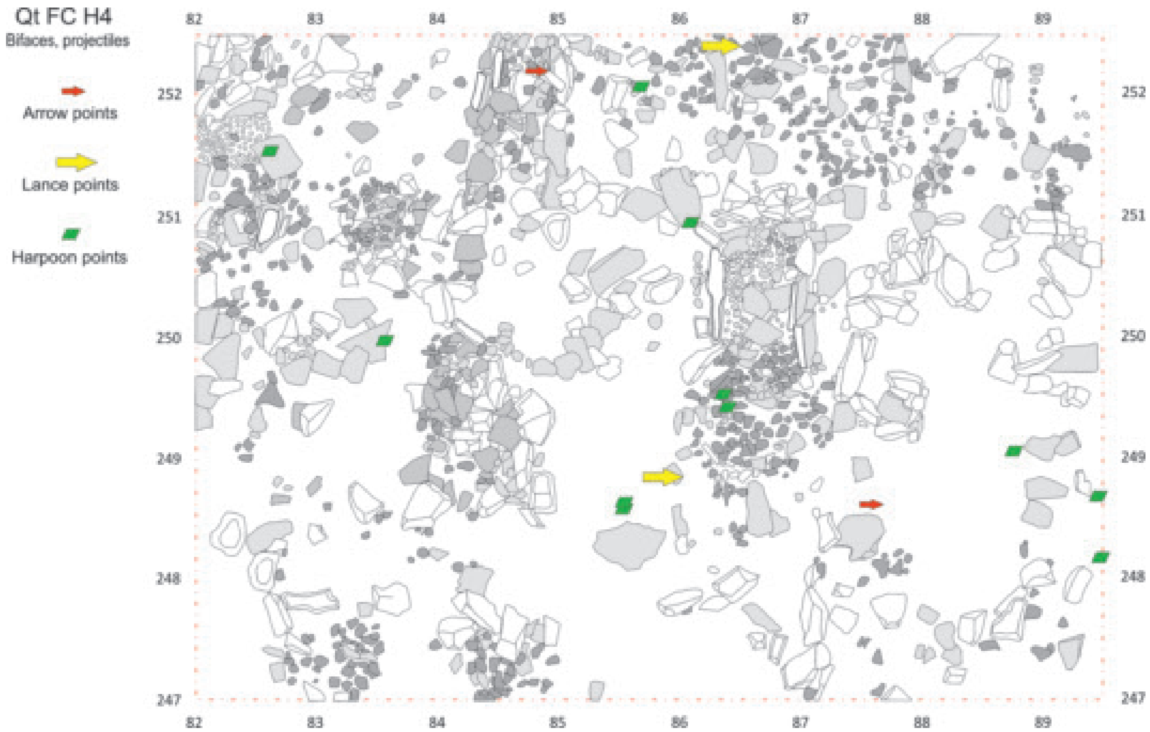


Fig. 5.26
Spatial distribution of lithic projectile points including harpoon points, Horizon 4.

5.1.2.6 Food processing and consumption

Spoons, ladles and knives

Obviously, ladles/spoons and bowls are connected with the 'household sphere'. There are four ladles, two wooden bowls and some fragments thereof in H4 (Fig. 5.27). It is noteworthy that the intact specimens inside Dwelling A8 are found in two sets, each consisting of one or two ladles/spoons and a wooden bowl. The two sets are located next to the midpassage: one set west of Zone 2 (front part of midpassage A8) and one set east of Zone 4 (back part of A8). This distribution could indicate that food processing, serving and consumption took place in two separate areas in the dwelling.

According to results of preliminary experiments (Appelt *et al.* 2012), the bifacial knives are probably connected with meat and blubber processing, including primary and secondary butchering. The distribution of these tools (nine in total, including two hafted specimens) follows the general pattern (Fig. 5.28): four are located in the workshop area in front of Dwelling A8, three are found inside or next to the midpassage and two are found in the eastern platform periphery. All specimens, except the one inside midpassage A8, are quite worn or exhausted, and thus their distribution pattern is a complex result both of re-tooling/hafting and clearing (the ones in the platform periphery). The exception, described in 5.1.1.6 above, consists of the intact, hafted knife found in the bottom of Zone 4 in midpassage A8. As mentioned there, it is presumed that the position of this knife reflects symbolic events rather than the discard of the tool.

Waste from food processing and consumption

Consisting of remains of food, which following processing and consumption went through 'secondary processes' like dumping, sweeping and trampling, the animal bone fragments of H4 were mixed thoroughly. Consequently, the accumulated fauna remains do not reflect a single episode but rather general trends in the use of

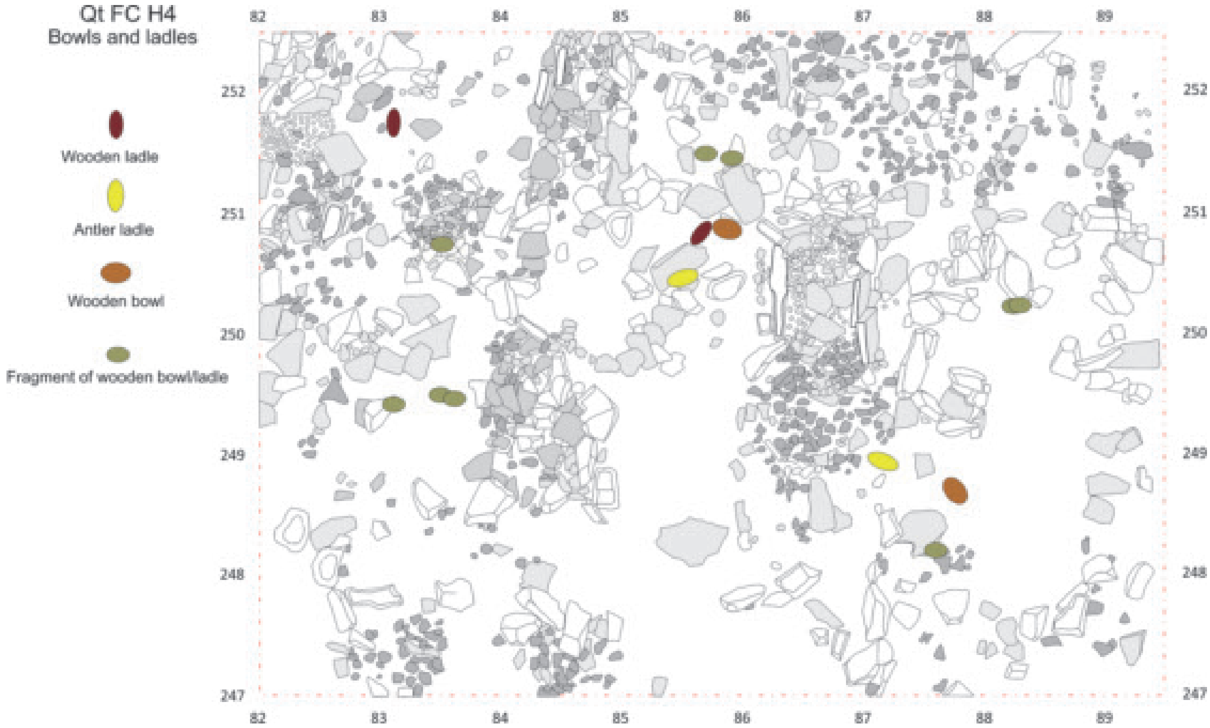


Fig. 5.27
Spatial distribution of bowls and ladles, Horizon 4.

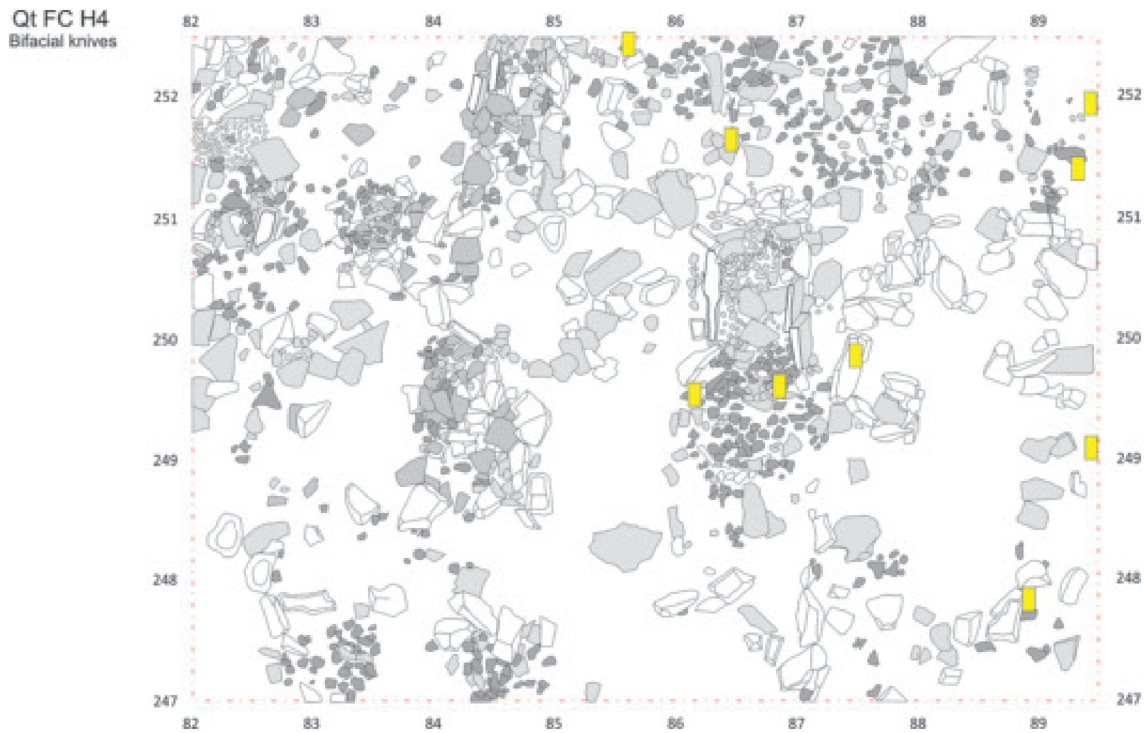


Fig. 5.28
Spatial distribution of bifacial knives (including hafted specimens), Horizon 4.

Dwelling A8 throughout its entire period of use. In order to create a starting point for this part of the spatial analysis, the faunal material from H4, Area C, was analysed by Anne Birgitte Gotfredsen in more detail and higher spatial resolution (quarter square metre) than previously (see Appendix B by Gotfredsen for bone counts and descriptions of methodology).

The spatial distribution (Fig. 5.29) of the entire material – *c.* 17.000 bone fragments in total – shows that the bone refuse in general 'behaves' in accordance with other organic waste categories, like shavings from wood-working: remarkably large amounts of bone waste are found immediately outside Dwelling A8 to the north and south-east. Also the bone fragment distribution follows the general pattern, with small amounts of waste evenly spread on the eastern platform and an almost 'clean' western platform. Finally, bone fragments are located in particular in the front part of the midpassage. Thus the faunal material shows that food processing and consumption centred on the midpassage and the eastern part of the dwelling, and that large quantities of waste from food consumption were cleared out of the dwelling and dumped in the 'door dump' area situated immediately outside the dwelling to the north of the tent ring. Like other categories of waste, bone refuse was swept away, ending up on the outer periphery of the eastern platform along the tent wall or outside the tent to the south-east, i.e. the waste was swept under the tent wall and out of the dwelling.

Spatial analyses were also carried out at more detailed levels: birds versus mammals, the two important seal species (*Phoca hispida* and *Phoca groenlandica*), Arctic fox (*Alopex lagopus*), alcids (*Uria* sp.), fulmars (*Fulmarus glacialis*), gulls (*Laridae*) and ptarmigan (*Lagopus mutus*). A few of these analyses are illustrated in Figs. 5.30, 5.31 and 5.32. It is concluded that the spatial patterns of the species represented by statistically

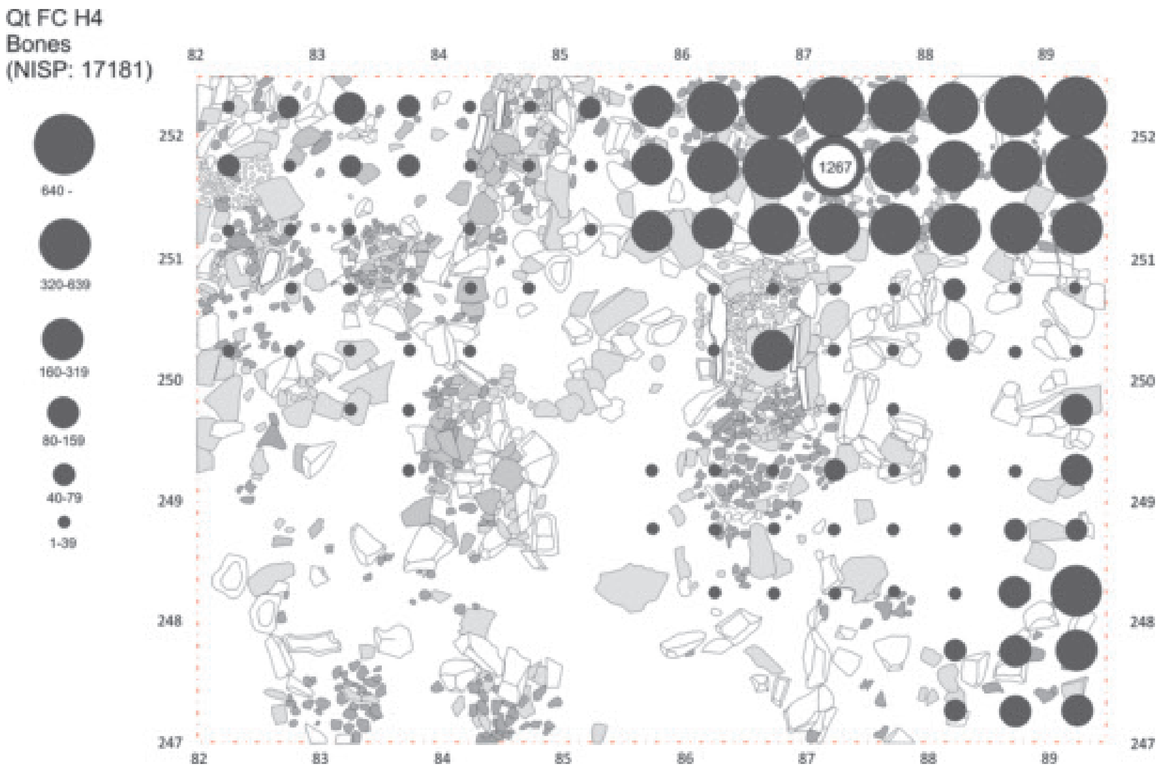


Fig. 5.29
Spatial distribution of the entire faunal material, Horizon 4. (Bone determinations by Anne Birgitte Gotfredsen).

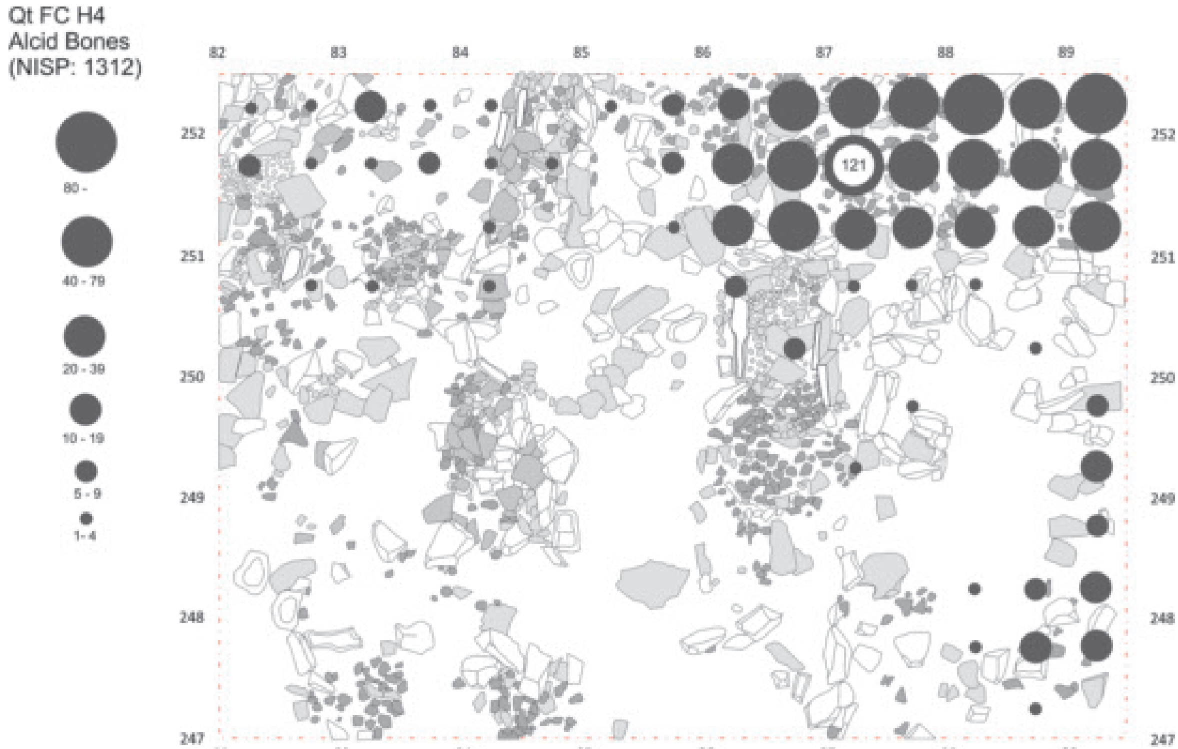


Fig. 5.30
Spatial distribution of bone fragments of alcids, Horizon 4.

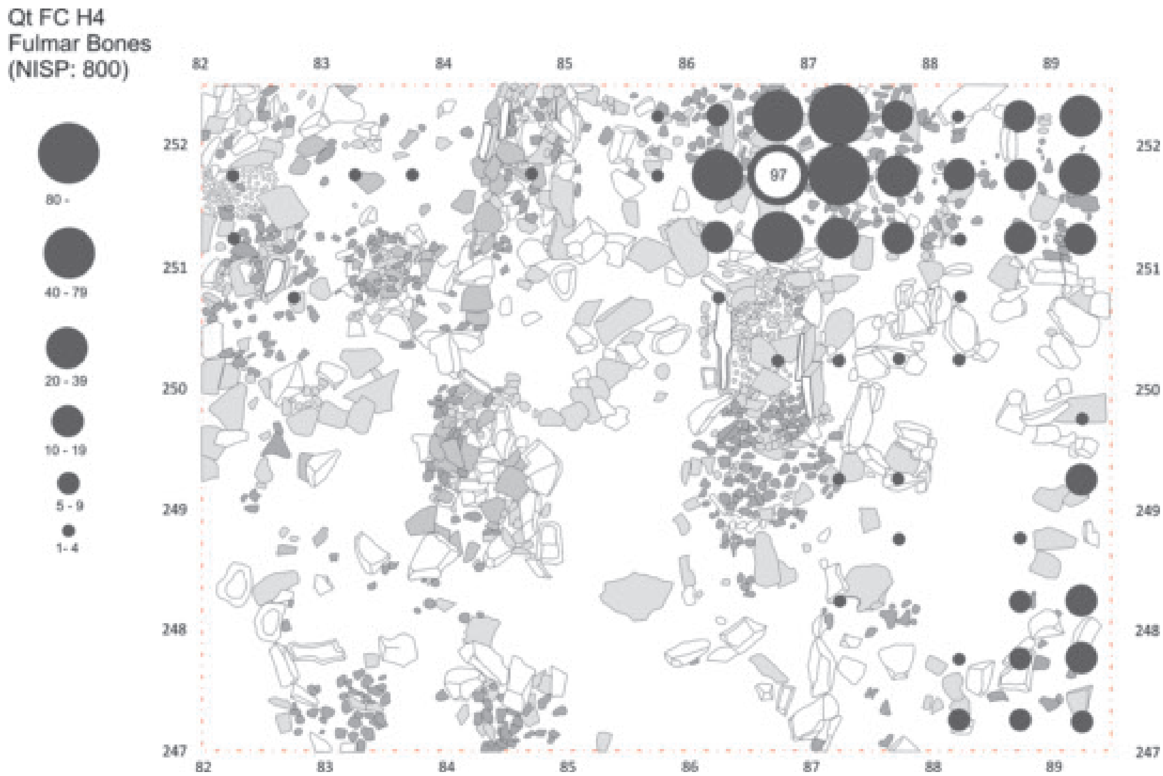


Fig. 5.31
Spatial distribution of bone fragments of fulmars, Horizon 4.

significant numbers of bones all repeat the general bone distribution. This 'homogenization' of bone refuse was probably caused by frequent clearings, as mentioned above, which moved waste from food preparation and consumption areas away from drop zones inside the dwelling and into refuse heaps. Another indicator supporting the impression of a quite even mixing of bone refuse on the site is the fact that the relative frequencies of species level in Area C (% NISP in Appendix B) are in accordance with the frequencies from Faunal Component II, according to the analyses of the midden layers in Area B (Meldgaard 2004: 112), which are at a distance from Area C and dated to the same period.

Only a few deviances from the overall spatial patterns are observed:

– The relative representation of bird bones in the single units is significantly high immediately to the north of the midpassage A8, where both fulmars and alcids show very high concentrations (Fig. 5.33).
– The specific seal bones determined to species level (Appendix B) show that *Phoca groenlandica* and *Phoca hispida* bones are almost similarly distributed on the surface. However, determinable *Phoca groenlandica* bones seem not to be represented inside midpassage A8 (Fig. 5.34).

Gotfredsen's faunal analyses also provide data for investigations of the spatial distribution of the different anatomical parts of the animals. However, several taphonomic factors bias the material, including differences involving the possibilities for identification of species and the 'survival probability' of the different bone elements (see discussion in Meldgaard 2004: 97 ff.). Taking these factors into consideration, a number of spatial analyses were made on relevant bone ele-

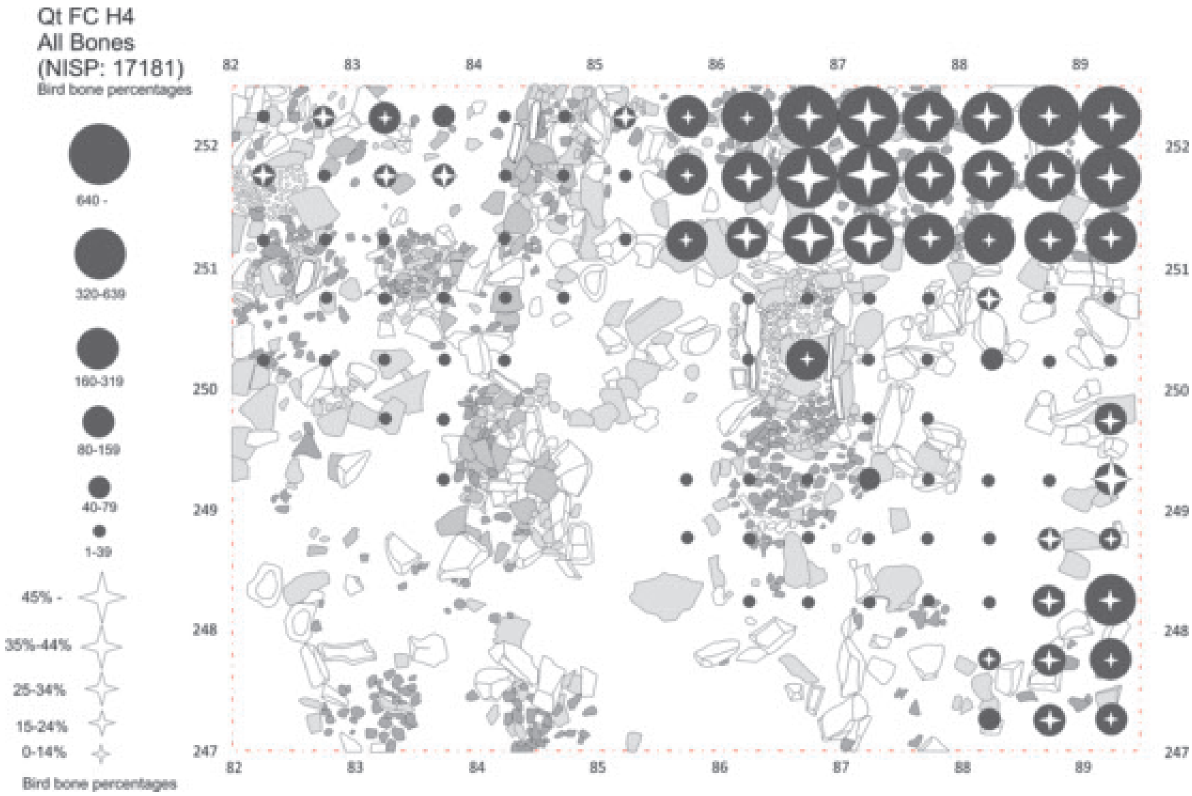


Fig. 5.33
Spatial distribution of bone fragments. The percentages of bird bones in relation to total number of bones in each excavation unit are shown, Horizon 4.

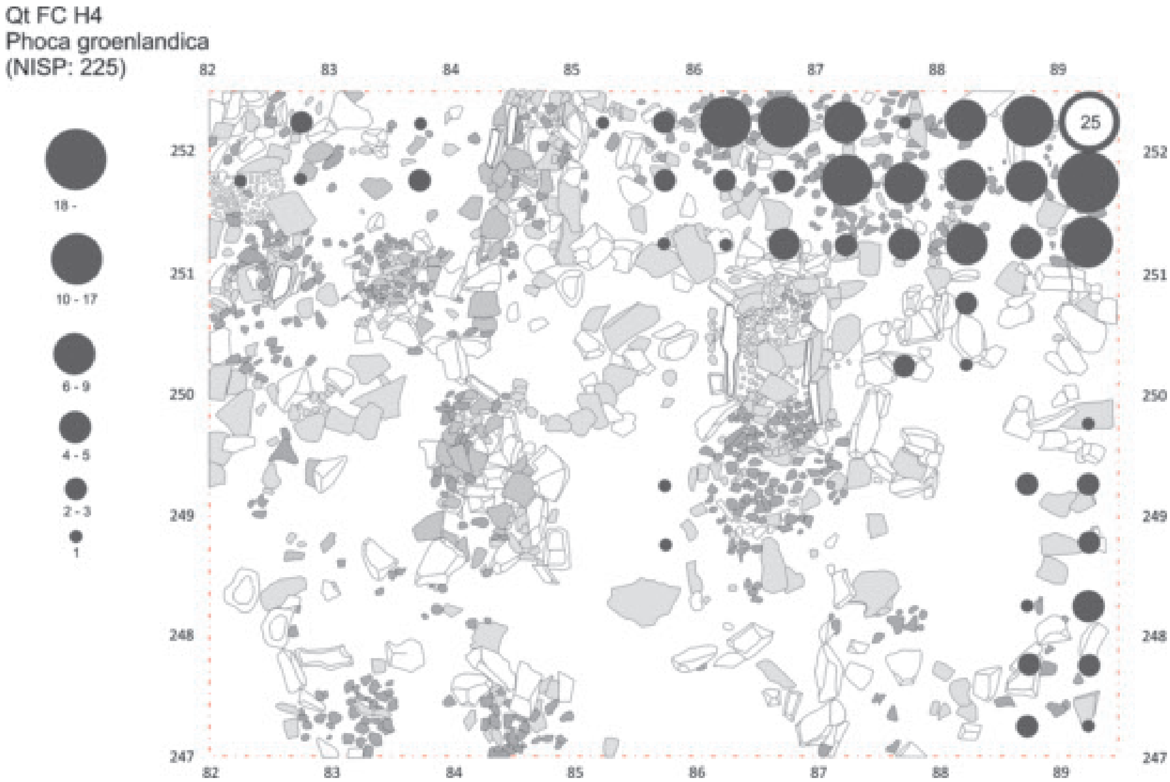


Fig. 5.34
Spatial distribution of bone fragments of Phoca groenlandica, Horizon 4.

ments, including an analysis of seal front flipper bones versus seal hind flipper bones. However, no significant contrasts and divergences from the general spatial patterns were observed in relation to the distribution of different anatomical parts.

As mentioned above, it must be emphasized that, in contrast to wood and lithic raw material refuse, animal bone fragments were found in fairly large numbers (in total over 400 fragments) in the sediments inside the A8 midpassage, in particular in its northern parts. Accordingly, not all remains of food preparation and consumption were cleared from the hearth area and swept aside.

Finally, it must be mentioned that the faunal material connected to A8 generally contains the same indicators of seasonality as the contemporary Faunal Component II in the midden, Area B, meaning that it is not possible to isolate a specific season during which Dwelling A8 was used. The frequencies of bones from the different species show a heavy emphasis on living resources accumulated during the spring, summer and autumn resource booms, but winter indicators in the shape of ringed seal are present as well. We conclude that the faunal data support the hypothesis that Dwelling A8 was used during practically all seasons of the year.

5.1.2.7 Various spatial patterns

Microblades with their razor-sharp edges probably served as a tool for a variety of cutting processes. The precisely cut, worked sealskin fragments (see Chapter 3.7) indicate that the edges of microblades were used for cutting skin for garments, etc. The distribution pattern of 41 microblades in H4 (Fig. 5.35) shows that such cutting took place inside Dwelling A8 on both sides of the midpassage. Some wasted microblades were swept away into the south-eastern platform periphery/tent wall zone. Sixteen microblades were located in the workshop area in front of the dwelling, but seven of these were found in a concentration right next to the neighbouring A9 midpassage, indicating that a special event was connected with this feature and not with Dwelling A8. As usual, the western platform area of Dwelling A8 is 'clean'.

Cutting activities of all sorts are also evidenced in the presence of 20 simply retouched flakes and flakes with fine edge serration (Fig. 5.36). It is noteworthy that ten of these are located inside or on the eastern side of midpassage A8 and on top of the turf platform of Dwelling A8. Strangely enough, none of them were swept into the platform periphery/tent wall zone and only two were found in the workshop area in front of Dwelling A8. This is a quite atypical pattern, probably reflecting the spontaneous making and expedient use of these simple cutting and sawing implements inside the dwelling. Only three are located west of A8, all in the periphery zone of the western platform.

As skin boat frame fragments in H4 only number four specimens we can hardly talk of any pattern, but we can observe that these fragments are found both inside and outside Dwelling A8. The only drum rim fragment in H4 is located in the workshop area in front of Dwelling A8 and thus not in an obviously significant position.

5.1.2.8 Summary and conclusions: activities on a complex settlement surface

The analyses of the stone-built features and the distribution of wooden tent poles in H4 in Area C led to the identification of one main midpassage dwelling: Dwelling A8. The feature was disturbed in the western part following abandonment by the construction of a probably circular dwelling containing a central box hearth, Feature A1. Earlier features, like the midpassages A3–5 and A9, are also present at this complex site surface. Accordingly, the spatial distribution patterns of organic and lithic refuse and tools, and bone fragments is the result of a mixture of activities in and around these different features. It must also be kept in mind that the south-west-

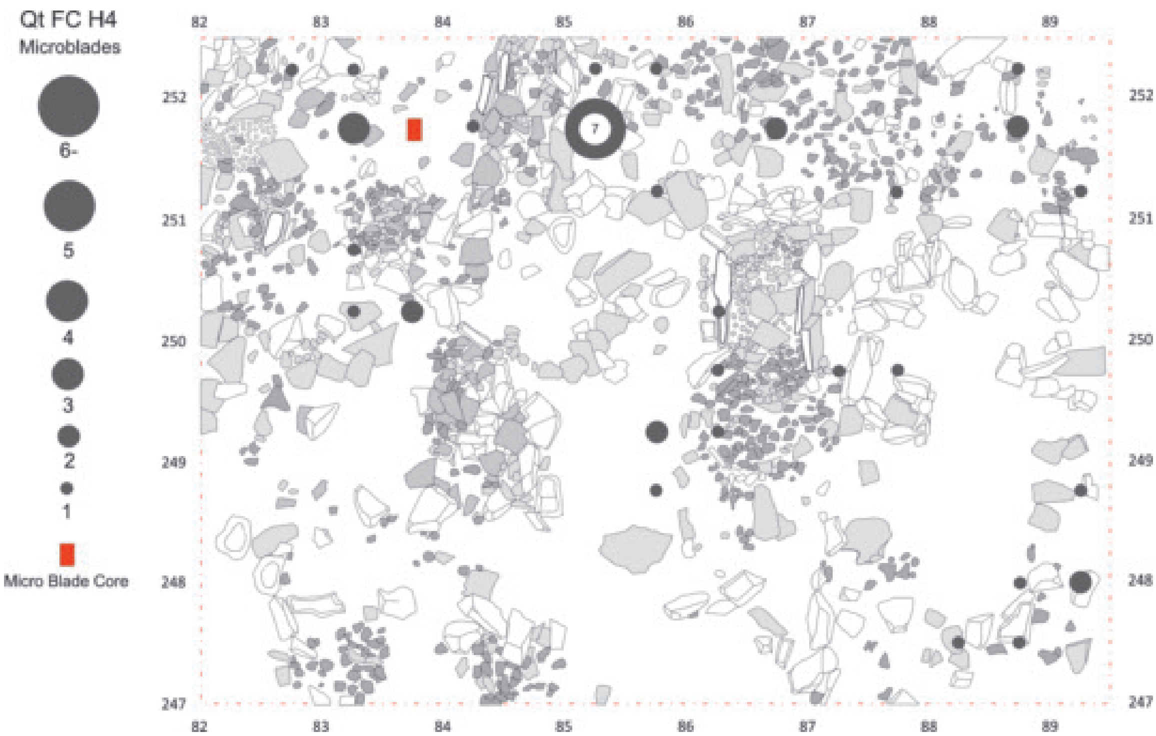


Fig. 5.35
Spatial distribution of microblades, Horizon 4.

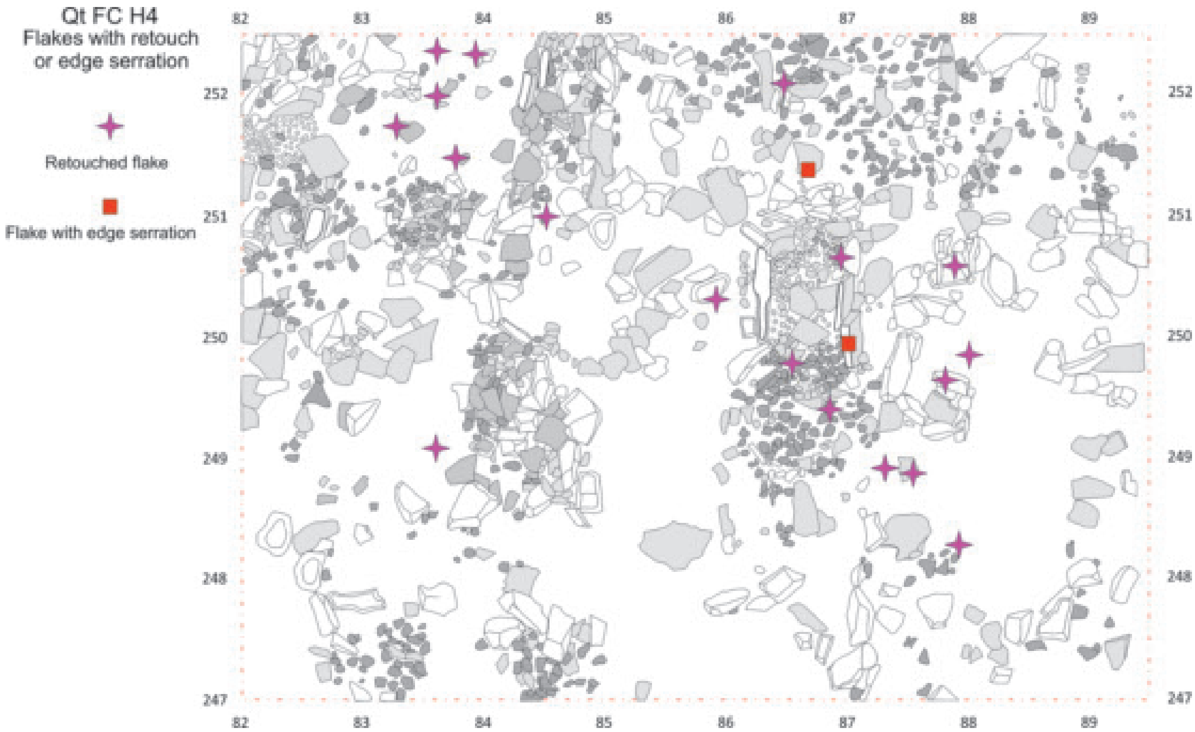


Fig. 5.36
Spatial distribution of flakes with retouching and with edge serration, Horizon 4.

ernmost part of Area C was disturbed by geological processes and that the full sequence of layers was not present here.

However, in spite of these complicating factors the analyses carried out and presented above show meaningful spatial distribution patterns, which can be related to activities in Dwelling A8. This is probably due to the fact that this feature was used much more intensively than the other features on the H4-surface. Considerable amounts of refuse accumulated in and around Dwelling A8 and accordingly the overall spatial patterns connected with this structure dominate the picture completely.

Taken together with the feature layout, the spatial analyses suggest the division of the surface into a number of different 'activity zones'. It is possible to distinguish between activities *inside* and *outside* the dwelling (Fig. 5.37):

Activities in and around the midpassage A8:
The spatial distribution of artefacts demonstrates that the midpassage and the floor area immediately around it were a focal point for several different household and craft activities. Based on the distribution of sets of spoons and wooden bowls, it was argued above that *food serving and consumption* took place here, as well as *food preparing and processing*, as indicated by the presence of skin bags for boiling meat with hot rocks inside the midpassage, the distribution of the faunal material, and bifacial knives for butchering. Interestingly, a few harpoon endblades of killiaq were located in this area. They could have been 'riders' hidden inside meat and blubber pieces processed for consumption inside the dwelling.

The midpassage was also the focal point for crafts carried out inside the dwelling. Here, the craftsperson took advantage of the light and heat radiating from one of the hearths situated inside the midpassage. Traces of *fine skin cutting* are evidenced by microblades, and *woodworking* – in particular, the finishing of round shafts – is indicated by pumice graters and side scrapers concentrated in and around the midpassage. Interestingly, a small 'heap' of split wooden pieces, interpreted as the remainder of a pile of firewood, was found at the west side of the back part of the midpassage. *Bone and antler working* also took place in this central area, as evidenced by the burin spalls, as well as *repair and retooling* of hunting and hand tools, which is reflected by several pieces of broken wooden shafts of arrows and light darts and a large number of exhausted lithic components of hand tools inside or close to the midpassage. Immediately to the west of A8 there is evidence of *raw material storage* – a small cache of lithic raw materials – but clearly the highest concentration of traces of activities is on the eastern side of the midpassage.

There is ample evidence of *clearing of the midpassage and central floor*: the 'pavement' of used fire-cracked rocks and the fan-shaped charcoal heap outside (in front of) Dwelling A8, as well as the heavy concentrations of refuse and artefacts along the periphery of the eastern platform (see below), show such clearings. In particular, the distribution of fire-cracked tools is informative. Originally, they cracked as a result of work processes, where exhausted tools were dropped (accidentally) close to the fire inside the midpassage. Later, many of these pieces were cleared out of the midpassage, and some ended up on the floor area beside the midpassage, while others were swept into the periphery of the eastern platform and further out under the tent wall to end up right outside the tent ring.

Activities of a symbolic character were probably carried out in close connection with the fireplace(s) in the midpassage (Odgaard 2003). Spatial patterns originating in such events are difficult to identify. However, the placement of a complete hafted and still usable bifacial knife at the bottom of Zone 4 in the midpassage is interpreted as a reflection of a symbolic event (an offering).

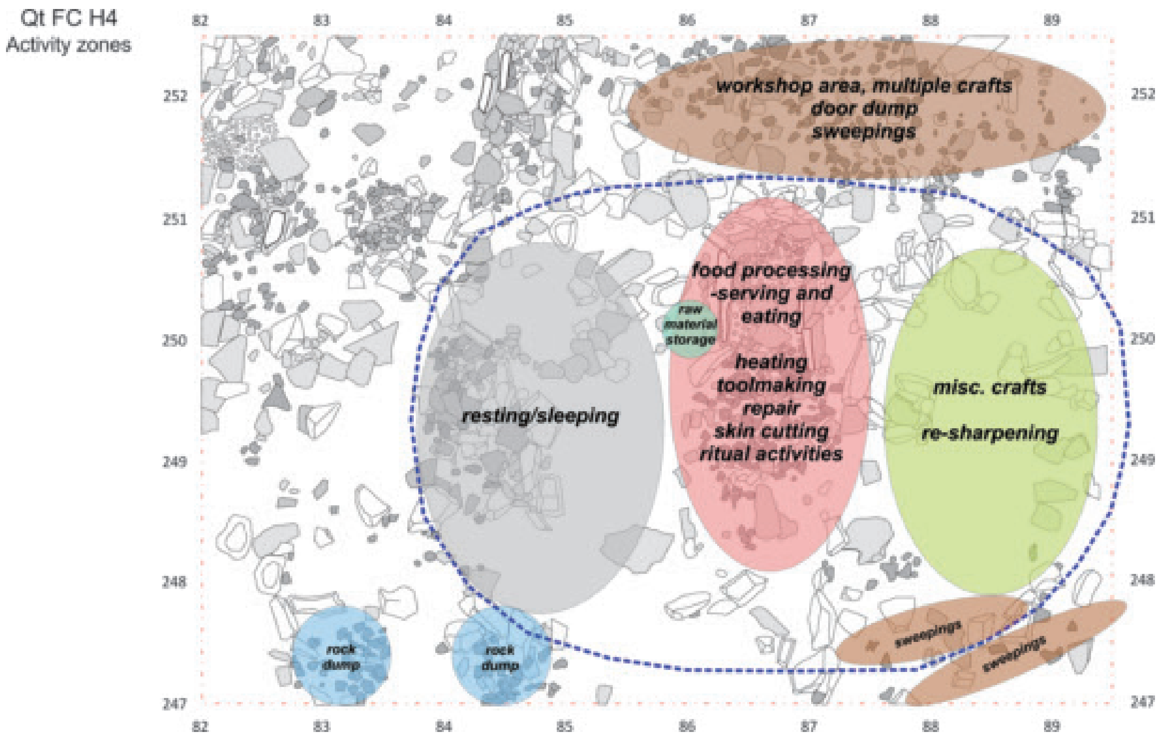


Fig. 5.37
Division of Dwelling A8 into activity zones based on spatial analyses of tools, waste and features.

Activities on the eastern turf platform and at the eastern periphery of Dwelling A8:
Of the two turf- and twig-built platforms on each side of the midpassage, the eastern platform shows most traces of activities. Some organic and lithic refuse and artefacts were found on the platform itself, but the spatial pattern clearly reflects secondary clearing or sweeping of the platform.

There is only limited evidence of *wood-working* on the platform: most wood shavings and split pieces and a few side and end scrapers were swept into the south-eastern platform periphery towards the tent wall or – like other refuse here – probably also under the tent skins to end up at the back and eastern sides of the dwelling. The same goes for traces of *bone and antler working.* The burins used for such work close to the midpassage or on top of the platform itself were swept into the periphery zone. The spatial distribution of pressure flakers and of lithic refuse, primarily small flakes, shows that *resharpening of lithic tools* took place on the eastern platform and that the majority of flakes ultimately ended up among the other 'rubbish', including a number of exhausted lithic tools, in the platform periphery and along the eastern tent wall. The distribution of simple knives (retouched flakes and flakes with serrated edge) is somewhat different, as they were left mainly on top of the eastern platform, underlining that a suite of working processes took place there.

Activities on the western turf platform of Dwelling A8:
The western platform area stands out as being 'clean': almost no bone fragments and other refuse – organic or lithic – or discarded tools are found in this zone of the dwelling. This is most likely a true picture. The area was arguably disturbed when A1, the round dwelling with the central fireplace, was established after the use of Dwelling A8, but if the concentration of artefacts was originally high here we should at least have located some waste in the periphery of the platform. Thus we conclude that the two platforms of Dwelling A8 were the locations of fundamentally different activities: the eastern platform, described above, was the centre of multiple work processes, whereas the western platform was kept extraordinarily clean. An obvious interpretation is that this slightly elevated turf construction served as *a sleeping platform* in contrast to the activity area opposite it.

Activities in the workshop and door dump area in front of Dwelling A8:
It must be stressed that the general spatial distribution of waste and artefacts shows that the 'workshop area' contained a mixture of materials. Heaps of cleared or dumped materials from the inside of Dwelling A8 ended up right in front of the dwelling, as seen from the many exhausted fire-cracked rocks, the high concentrations of bone waste and the massive layer of charcoal originating from clearing the midpassage (see above). Such refuse in 'secondary position' was mixed with the remains of regular work processes that actually took place in front of the dwelling.

First and foremost, some *early stages of wooden tool production* were carried out in this combined refuse 'pavement' and workshop area. Split wooden pieces and massive 'lenses' of wood shavings testify to this. However, as mentioned above, the last stages – the very finishing of round shafts – often took place inside the dwelling. The remarkably high frequency of fragments of arrow shafts and bows, shaft for darts as well as end prongs for bird darts and, not least, harpoon heads in this zone indicate that *repair of hunting tools* also took place by the very front of the dwelling. The presence of lithic flakes, lithic tools (mostly burins but also a few specimens of other tool types), a couple of pressure flakers, and a little debris from production of antler and bone artefacts supports the interpretation of this area as a *workshop for multiple crafts*, combined with its function as a 'door dump'.

Activities behind the western part of Dwelling A8:
The two small, well-defined heaps of exhausted fire-cracked rocks, A6 and A7, immediately south of the suggested tent wall of Dwelling A8, were interpreted as resulting from waste disposal behind the western part of the dwelling.

This activity area may thus be connected to single episodes of food preparation (boiling in skin bags) and/or heating by means of hot rocks in the midpassage.

In conclusion, the spatial analyses of H4 in Area C have resulted in a quite unique insight into the daily life in and around a Saqqaq midpassage dwelling. In spite of some disturbances from earlier or later activities, it has been argued that it is possible to connect certain patterns of the spatial distribution of refuse and tools – organic as well as lithic – directly to Dwelling A8. As seen from the microstratigraphy of the midpassage of Dwelling A8 and its turf platforms, this dwelling was used during several (close) sequential episodes, but they all resulted in accumulations of refuse and tools forming meaningful patterns.

5.1.3 Spatial analyses: supplementary information from Areas A and B

As mentioned in 2.4.2 above, several midpassage structures filled with fire-cracked rocks were seen on the surface of the windswept, sandy area on top of the tombolo on which the Qt site is situated. Excavation Area A from the first field season (1984) uncovered one of these, while two other midpassages, partly destroyed, were sitting on the eastern edge of this excavation area. Only lithic artefacts were preserved at this part of the site. About a thousand flakes and thirty lithic tools were found in the 4.5 m × 5.0 m excavation area.

Most of the lithics in Area A were found on the surface and some pieces were sitting just a few centimetres down in the sandy gravel. The spatial distribution of the lithic waste and tools shows concentrations immediately west of each of the three features, but it must be kept in mind that the excavation only covered a limited area around the midpassages. Further excavations are needed before an in-depth analysis of Area A can be made.

Area B in the north-western corner of the site was characterized by 'typical midden layers', i.e. the cultural layers here resulted from clearings of fireplaces, dwellings and other activity areas situated on higher-lying areas of the site. There were no regular stone-built features here. However, a four-square-metre test area was excavated in the area between Section C and Area B in an attempt to correlate the stratigraphy of the two areas. During excavation of this permanently frozen unit, where the preservation conditions of organic materials in the culture layers were optimal, indications of dwelling remains were uncovered in the shape of probable turf platform remains, as well as different disturbed stone-built structures. Likewise several intact and hafted tools were found here, probably cached and not discarded tools. However, this excavation unit was quite small, and future excavations at Qt could usefully be carried out in this particular area.

5.2 Qajaa

5.2.1 Stone-built structures

Due to the character of Meldgaard's excavations at Qa – first and foremost, sections through exposed sequences of layers along the erosion brink – not much information on the many dwellings and other features that once stood on the large settlement area can be gained from the 1981 and 1982 records.

In Area E some disturbed remains of perhaps a platform and a couple of vertical standing wooden pegs were recovered (see 4.2.1.4 above).

The small excavation area, F (*c.* 2.5 m^2), is a little more informative as a section of a midpassage about a metre long, constructed of flagstones, was excavated. It is not clear whether it was the rear or front part of a structure. However, the presence of bedrock in the back or southernmost part of the excavated area might indicate that the feature is the rear portion of a midpassage, where the front half has been washed away by the sea. At this particular place the eroded brink is oriented more south-east–north-west, and the metre-long preserved part of the midpassage is placed perpendicular to the eroded brink. The sides of the midpassage are set by up to *c.* 50 cm long flat, oblong stones. A flag on the western side was still standing, whereas the remaining stones have fallen inwards. Along the sides of the midpassage distinct platforms of twigs and grass, partly placed on sheets of baleen, were found. A complete, hafted knife was found in the eastern side of the midpassage – resembling aspects of Structure A8 at the Qt site.

5.3 Architecture and spatial organization: comparative perspectives

5.3.1 Complex Saqqaq dwellings

Midpassage dwellings like Dwelling A8 at Qt are only one type among a range of different Saqqaq dwellings in Greenland (Grønnow 2004: 91–94; Jensen 2006: 178). However, not many of these elaborate midpassage dwellings have been identified on Saqqaq sites and documented by excavations, probably due to the fact that many palaeo-Eskimo stone-built structures were destroyed by reuse, scavenging, erosion and cryoturbation.

The few substantial Saqqaq midpassage dwellings, which have nevertheless been excavated, do not show excellent preservation conditions like Dwelling A8. Nevertheless, comparative studies show that A8 and the other structures at Qt and Qa in many respects have counterparts in other regions, and they place the observations from the frozen sites in a broader perspective. An overview of the most important archaeological parallels is presented below:

The closest analogy to Dwelling A8 is Structure III at Tupersuai, only 40 km west of Qt (Fig. 5.38) (Olsen 1998: 95–97, 103 ff.; Mikalsen 2001: 88 ff.). The sizes of the frame stones and the outer dimensions of the midpassage itself, 3.2 m × 1.0 m, resemble A8, and so do the sediments inside the frame. They contain charcoal, flagstone fragments (from 'frying stones') and remarkably large amounts of fire-cracked rock: 123 kg. This is within the range of the quantities of fire-cracked rocks in the midpassages at

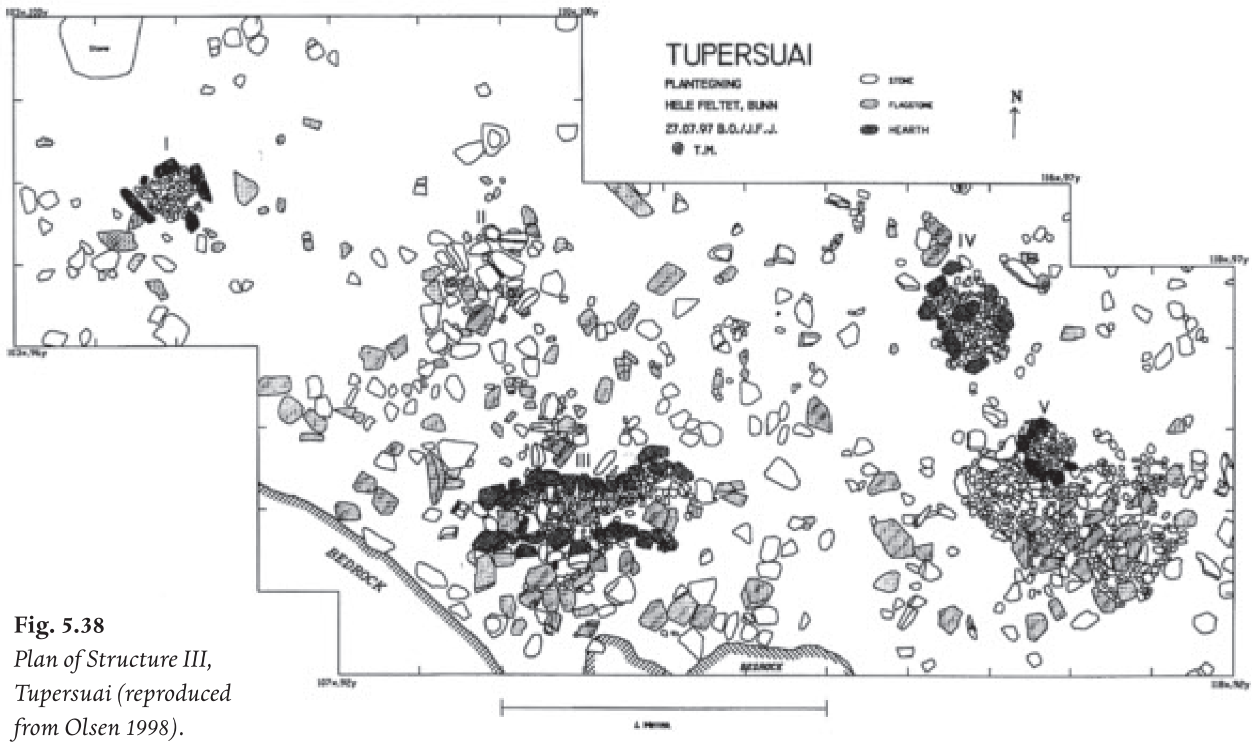


Fig. 5.38
Plan of Structure III, Tupersuai (reproduced from Olsen 1998).

Qt: 60 kg in A 3–5, 92 kg in A9, and more than 200 kg in A8. Tupersuai Structure III also shows several phases of use/reuse (Olsen 1998: 97) and several changes in the position of the fireplace inside the structure during its 'lifetime'. There is no well-defined box hearth inside the midpassage at Tupersuai, just like at Dwelling A8. However, there are no traces in Structure III of a 'work table' – a distinct zone inside the frame paved with 'fresh' beach cobbles or pebbles, which is a characteristic feature of all midpassages at Qt. The dwelling floor of Structure III is not framed by a ring of stones, and only the distribution of lithic artefacts indicates indirectly the presence of a tent erected around the midpassage.

In the Nuuk area, two structures resembling A8 and the other two midpassages at Qt have been thoroughly investigated. Structure A at Nunnguaq (excavated in 1963 and briefly described in Appelt and Pind 1996: 131–33) consists of a midpassage measuring *c.* 3 m × 1 m, which divided an oval tent floor, 5.0 m × 5.6 m, into two areas of equal size. There is, however, neither detailed information concerning the content of rocks nor the spatial distribution of artifacts published from this excavation. The other parallel in the Nuuk Fjord is 'Axial Structure A' at the site Narsaarsuup Nuua (Hinnerson-Berglund 2004: 51). This midpassage measured about 2.5m by 1 m and was divided into three parts of which the center section was as a flag stone framed hearth. Sixty fire-cracked rocks and flag stones were found in and around this midpassage. Un-burnt flag stones in front may have served as a working table parallel to the function of the front part of A8. The entire floor of 'Axial Structure A' was not uncovered and the dwelling may well have been considerably larger than the suggested 3 m by 2.75 m. None of the two Nuuk-parallels show sections filled with fresh beach pebbles.

5.3.2 Spatial organization of 'cold season dwellings'

Due to the limited source materials and 'disturbing' factors like different degrees of clearing of waste in the dwellings (c.f. Mikalsen 2001: 111) conclusions about 'typical trends' of the spatial organization of Saqqaq dwellings are problematic. For example, it is seen that the tendency to a mutually excluding spatial distribution of microblades and scrapers on the one hand and projectile points, knives and burins/burin spalls on the other, as observed at Tupersuai (Mikalsen 2001: 112) and to a certain degree at Narsaarsuup Nuua (Hinnerson-Berglund 2004: 53), is not supported by the analyses of Dwelling A8. However, other phenomena seem to be of a more general character:

It is striking that at Tupersuai and Narsaarsuup Nuua the artefacts and lithic waste concentrate along the sides of the midpassage and in only one of the two floor/platform areas. This is in accordance with the overall pattern from Dwelling A8 and supports the interpretation that these most elaborate Saqqaq dwellings were organized with a sleeping/resting area at one side of the dwelling (in some cases on top of a low platform) and a work and activity area at the opposite side. At Tupersuai the excavated area is big enough to cover the area in front of (west of) the dwelling. Here concentrations of lithic refuse and artefact fragments indicate a workshop/door-dump area similar to the situation at Dwelling A8.

These Saqqaq dwellings, characterized by elaborate and solid midpassages with several functions and use-phases, conspicuous numbers of fire-cracked rocks, great diversity of tools ('rich in finds'), and clearly organized space within a tent ring, are classified by Jensen as cold-season base camp dwellings (2006: 178). This fits very well with the interpretation of Dwelling A8 as having been used all year round, except probably during midsummer.

Other Saqqaq dwelling types meet these criteria and are classified as winter dwellings as well. In these complex dwellings a quite carefully constructed box hearth filled with fire-cracked rocks has replaced the midpassage. The best documented examples are: Nunnguaq Structure B1 in the Nuuk area (Appelt and Pind 1996: 131–32), Akia in the Sisimiut area (Fig. 5.39) (Kramer 1996b: 65–73), and Niivertussannguaq (Structure II) and Tupersuai (Structure V) in the Aas-

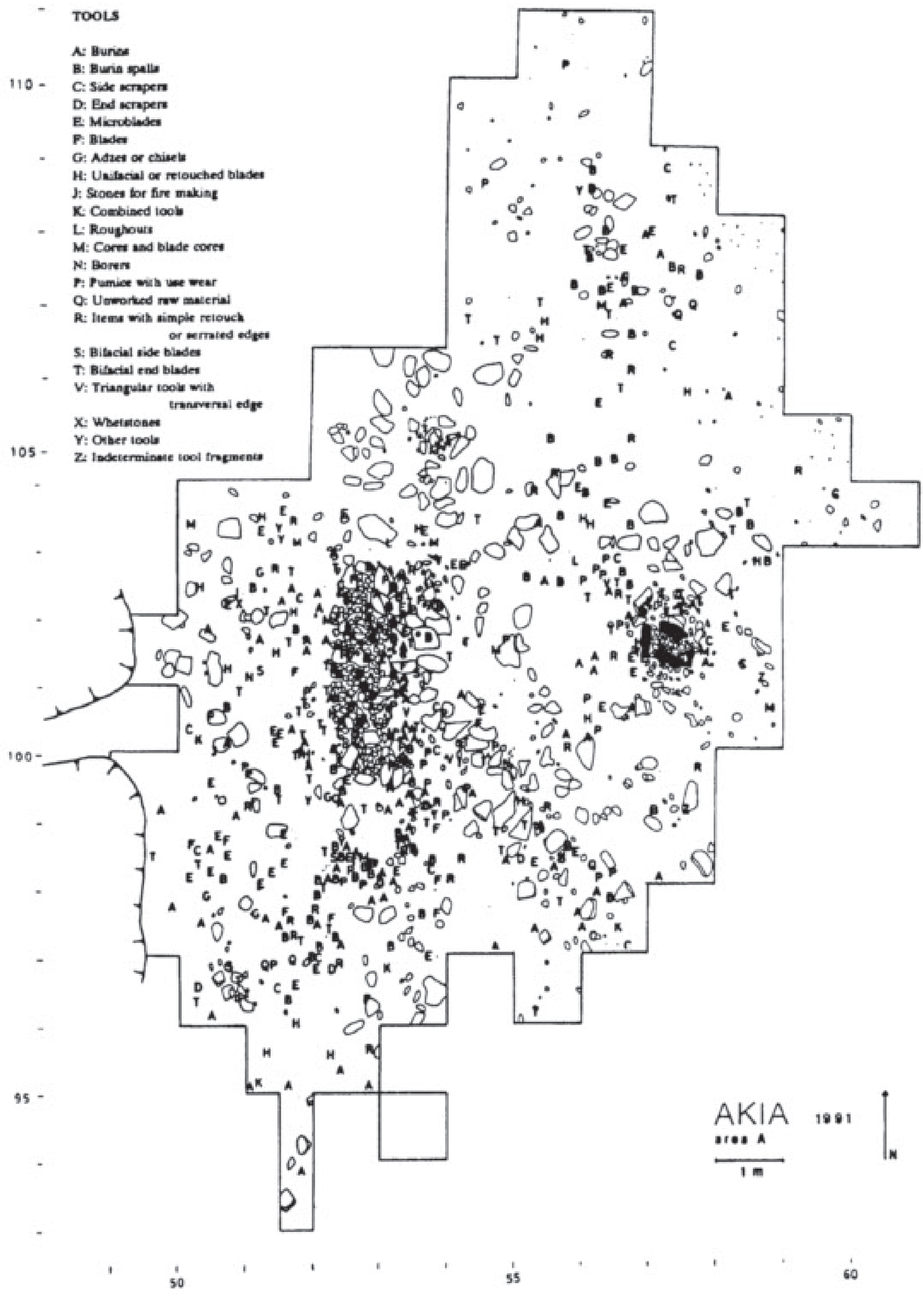


Fig. 5.39
Plan of the dwelling structure at Akia (reproduced from Kramer 1996b).

iaat area (Olsen 1998: 84 ff.). It is seen that at Akia and Niivertussannguaq, from where the spatial distributions of lithic artefacts are published, the patterns indicate a bipartition of the dwelling floor along an axis from the entrance to the back wall. As emphasized by Olsen (1998: 121) and Mikalsen (2001: 112), the division into a 'sleeping side' and a 'working side' was maintained even if a clear physical structure was not present.

A parallel to the mixed door dump/workshop area at Qt right in front of the dwelling is clearly seen at Structure II at Niivertussannguaq (Olsen 1998: 88), whereas dumping of exhausted fire-cracked rocks in piles, as represented by the dumps A2, A6 and A7 at Qt, are paralleled by Structure III at Niivertussannguaq (ibid.: 90). Conspicuously large quantities of fire-cracked rocks in a single dump are seen at Akia, where a huge pile (3 m by 1 m) of these fist-sized rocks almost leaned against the western part of the tent ring. As at Dwelling A8, a massive 'fan' of charcoal – probably cleared from the central hearth – was present outside the Akia dwelling, even if it was situated at the side and not on top of the door dump.

5.3.3 Dwelling floor size

Even though data are sparse and some of the outlines of the dwellings are irregular, we are able to extract some information on the size of the Saqqaq cold season dwellings. Measurements of the published floor plans of the selected dwellings described above (excluding Narsaarsuup Nuua, for reasons mentioned above) provide estimates of total square-metres inside the domes as presented in Table 5.3.3.

From the table it is seen that it is mainly the length variations (4.5 m–7.0 m) that create the range of the floor area measurements from 15 to 26 m^2. This is enough space to accommodate much more than a single core family. It can also be inferred from these comparisons that Dwelling A8 from Qt belongs to a group of small cold season dwellings (15–18 m^2). The larger Saqqaq dome constructions spanned floors of no less than 23–26 m^2.

5.4 Temporal dynamics of the frozen sites

5.4.1 Qeqertasussuk – subsistence periods and archaeological evidence

5.4.1.1 Introduction

In the section on the chronology of the site (Chapter 4.3), we concluded that the typological/stylistic properties of those lithic artefacts and raw material preferences which we can follow throughout the entire settlement period vary only slightly and through continuous processes. However, as seen from the section on stratigraphy (4.1.2), the matrix and content of the culture layers at Qt show marked variations. Obviously, several factors contribute to this variation: sediment formation processes, refuse accumulation rates and changes through time in the spatial position of different activity areas at the site. The last factor is clearly demonstrated through the long trench, Section C, which reveals how the culture layers at the northern part of the site consist of separate and sometimes overlapping 'heaps' of waste from different activities. Some of them might represent single events. As only a small portion of the site is excavated – about 10% of the volume of the culture layers, as calculated from the faunal materials (Meldgaard 2004: 97) – it is not possible to follow spatial displacements of the activity areas through time. But by gathering the data from Areas B and C on horizons and faunal components, we have been able to throw light on some general trends through time (Meldgaard 2004: 103, 111–13, 159 ff.). Meldgaard identified three 'subsistence periods' based on temporal changes in the economy: the Base Camp Periods I and II, and the Hunting Camp Period. In the following chapter we investigate how these subsistence periods are reflected in the archaeological evidence.

Fluctuations in the frequencies of the tool types through time are seen mainly as resulting from changes in craft- and subsistence-related activities at Qt and not as a reflection of general chronological trends in the Saqqaq culture. The archaeological materials used for the quantitative analyses must meet two important criteria: they should be from contexts where they can be connected to well-defined chronological horizons and the different tool types must be present in significant numbers. As seen from Tables 5.4.1-1 through 5.4.1-3, the lithic materials from Area C, H1–H5, meet these criteria. The quantity of lithic artefacts in Area B is quite limited: only 696 artefacts (529 flakes and 167 tools) are from Area B, whereas 12,262 lithic artefacts, including 1,279 tools, were located in Area C. However, the inventories from the lowermost layers in Area B (H4–H5) comprise 130 lithic tools, and they will be used as supplementary data in the frequency analyses.

The frequency analyses are based on a comprehensive, well-dated lithic material, but it must be kept in mind that it mainly originates from Area C, a 7.5 m × 5.5 m area. Thus there is an issue of representativity in relation to conclusions concerning the entire site. It is not possible to elaborate or test this by means of the available data set, as the lithic finds from Area B, as mentioned above, and the test pits covering the entire northern part of the site are not numerous enough and do not meet the dating criteria. This must be kept in mind when evaluating the results of the following analyses.

5.4.1.2 An overview of the subsistence periods at Qt (Fig. 5.40)

The characteristics of the three 'subsistence periods' at Qt can be summarized as follows:

The earliest 'permanent' settlement at Qt is represented by Faunal Component III (**'Base Camp Period I'**), dated to *c.* 2400–2200 cal BC, which is parallel to H5. The faunal data indicate that the site was inhabited throughout the year, except perhaps in July, and that resources were brought to the site from the entire Sydostbugten. Expressed in biomass consumption, harp seal

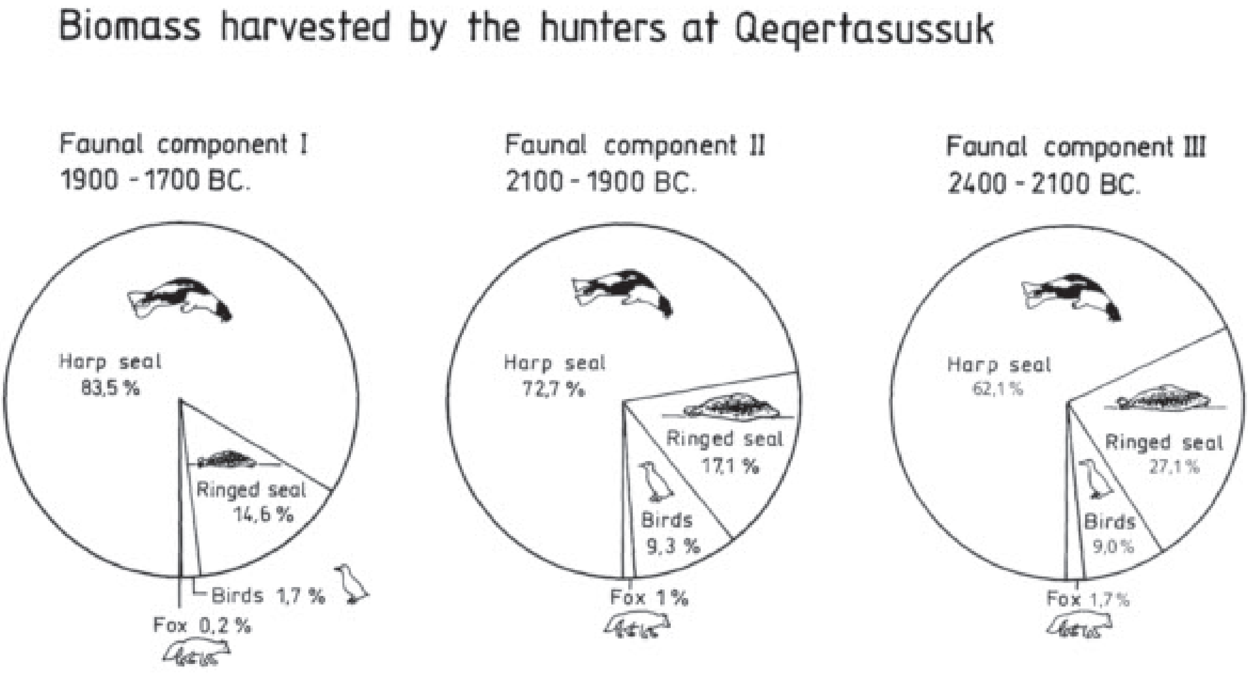


Fig. 5.40
The three subsistence periods at Qt based on M. Meldgaard's quantitative faunal analyses (Faunal Components I–III). (Reproduced from Meldgaard 2004).

dominated with 62%, but ringed seal was also of quantitative importance (27%). Birds, dominated by Brünnich's guillemot, little auk and fulmar, made up 9% of the food intake, whereas fox was represented with about 2% biomass. A few caribou and ptarmigan bones show that inland resources were exploited as well.

The following settlement period at Qt is represented by Faunal Component II (**'Base Camp Period II'**), dated to *c.* 2200–1900 cal BC. This comprises the archaeological Horizons 4 and 3. Large quantities of bones – about twice as many as in the other phases – accumulated in the midden area. The site was, as in the early phase, used on a whole-year basis. As regards biomass, the relative importance of the different game species changed only slightly: harp seal now dominated by 73% over ringed seal at 17%, while the relative quantity of food from birds (and fox) remained almost unchanged compared to the early period. However, there is a difference: a drop in the representation of the young-of-the-year harp seals. Meldgaard concluded that increasing weight was put on open-water hunting of entire herds of harp seal, and accordingly communal mass hunting of *ammissut* was introduced. Caribou and ptarmigan were hunted inland and brought back to the camp on the island in quite limited quantities.

The latest phase with bone preservation is Faunal Component I, dated to *c.* 1900–1750 cal BC. This is parallel to H2. The phase was designated the **'Hunting Camp Period'** due to a change in site use: in this period emphasis was put on spring and early summer harp seal hunting. Harp seal now completely dominated the food intake with 84% of the total biomass consumed at the site, and mass hunting of migrating harp seal was a dominant subsistence activity. Ringed seal, showing winter presence, represented 15% of the resources, whereas input from birds and fox dropped to a mere 1%. Inland resources in the shape of caribou products were still brought to the site. According to Meldgaard's interpretation, Qt had now developed from a whole-year base camp into a site which was sporadically used throughout the year as an integral part of a seasonal cycle including several other sites and base camps elsewhere in Sydostbugten (Meldgaard 2004: 169).

There is regrettably not enough faunal material preserved from the latest settlement phase, the archaeological H1, to characterize the subsistence economy in this period, which followed a probable 'lacuna' in the sequence at the site. H1 is dated to a period after *c.* 1500 cal BC, and it is characterized by the largest content of lithic artefacts among all horizons.

5.4.1.3 Archaeological evidence and the subsistence periods

Based on the characterization of the 'subsistence periods', it is expected that the archaeological inventories from the Base Camp I and II periods – corresponding to Horizons 5, 4 and 3 – would reflect a continuum, as the whole-year use of the site and its economic basis did not change radically. There was, as seen above, a development towards an increased emphasis on open-water hunting of harp seal herds, which could have made an impact on the frequencies of lithic tool categories. However, only a few tendencies are seen from the archaeological data set (Figs. 5.41a and 5.41b; Table 4.3.1-1 through 4.3.1-4 and Table 5.4.1-1 through 5.4.1-3): the frequencies of microblades decrease systematically from H5 to H3 (17% to 8%) and the frequencies of burins do the same (21% to 13%), whereas the frequencies of simple retouched flakes increase quite significantly (15% to 31%). The frequency of bifacial endblades is uniformly high throughout the horizons (26% to 23%), but when these data are qualified (Figure 5.41b; Table 5.4.1-1) some changes are observed: there is an increase in the relative quantum of harpoon points from H5 to H3, generally low frequencies of arrowheads in all three early horizons, and a decrease in bifacial knives from H5 to H3. In addition to the 27 harpoon heads of ivory, antler and wood that were recovered in Area C, the majority (16 heads or 60%) are from H4, which corresponds to the highest frequency of small triangular harpoon points (49% of bifacial blades) among the horizons.

Fig. 5.41
a: *Frequencies of formal lithic tool types in the different chronological horizons at Qt. H5 is the earliest and H1 is the latest horizon. (2: microblades; 3: bifacial endblades; 5: other endblades; 6: burins; 7: burins with polished facets; 8: end scrapers; 9: side scrapers; 10: drills; 11: saws; 12: adzes and chisels; 13: flakes with retouch or edge serration; 14: other tools; 15: strike-a-lights; 16: graters and grinding stones; 17: hammerstones).*
b: *Frequencies of bifacial endblade types by chronological horizon.*

Obviously, there is no simple correlation between these tendencies in tool frequencies and the development of the subsistence economy from Base Camp Period I to Period II. However, a few significant trends are observed:

The change from individual seal hunting (H5) to the introduction of mass hunting of harp seal herds in H4 and H3 is not clearly seen in the inventory, but generally the high percentages of tools for seal hunting and sealskin processing (harpoon heads and points, bifacial knives, microblades and (probably) simple retouched flakes) fit the picture derived from the faunal analysis. The significantly high percentages of microblades in H5–3 would match an emphasis on the cutting of skin for garments, etc. made from the large numbers of sealskins at the site. The decrease in the importance of microblades through time might correspond to the marked increase in the frequency of simple retouched flakes from H5 to H3, thus showing a shift in the skin-cutting tool kit.

Moving ahead to H2, we enter the Hunting Camp Period. This marks the transition from a whole-year settlement to sporadic presence throughout the year and a period with a narrow focus on seasonal harp seal hunting on a large scale. Drastic changes are now observed in the structure of the layers at Qt: a huge oval refuse heap (*c.* 14 m E–W, 10 m N–S, 10–90 cm deep and with up to 20 kg of bones per square metre, i.e. an estimated total of 1–2 tonnes of bones) covers Area C and its vicinity, as the bone density curves in Meldgaard 2004 (98) clearly show. The content of the waste heap consists of massive amounts of fire-cracked rocks, charcoal, disarticulated bones of harp seals, charred blubber and congealed blubber oil, which, particularly in the south-eastern part of Area C, soaked the layers below the heap. The inhabitants responsible for these activities should have left some traces of dwellings or shelters, but it is not possible to identify stone-built structures belonging to H2 in Area C or in other parts of the site without further excavations.

The archaeological characterization of H2 fits very well with the faunal evidence. As described above, the overwhelmingly predominant hunting technique in this period was targeted towards herds of migrating harp seals (84% of the biomass at the site). This would yield large quantities of meat and blubber from just a single hunting event. Processing of these bulk resources during the Hunting Camp Period must in some way be 'responsible' for the huge amounts of charcoal and fire-cracked rocks which make up the matrix of H2, but it is difficult to pinpoint such a causality due to the lack of ethnographic/historical analogies for this phenomenon. Bulk production of blubber oil for later storage in skin bags does not necessarily involve heated stones, as seal blubber is self-rendering (Burch 1998: 94). Nevertheless, meat and blubber processing, as well as seeping oil from decaying blubber, resulted in the 'cementation' of the layers below the refuse heap. Parallel cases of 'industrial' processing of bulk living resources following large-scale communal hunting are described by e.g. Grønnow concerning caribou (1987: 149) and Wheat concerning bison (1972).

The intensive use of fire and heat during the Hunting Camp Period is also documented by the remarkably high percentage of fire-cracked lithic artefacts from H2. The percentages of fire-cracked lithics from all periods at Qt, starting with the earliest horizon, are informative: H5: 38% (out of a total of 928 lithics), H4: 40% (out of a total of 1,886 lithics), H3: 14% (out of 1,615 lithics), H2: 49% (out of 3,511 lithics) and H1: 25% (out of 6,040 lithics). As can be seen, no less than 49%, nearly half of all lithics from H2 have been exposed to open fire or very intensive heat from hot rocks. This is the highest content of fire-cracked lithics among the settlement periods at the site.

One would expect this radical change in subsistence economy to be reflected in the tool frequencies, but as seen from Table 5.4.1-2, bifacial (flensing) knives are not important in H2 and microblades for fine cutting are almost absent. This is, however, matched by a high frequency of simple retouched flakes (24%), which might have substituted for formal knives and blades during this period.

A significant increase in the importance of arrowheads from H3 to H2 (from 13% to 32% of the bifacial endblades per horizon) indicate an increased emphasis on caribou hunting, but a corresponding change is not visible in the faunal material from H4/H3 to H2.

The artefacts from H1 are, in absolute terms, the most numerous at Qt. Table 5.4.1-1 shows that no fewer than 4,645 flakes and tools (38% of the total lithic material) comes from this, the latest settlement period at the site. As mentioned above, no 'subsistence profile' of this High Activity Period could be constructed due to lack of faunal material.

In spite of the fact that numerous large stones were encapsulated in the sediments forming H1, no well-defined tent rings or fireplaces could be identified in the horizon. The layers of H1 have been exposed to heavy cryoturbation and this has probably destroyed the features. H1 contained only a very small amount of fist-sized, fire-cracked rocks ('boiling stones'). This fact alone suggests a radical change from the role of the site from H2 to H1. However, the tool frequencies are not very informative, as they are quite similar to those of earlier horizons. The only remarkable difference is the high frequency of burins in H1 (25%) – the highest percentage of burins among all horizons – meaning that much weight was put on working hard organic materials like antler, bone and ivory during this period. The high frequency of arrowheads, which H1 shares with H2, is an indication of the importance of caribou hunting.

5.4.1.4 Conclusions: activities at Qeqertasussuk through time

The changing role of the Qt site through time was investigated with a starting point in the three 'subsistence periods' defined by faunal analyses, which showed some significant changes. It was attempted to trace these subsistence changes in the archaeological record of the corresponding chronological horizons. There are issues of representativity concerning the lithic inventories, but in combination with observations on the changing matrixes of the culture layers, some conclusions were reached:

The continuous development of the whole-year subsistence economy at the site through Base Camp Periods I and II, representing the early stages at Qt, is matched by a diverse artefact inventory which does not change significantly through time. It is not possible to identify the growing importance of the mass hunting of harp seal in the archaeological record as far as tool frequencies or the introduction of new tool types are concerned. However, a shift in the tool types used for flensing seals and processing of skins into garments was seen through a relative increase in the frequency of simple retouched flake knives at the expense of bifacial knives and microblades.

The following subsistence period, 'The Hunting Camp Period', represents a radical change in the use of the site: a transition from a whole-year settlement to a seasonal camp focused on communal mass hunting of harp seal herds. This development is clearly reflected in the character and structure of the sediments: a mixture of seal bones, fire-cracked rocks, charcoal, charred blubber and congealed blubber oil now accumulate on top of the earlier layers. It was concluded that this huge refuse heap was related to systematic processing of bulk products from harp seal for storage – dried meat, blubber oil and skin – but it will take further research to understand these relations.

It is difficult to characterize the last phase at Qt as almost no faunal remains and stone-built structures are preserved. Concerning lithic artefacts, the relative frequencies of the tool types are almost identical to the earlier horizon, but as this layer included only a small proportion of fire-cracked rocks and flakes, the subsistence economy and the activities must have differed from the preceding phases. The use of Qt had changed, and following this the site was abandoned, never to be settled again.

5.4.2 Temporal dynamics at Qajaa

Concerning Qa, which is interpreted as a huge aggregation site, it is expected that the number of inhabitants, the intensity of use, the subsistence base, the importance of the site, etc., must have varied considerably throughout its many centuries of use. It is clear from investigations of other archaeologically/historically known long-term aggregation sites in the Arctic that they change role through time, e.g. from regional to inter-regional centres (e.g. Grønnow *et al.* 1983).

Regrettably, due to the limited excavations at Qa, it is not clear how the importance and function of the site changed through time. The culture layers at Qa are, as seen, unevenly distributed on the site area and they are of varying character, but based on the current data it is not possible to determine if this heterogeneity reflects spatially differentiated but contemporary activity zones, chronological use phases of different character, or – probably – a mixture of both factors. The excavations and the faunal analyses from the 1980s simply do not allow conclusions on differences in site use and formation through time. It is, however, interesting that massive heaps of a mixture of fire-cracked rocks, (harp) seal bones, charcoal, charred blubber and twigs, up to about a metre thick, are found in the northern part of Qa. As far as volume and character are concerned, these heaps at Qa are directly parallel to the heap in H2 covering Area C at Qt.

6. The Saqqaq Human Being, Society and Cosmology

6.1 Human bones and hair from Qt: evidence from morphology and aDNA

Human remains from the Early ASTt are extremely rare. No formal burials containing bones are known and in Canada only two finds have been made – a foetus skeleton found in an irregular, shallow pit inside a Pre-Dorset tent ring on Devon Island (Helmer and Kennedy 1986) and a mandible of an adult person at the Umingmak site (Haidle 1992). Thus it is of great importance that the excavations at Qt revealed a few bones and some clumps of human hair. The assemblage from Qa regrettably does not contain any human remains. The human bones from Qt have previously been published in overview papers (Koch *et al*. 1996) and the hair formed the basis for ground-breaking analyses based on extraction of ancient DNA (aDNA), which have yielded information on the genetic origins of the Saqqaq people (Gilbert *et al*. 2008; Rasmussen *et al*. 2010; Raghavan *et al*. 2014).

The four human bones from Qt are described in detail in Appendix C (by Frølich and Lynnerup), where morphological, pathological and chronological evidence is presented. In the following an overview of the contexts and the results of the forensic analyses of the bones will be presented.

The finds consist of: an almost complete diaphysis of a left tibia, two fibulae (a left and a right, both missing their proximal ends), and a

Fig. 6.1
The human bones from Qt. From above: a left tibia, two fibulae, and a fragment of a left humerus. All from the midden area, Area B. (Photo: Geert Brovad).

proximal part of a left humerus (Fig. 6.1). The first three mentioned were all excavated *in situ* in Layer 6 in Area B (the midden area), i.e. they belong to the H5/Faunal Component III, which is the earliest settlement phase at Qt. These three leg bones were found close to each other in the square-metre units 12/24 and 13/24 in the middle/upper part of the early midden layer (20–30 cm above the sterile beach sand), but not in anatomical order, i.e. the human bones were – just like animal bones, twigs and heather, wood, fire-cracked rocks – part of the midden heap. The humerus fragment had fallen down from the present erosion bank of the midden and was collected on the beach in front of Area B, thus with no secure find context. There is, however, no doubt that this fragment belongs to the Saqqaq assemblage.

Morphological observations, metric analysis, and microscopic analysis of secondary osteons (see Appendix C) show that the humerus likely belonged to a male at the age of 40–60 years, whereas the three leg bones all derive from a female – probably the same individual – who was 25–40 years at the time of death. The living stature of the female was estimated at *c.* 150 cm (in accordance with the range of the stature of later Thule culture women).

So-called Harris lines were identified by X-ray in the tibia and the fibulae, and they might indicate periods of stress during the woman's life. The male humerus fragment shows signs of osteoporosis, which could reflect diagenetic factors, hormonal disturbances and/or a dietary calcium deficit.

The tibia, one of the fibulae and the humerus were AMS-dated (Table 2, Appendix C). These dates were made in the early years of AMS dating (1995) in Aarhus, Denmark, and thus the standard deviation is very high. However, corrected for the marine reservoir effect (about 410 years), the direct dates of the bones place them within the time frames of H4 (3760 BP–3640 BP) and H5 (3880 BP–3760 BP), i.e. in the early phases of settlement at Qt. The $\partial^{13}C$ measurements fall within – 12.9 to –13.11, indicating a diet completely dominated by marine food sources. Obviously, this is in accordance with the analyses of food consumption at the site based on faunal material.

There is no straightforward explanation for why the human bones ended their life cycle in the middle of what was a genuine heap of waste. A burial ritual including skeletonization, subsequent treatment of selected bones, and ultimately discard of 'unimportant' bones could be the explanation for this final deposition of the male humerus and the three female leg bones. This is one of the ways that the later Dorset culture seems to have treated its dead (Lynnerup *et al.* 2003). Haematite/ochre has been observed in connection with these supposed Dorset burials, and it is interesting that the tibia diaphysis from Qt shows two tiny spots of haematite on the surface of the distal part. However, the bones could also originate in disturbed graves from the near vicinity of the site and by coincidence have found their way into this corner of the site. Such 'loose' human bones are sometimes found below a scree with Thule culture graves that have been disturbed, whether by nature or humans. However, no Saqqaq burials were discovered on the island of Qeqertasussuk in spite of intensive surveys.

On a morphological basis, five samples of hair among many finds of animal hair at Qt were initially thought to be possible human hair. Two of these samples (85/261: 12 and 20/20: 75) were microscopically investigated in detail by Rørdam and Jensen (1991a; 1991 b) and determined to be of human origin. This was later confirmed by aDNA analysis and further morphological analysis by Silvana Tridico, see below. The three other samples turned out to be non-human hair, according to the aDNA tests.

Like the human bones, the clumps of human hair were found in contexts which seem accidental, i.e. they were located randomly in the permanently frozen layers containing animal bones, wood shavings, lithic flakes, fire-cracked rocks and other refuse. The two samples analysed in detail morphologically seem to be cut off, and thus resulting from a 'haircut' rather than being remains from disturbed graves.

The clump 20/20: 75 is particularly interesting as a bone needle with a drilled broken and a half-finished eye was recovered inside it. The clump perhaps served as a pincushion, or maybe the Saqqaq seamstresses stored their needles in their piled-up hairdo?

85/261: 12 is a large clump of hair (15 × 9 cm and 5 cm thick) which – when we extracted the samples for aDNA – turned out to be a folded tuft, meaning that many of the single hairs were in fact up to 20 cm long. The hairs were hard and well preserved, even if the surface and thus the scales were degraded to some extent (Fig. 6.2). Further analyses were carried out on this sample (Rasmussen *et al.* 2010), which was recovered in Section C, Layer 15 (assigned to H3: 3640 BP–3570 BP (estimated best fit: 2000 cal BC–1900 cal BC)).

The AMS date of the hair clump itself gave the following result (Appendix C, Table 2): OxA20656 4.044 ± 31 BP. Due to a $\partial^{13}C$ content of –13.9, this date must be corrected for the marine reservoir effect. Thus the calibrated date comes out at 2085 – 1778 cal BC (one standard deviation) (Rasmussen *et al.* 2010: Table S2). This absolute time frame nicely fits the AMS date of a caribou cranium from the same context (Table 4.1.5-1): OxA18749: 3628 ± 28 BP. Calibration: OxCal v. 3.10: 2030 – 1950 BC (one standard deviation).

In connection with the latest aDNA project (Raghavan *et al.* 2014), two more human hair samples, Qt1.1 and Qt2.1, were AMS-dated. This material was collected among clumps of fallen-down cultural remains below the erosion bank close to Area B. From Appendix C, Table 2 it is seen that the absolute ages of these samples are very close to the age of the large hair clump, only about 35 and 75 ^{14}C years younger, respectively. The dates support the notion that the hair samples are a little older than the human bones, which is in accordance with the contextual data.

Detailed morphological analyses of a sample of hairs from the large hair clump, 85/261: 12, were carried out by Silvana Tridico (Rasmussen *et al.* 2010: Supplementary Information, 1–4). They confirmed and supplemented the earlier

Fig. 6.2
The clump of human hair from Qt, 85/261: 12, recovered in Layer 15 belonging to Horizon 3, Section C. (Photo: Peter Andreas Toft).

observations by Rørdam and Jensen: in spite of some fungal tunnelling, the hairs were excellently preserved, they were black and coarse, showed a diameter of 100 μm (within the range of Mongoloid scalp hairs), and had a circular cross section typical of Mongoloid rather than Caucasian scalp hairs.

Stable isotope analyses of the hair samples concerning the $\partial^{13}C$ and $\partial^{15}N$ values underline the fact that Saqqaq human subsistence was based almost exclusively on high trophic level marine living resources. In a comparative study, the measurements place the Saqqaq diet in the midst of a cluster of prehistoric Greenland Thule culture diets (Rasmussen *et al.* 2010: 758 and Supplementary Information, 7–8; Raghavan *et al.* 2014).

In two pioneering steps the aDNA laboratory at the University of Copenhagen carried out aDNA analyses of hair from the sample 85/261: 12. First, in 2007–08, a team headed by Tom Gilbert (Gilbert *et al.* 2008) extracted mitochondrial DNA from the sample and sequenced it. The results showed that the Saqqaq person belonged to haplogroup D2a1, which is distinct from modern Native Americans and Inuit. The closest modern descendants of the Saqqaq, according to this matrilineal line, are people of the Bering Strait area, Aleuts and Siberian Sireniki Yuits. On this basis it was concluded that there was a matrilineal discontinuity between the Saqqaq people and the Inuit of the Thule culture (Gilbert *et al.* 2008: 3). Second, in 2009–10 a team headed by Morten Rasmussen and Eske Willerslev succeeded in extracting from the Qt hair sample the first complete ancient human nuclear genome (Rasmussen *et al.* 2010). In accordance with the results from the mtDNA analyses, the nuclear genome points to an Asian/Bering Strait origin of the Saqqaq people. The Saqqaq person could be assigned to the Y chromosome haplogroup of Q1a, and the most closely related ethnographically known groups are Koryaks and Chukchis, now living on the western side of the Bering Strait.

The mapping of the nuclear genome resulted in a closer characterization of the original 'owner' of the hair clump from Qt: it was a male person, who had blood type A+, brown eyes, dark thick hair with an increased risk of baldness, shovel-graded front teeth, earwax of the dry type, and he was adapted to a cold climate according to his body mass index.

From the bio-anthropological and genetic investigations of the four human limb bones and two clumps of human hair from Qt it can be concluded that a remarkably detailed picture of at least one individual from the site can be drawn and that the results of the bone and the hair analyses are in accord: they place the Saqqaq individuals within the body size range (stature and body mass index) of the Greenland Thule culture (Inuit before colonization) and within their diet type, completely dominated by marine animals at the top of the food chain.

But the analyses also point to the fact that the Saqqaq's closest modern descendants, genetically speaking, are people from Siberia (like Koryaks and Chukchi) and, from the evidence of the mtDNA, from the Aleuts. As will be touched upon below (Chapter 8.3), this genetic track is in accordance with archaeologically based theories of palaeo-Eskimo origins (e.g. McGhee 1996: 41). Estimates based on mtDNA mutation rates indicate that the shared ancestry of Saqqaq and Inuit dates back to before the palaeo-Eskimo movement into the New World (over 5500 years BP) and that 'the ancestral Saqqaq separated from their Old World relatives almost immediately before their migration into the New World' (Rasmussen *et al.* 2010: 761). The latest comprehensive aDNA study of Arctic human remains supports these conclusions, and adds the information that there was a genetic continuity throughout four millennia in the Eastern Arctic, from the earliest ASTt groups to the Late Dorset (Raghavan *et al.* 2014).

In a final attempt at drawing a 'close-up' picture of the individuals at Qt, we return for a moment to a particular find: the foot of the kamik stocking (Fig. 3.116). The object was completely compressed, but at the recovery from the frozen layer in 1986 the excavators could observe wear marks or imprints of the toes in the sole and the repaired hole caused by wear of the nail of the big toe in the distal end of the uppers. At this moment we felt that the distance between us and them collapsed.

6.2 On the track of space and gender at Qt

Aspects of a society's social dimensions are embedded in its material culture and the ways and contexts in which material culture is brought into play. Thus, gender and age relations have shaped the archaeological record (LeMoine 2003; Boismier 1991; Yates 1989; Whitelaw 1994; Lally and Moore 2011). Archaeological data on gender are often derived from graves, where certain artefacts ('grave goods') appear in gender-specific, but rarely unambiguous, contexts. Due to lack of formal Saqqaq graves, identification of gender-specific traits and artefacts by such contextual data is not an option. We must turn to more indirect evidence and in a balanced way apply ethnographic analogy in our archaeological inference in order to identify male and female spheres in the Saqqaq culture in general (Ravn 1993, 2011; Grønnow 1993; Wylie 1985; LeMoine 2003) and specifically gendered spaces inside Dwelling A8 at Qt. The starting point for our inquiry is the identification of material culture contexts, which in historic/ethnographic Inuit societies were gender-specific. Additionally, these markers of gender must be of a kind that, in spite of taphonomic processes, would 'survive' and become part of an archaeological record comparable to those at Qt and Qa.

A survey of the ethnographic record (Birket-Smith 1929; Nelson 1899; Nansen 1891; Boas 1888; Jenness 1922; Mathiassen 1928; Turner 1894) shows that blubber lamps, blubber pounders, wick trimmers, pots, spoons and wooden trays (light, heat and food preparation) almost exclusively belonged to the Inuit female domain. Lamps and the related objects (and knowledge) were inherited in a female 'order of succession': from mother to daughter or the closest female relative. Likewise, the preparation, cutting and technologically advanced sewing of skins for garments were exclusively female domains (LeMoine 2003: 127–31). Thus, in historic Inuit societies we can connect sewing needles, needle cases, thimbles, sewing knives and skin-working tools, as well as certain scrapers, softeners, scraping boards, sewing knives, etc. to female activities. In the preceding chapters, we have – based on technological arguments, work traces, contexts and formal ethnographical analogies – ascribed certain functions to the archaeologically recovered artefacts, and that facilitates the search for female spatial domains on the H4-surface at Qt by analogical inference (formal analogies).

In the Saqqaq find material blubber lamps, spoons, ladles, bowls and trays were recorded, as well as bags for boiling meat, frying stones and, not least, huge numbers of fire-cracked rocks connected to food processing and consumption. Sewing needles and microblades (probably 'sewing knives') were identified as well. It was furthermore suggested that bifacial knives were first and foremost connected to women's flensing and cutting of meat and blubber, but this is not a certain relation. Likewise, end scrapers could not unambiguously be connected to skin work. Thus bifacial knives and end scrapers are not incorporated in the following gender/space analysis.

The H4-surface at Qt yielded spatial data showing that two characteristic tool kits – each consisting of one or two spoons/ladles and a wooden bowl – were located right next to the midpassage in Dwelling A8: one set west of the front part of A8 and one set east of the back part of this feature (Fig. 5.27). This was interpreted as traces of food processing/serving on each side of the midpassage and, in accordance with our analogies, this is an indication of the close relation between the midpassage and female activities. Furthermore, it is suggested that the two spoon/bowl sets are the archaeological imprint of two adult women in Dwelling A8. Finds of remains of skin bags for boiling meat soup inside the midpassage, frying stones and large quantities of fire-cracked rocks inside the midpassage frame are traces of food processing directly connected to this feature as well, and this supports the notion that the midpassage was an integral and focal part of the female domain. Turning to the distribution of tools connected to skin processing and fine sewing, there are regrettably no bone needles (direct evidence of detailed sewing) on the H4-surface. However, the distribution of microblades ('sewing knives') is informative, as a considerable number (eight out of 14 microblades inside Dwelling A8) were concentrated along the sides of the back part of the midpassage. This supports the argument that there was a close relation between female activities and the midpassage. However, it must be noted that seven microblade fragments were located in the combined 'workshop and door dump' in front of Dwelling A8. Their distribution is not distinct and could be a result of clearing of the dwelling floor, but it could also indicate that minute skin-working also took place outside, in front of the dwelling.

It is difficult from the ethnographical sources to pinpoint common components of material culture which were specifically connected to Inuit male activities and which would be preserved in the archaeological record. Arctic ethnography tells of many examples of crafts and other activities that are shared between men and women and *ad hoc* shifts of tasks. Hunting and carving, for instance, could in the Thule area be carried out by Inuhuit women, depending on specific situations, and seal-flensing and sewing (repair and float-making) by men (Holtved 1967: 123 ff.). However, in general the sources point at the production and repair of hunting tools being connected with the male crafts, and thus we should be looking for material traces of 'retooling' in the archaeological record to trace the focal areas of at least some of the Saqqaq male activities.

The spatial analyses of site surface H4 included traces from the repair of arrow shafts and bows, shafts of light lances, darts and bird darts (wooden foreshafts and end prongs of whalebone), and harpoon heads (Chapter 5.1.2). It was concluded that these artefact categories share distribution patterns indicating that repair of hunting gear primarily took place in the 'workshop and door dump area' in front of Dwelling A8, and to a lesser degree inside in the eastern part of the dwelling (Fig. 5.22 ff.). This picture could be supplemented with information concerning tool classes that were indispensable or useful in the production, repair and retooling process: burins, side scrapers and pumice grinders. The distribution of the burins follows the general trend, showing activities both inside (next to the midpassage) and outside in the workshop area, whereas the pumice grinders and side scrapers are solely connected to work centred round the midpassage itself (Fig. 5.13). In this line of argument, these distributions suggest that the male spheres included work close to the heat and light of the hearth and thus overlapped a focal area for female activities.

To sum up: Based on ethnographic analogies a few tool categories were selected for analysis of gender and space on the H4-surface. The distribution of tool kits and refuse connected to food processing and consumption, as well as to fine skin cutting and sewing, underlined the importance of the dwelling's midpassage as a focal point of female space at the site. The male sphere was reflected in tools and refuse from repair of hunting tools, and it was argued that the focal areas of these activities were the 'workshop and door dump area' in front of the dwelling, as well as indoors along the midpassage. Obviously, the focal areas of the genders do not exclude each other. They overlap both inside and outside the dome.

Furthermore, based on the sets of spoons/ladles and bowls it was suggested that two adult women were among the inhabitants of the dome: one with her space on the eastern side of the midpassage, including the floor and platform characterized by traces of intensive craft activities, and one woman with her space at the western side of the midpassage, where activities were few (i.e. have left only a few archaeological traces) and where the sleeping platform was probably situated.

6.3 Where are the children?

Children are the most obvious age group to search for in the material culture of the Saqqaq sites. By analogy with Thule culture/historical Inuit sites, one would expect children to have left clear and numerous archaeological traces of their presence and activities at the sites (e.g. Mathiassen 1930: 254–57). In an Inuit context, material remains from children's activities consist of, for example, miniature models of adult artefacts, female and male dolls, figurines, as well as stone-built structures situated on playgrounds in the proximity of the settlement. These playgrounds include outlines of kayaks and umiaqs, tent rings, winter houses and meat caches – all in miniature sizes (Hardenberg 2010; Park 1998; see also Lillehammer 1989). The children's world is archaeologically visible at practically all substantial Thule culture sites in the Eastern Arctic, but remarkably this is not the case at Saqqaq sites.

Perhaps we have not cracked the 'code for children' in the Saqqaq archaeological record yet, or alternatively the archaeological picture may reflect that the concept of childhood in Saqqaq times was different from the Inuit's concepts (e.g. Guemple 1988). Thule culture kids made themselves 'spaces of their own' – physically manifested in playgrounds – while growing up (e.g. Hardenberg 2010: 207). It has not been possible to trace any Saqqaq playgrounds in the vicinity of the sites of Qt and Qa. In fact, play houses etc. are not known from any ASTt context.

Through analysis of the artefacts we have been able to point at a few 'models' or miniatures among thousands of finds, that with some probability could be classified as 'toys'. These include a probable wooden toy bow (Fig. 3. 4) and a tiny harpoon triangular endblade of killiaq from Qt and a miniature end prong from Qa. In addition, it was speculated that a paper-thin wooden arrowhead 'depicting' a typical tanged killiaq head from Qt (Fig. 3.11) might have served as a model for an apprentice knapper, and that four wooden harpoon heads from the same site were 'models' rather than functional tools. This is the quite meagre result of our search for toys at Qa and Qt. However, it must be added that a couple of later Saqqaq sites in the Nuuk area show a few tiny, round soapstone lamps, which are probably toys (Appelt and Pind 1996: 139–41).

The sparse direct evidence of children at Qt and Qa might, as mentioned above, be due to our lack of understanding to interpret the archaeological sources, but it might also be a signal that the Saqqaq society did not consider 'childhood' a social category. 'Toys' as models of the adult world were more than rare and dolls were absent. Perhaps children preferred to play with and learn from handling the tools of the adults. Indeed, most functional Saqqaq tools are of a size and shape that an Inuit would consider a toy (personal observation from an 'on-site' demonstration of Saqqaq artefacts for people from Qasigiannguit and their guests from the friendship community, Broughton Island, Baffin Island, 1986), and most of the full-scale, lightweight Saqqaq tools could easily have been handled by kids, unlike many full-scale Thule culture artefacts. Perhaps Saqqaq children were given the whole spectrum of functional tools to experiment with. If children's playing was not separated from the adult world, either mentally or by its material expression, it might have worked to maintain a strong cultural identity and continuity (c.f. Guemple 1988: 147). The children's constant engagement with real, not toy artefacts, structures and spaces would fit perfectly into the key position which Saqqaq material culture is thought to have occupied, including a strict demarcation of social norms.

Given the observations and considerations above, it is at present not possible to discover any delimited spaces belonging to children on the site surface H4 at Qt. As with analyses of Palaeolithic sites in Europe, where traces of apprentices ('learners') were identified (e.g. Fischer 1990; Johansen and Stapert 2008; see also Milne 2005), future detailed refitting analyses of lithic and organic refuse might pave the road to an archaeological detection of children on Saqqaq sites, and yield at least a glimpse of a children's world which was probably quite different from later cultures.

6.4 Saqqaq identity

Triggered by the discovery of the drum rim fragments from Qt and Qa, a recent paper explores the symbolic and cosmological aspects of the Saqqaq culture (Grønnow 2012a). The following two sections are based on these analyses and interpretations.

The theoretical starting point for the following analysis is that material culture is imbued with layers of symbolic meaning (e.g. Hodder 1982; for the Arctic, e.g., Fitzhugh and Kaplan 1982; Fienup-Riordan 2007). Furthermore, it is assumed that material culture is an actor, in the sense that human creation and manipulation of it and constant interaction with it has behavioural and ideological implications. Material culture is involved in almost all aspects of life, and through materiality, design, ornamentation and context it transmits and is given symbolic meanings concerning cultural norms, belongingness and individuality (Olsen 2010; Shanks 2007).

It is possible to identify a few likely symbolic 'signals' of this kind in the Saqqaq material culture. We begin our archaeological inquiry by pointing at phenomena that most profoundly characterize the culture and clearly separate it from other prehistoric cultures:

The Saqqaq preference for killiaq is conspicuous. As seen above, more than 85% of the Saqqaq lithic tools in the Disko Bay area were made from this grey, silicified slate, which is found in large quantities, but only at a two limited outcrops: the well-known deposit at the Slibestensfjeldet at Qaarsut and the less-known deposit (brownish/yellowish variant) at Angissat, Grønne Eiland (Jensen 2006: 85 ff.; Sørensen 2012a: 54 ff.). That killiaq is a marker raw material is seen from the fact that it has been distributed from Disko Bay via a 'down the line' trading network to the whole of West Greenland (see references immediately above). Furthermore, in areas at great distances from the killiaq sources – east and north-east Greenland and probably Thule/Ellesmere – the Saqqaq carefully selected killiaq-like lithic raw materials (Sørensen 2012a, 2012b) for most of their lithic production. Killiaq was preferred even though the Saqqaq had access to other raw materials with comparable physical/mechanical properties. Thus it is reasonable to view this particular raw material preference as an expression of a specific Saqqaq identity.

The culture's design of not only its lithic but also its organic artefacts supplements this picture. As we have seen in the section on chronology (Chapter 4.3), only few and subtle changes in the metric properties and the morphology of the hand tools, projectile heads, etc., can be traced throughout the Saqqaq era in Disko Bay. The streamlined and taut designs are almost constant through time.

Another well-known 'constant' characterizing not only the entire Saqqaq period but the whole ASTt era is the midpassage structure. Obviously, not all Saqqaq dwellings include a midpassage (Jensen 2006: 178), but the substantial ones, like the one from Qt H4, are structured in accordance with the stringent 'midpassage principle', as described in detail in Chapter 7.3. These features are so characteristic that they act as 'signatures in stone', and they would probably remind travellers and settlers of the omnipresence of their ancestors and kinsmen and -women in the seemingly barren Arctic landscapes. Even today, the midpassage features stand out as Saqqaq markers on the ancient beach ridges (Sørensen 2012b).

Based on these archaeological observations, it can be concluded that the Saqqaq culture underlined its common identity, homogeneity and belongingness to the landscape via the material culture. Likewise, it is, according to the approach described above, reasonable to assume that in turn these stringent and clear signals acted on the members of the Saqqaq society. By their daily handling, reshaping and reuse of the material culture they were constantly reminded of a well-defined set of acceptable cultural norms and frames.

Only in connection with a particular part of the material culture, the harpoon heads, have we been able to detect some expressions of individuality. As seen by the presentation of these hunting tools, four main types (Qt-A–D) were identified. As illustrated (Figs. 3.25 ff.), the harpoon heads within each type show characteristic variations in design details. None are in fact exactly similar, and this could mean that the individual hunter's identity could be determined from these details (see Hansen 2008: 113–19 for an ethnographic analogy from West Greenland). It is thus assumed that some of the design variations among the Saqqaq harpoon heads, e.g. the position and shape of the barbs, served as owner's marks. The hunters were thus able to identify which animals were caught by which hunters and they could also identify the exact position of the individual hunter's harpoon head in the body of the game. Again, drawing upon historic/ethnographic analogies (e.g. Hansen 2008: 156–58; Grønnow *et al.* 1983: 30–31) this would have been important information in relation to sharing meat following communal hunting of marine big game.

6.5 Saqqaq cosmology

The harpoon heads from Qt and Qa also form a starting point for an investigation of the world view or cosmology of the Saqqaq people. In particular, one design element of the harpoon heads – the proximal spurs of Type Qt-A – represents the well-known 'cloven foot' motif (Knuth 1967: 75; Grønnow 2012a: 62), which is probably directly inspired by the feet of either musk-oxen or caribou. Obviously, this observation encourages the search for other animal elements in the harpoon designs, but regrettably this is not straightforward. Nevertheless, based on ethnographic analogies there have been attempts to decipher the morphology of the distal ends of the harpoons either as representing elements from terrestrial carnivores or, alternatively, from sea birds with slender, pointed beaks, like loons (Grønnow 1997: 128; 2012: 62). These interpretations might be too straightforward, but the point is that Saqqaq harpoon head design was related to the world of animals.

From the ethnographical/historical record we are informed that Inuit harpoon heads show designs and ornaments that depict the spiritual content or souls of the implements, their 'inua' (for Greenland in particular see Gulløv 1996, 1997, 2009: 248; Møbjerg and Rosing 2001). These 'inua-elements' originate most often in the animal realm, e.g. characteristic features of whales or polar bears. They are material expressions originating in an animistic cosmology (cf. Fitzhugh and Kaplan 1982: 66–73; Nelson 1899: 196 ff., 322 ff., 436 ff.; Hill 2011). Thus, by analogy, this could mean that the Saqqaq world view was animistic. However, in order to support this deduction we must search the archaeological data from the frozen sites for additional evidence related to the notion that objects contain souls or wills.

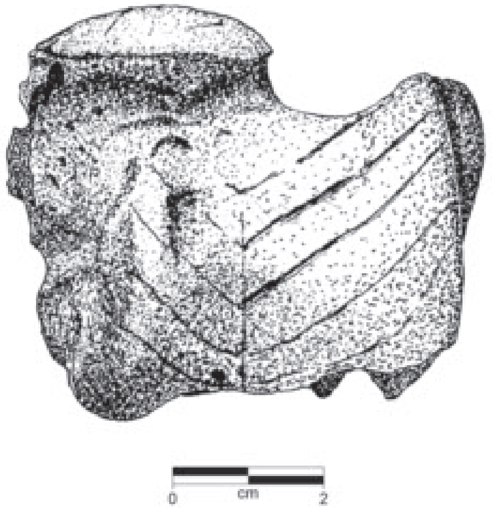
First, we turn to the handful of ornamented objects from the sites. Among these are carefully made tubes of antler with 'swallow-tails', which were probably nozzles for bags or pouches containing spare parts and small tools. They show an ornamentation consisting of two to four shallow grooves or longitudinal lines (Fig. 3.38). The same simple 'decoration' is found on a needle case, which in addition shows a carved diamond-shaped pattern on one side and a simple triangular line ornament reminiscent of a bird's foot (Fig. 3.93). Shallow, straight lines are also found on a few lance foreshafts of wood and bone (Fig. 3.19a), including a single miniature foreshaft from Qa and a harpoon head from this site as well (Fig. 3.12c; Fig. 3.26-3). These, the very simplest of ornamentations, have both later archaeological (Dorset) and ethnographic counterparts, which are interpreted and recorded as symbols of the spine of living creatures – or rather the 'life line' of the object (e.g. Meldgaard 1959: 13–14; Fitzhugh and Kaplan 1982: 198–202). Line ornaments on an object from Meldgaard's material from Itinnera (1961), a fragment of a probable caribou vertebra, seem to confirm that simple skeleton motifs were part of Saqqaq symbolism, even if very rare (Fig. 6.3a). A couple of tiny containers from Qt (Fig. 3.109) reminiscent of diving/swimming creatures fit into this notion of an animistic Saqqaq world view. Carved oval holes penetrate the objects on each side of their ends. Based on analogies from historic Alaska and Greenland, they are interpreted as amulet containers (Nelson 1899: 94 ff.; Rosing 1994). Finally, the Saqqaq's attention to the marine animal world is demonstrated by a tiny, carved antler object from Itinnera. This seems to depict a seal head (Fig. 6.3b). As has been seen, such symbolic representations are extremely rare in Saqqaq inventories and, regrettably, the find contexts do not add further information on their meaning and importance.

Next, the finds of the drum rim fragments described above (3.5.3) from Qt, as well as those from Qa, must be considered (Fig. 3.111). Drum playing, singing and dancing were in historic Inuit times important social and spiritual manifestations, which were integral parts of entertaining, teasing, settling disputes, and getting into contact with other worlds (Hauser 2010). Is it possible to ascribe an analogous cultural importance to the Saqqaq drum? Again, the archaeological find contexts of the drum rim fragments are not informative, and thus we can only speculate that the presence of drums at the frozen sites could be evidence of communication with the spiritual worlds (Hill 2011), and thus they would fit the picture of an animistic world view of the Saqqaq people. Concerning drums, it must be emphasized that hitherto we have not at Qt, Qa or any other Early ASTt site found 'shaman's paraphernalia', like the masks, 'wands' and tubes from Late Dorset sites, and thus there are no archaeological evidence of specialized shamans in the Saqqaq culture.

A further clue to Saqqaq cosmology is provided by the architectural remains. Based on ethnographical/historical analogies from northern Scandinavia and Siberia (e.g. Yates 1989; Anisimov 1963) and phenomenological analyses, the floor plan and the hearth construction of midpassage dwellings are interpreted by Odgaard (2003, 2010) as a microcosmos reflecting aspects of the Saqqaq perception of the world. The midpassage was a passageway to other worlds for a person in trance – a spiritual travel connected with birth and rebirth (ibid.: 233) – and the central hearth with its open fire played an important role as the home of a (universal) 'Fire Mother', who protected the inhabitants in different ways and provided them with game. She was contacted through offerings in the fireplace itself and through a ritual of 'feeding the fire'. Is there any archaeological evidence from Qt or Qa in favour of this interpretation of Saqqaq cosmology?

One particular find is significant in this respect: the complete knife recovered in the centre of midpassage A8 at Qt. As described above (3.3.1.1), this knife (Fig. 3.59a1) shows clear traces of use

a.



b.

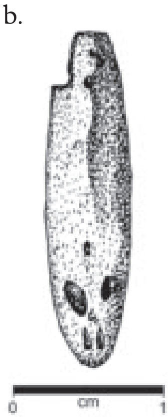


Fig. 6.3
a: *Fragment of caribou vertebra with ornamental scratches, probably a simple skeleton motif. From the Itinnera site, Nuuk area. (Drawing: H.C. Gulløv).*
b: *A tiny ornament of antler from Itinnera, symbolizing an animal head, probably a seal head. (Drawing H.C. Gulløv).*

(resharpening), but it is far from exhausted. The context indicates that it was deliberately placed on the bottom of the midpassage and carefully covered with a thin layer of soil before the inhabitants began to use the hearth of the midpassage. This find context of a complete and functional knife suggests that the Saqqaq in fact made offerings to a being in the hearth and that the female gender was emphasized in this ritual (if the interpretation of the bifacial knife as connected to the female sphere is accepted).

7. Comparative Studies: an Eastern Arctic Perspective

7.1 Introduction

Hitherto the archaeological materials from the two frozen sites have been analysed in their Saqqaq culture contexts. This chapter places the two sites in a wider Eastern Arctic perspective, drawing upon archaeological evidence selected from the entire geographical and temporal range of the Early ASTt. Fig. 7.1 shows the geographical position of the sites in Canada and Alaska which have yielded finds and/or radiocarbon dates that are discussed in the text. The maps in Chapter 3.2.9 show the position of the Saqqaq sites mentioned.

Comparative studies are biased due to the well-known fact that organic materials are only rarely preserved in Pre-Dorset and Independence I assemblages. A few fragments of wooden artefacts (poles, pegs, split pieces and shavings) and an object of skin have survived on late Pre-Dorset sites in the westernmost range of the ASTt. Artefacts of bone, antler and ivory have been recovered in very limited quantities, and consequently only part of the material culture described in detail in connection with the frozen sites is paralleled in remains from other early Eastern Arctic ASTt cultures. However, the archaeological sources are quite informative when it comes to architecture and spatial organization inside the dwellings. The discussion of the cultural historical development which led to the formation of the Saqqaq culture in Greenland is based on thorough analyses of radiocarbon dates.

A few comments on the cultural terminology applied in this comparative study must be made: the term 'Early Dorset' includes all archaeologically defined cultures that have been or are designated Dorset I, Independence II, Greenlandic Dorset, and Transitional (Grønnow and Sørensen 2006; Sørensen 2012a). Following this terminology, Early Dorset is an overall designation for several regional or local groups, characterized by differences in their lithic *chaînes opératoires*, in particular their burin/BLT-production and -morphology. The definitions of these Early Dorset groups need to be clarified in the future and the cultural and chronological relations of these Early Dorset groups remain to be explored (c.f. Nagy 1997; Desrosiers 2009).

The three cultures Saqqaq, Independence I and Pre-Dorset (plus Denbigh in Alaska) belong to the Early ASTt, whereas the entire Dorset sequence, including Early Dorset, is classified as Late ASTt.

7.2 Comparative studies: early ASTt tool kits and technology

7.2.1 Hunting tool kits

7.2.1.1 Bow and arrow technology

It is likely that the Early ASTt groups introduced the bow and arrow to the New World, and that this technology spread to the subarctic only after the Early ASTt era (e.g. Alix *et al.* 2012; Hare *et al.* 2012). As we have seen from the finds from Qt and Qa, the Saqqaq used this complex hunting technology along with darts propelled by throwing boards. Traces of bow and arrow technology are found in the entire ASTt range in the shape of lithic arrow points – typically bifaces with tapering or straight stems (e.g. Bielawski 1988: 60; McGhee 1979: 140–41, 154–55; Nash 1969: 39 ff.; Schledermann 1990: 53; Helmer 1991: 307, 310; Tuck 1975: 213, 249; Cox 1978: 100). It must be mentioned that the small, triangular lithic points (isosceles), which were previously sometimes classified as arrow points, served as endblades for harpoon heads of the barbed/tanged types. As with the Saqqaq, arrow foreshafts or heads of antler are extremely rare in Pre-Dor-

Fig. 7.1
Map showing the geographical position of archaeological sites mentioned in the comparative studies (Chapter 7).

Independence I sites:
1 Røde Hytte
2 Silja Ø
3 Pearylandville
4 Portfjeldet
5 Midternæs
6 Adam C. Knuth Site
7 Deltaterrasserne
8 Gammel Strand
9 Bob's Site
10 Kap Holbæk
11 Vandfaldsnæs
12 Solbakken
13 Old Nuulliit
14 Kettle Lake
15 West Wind
16 Camp View
17 Tusk Site
18 Ridge Site
19 Far Site
20 Upper Beaches
21 Port Refuge
22 Cold Site

Pre-Dorset sites:
23 QkHn13
24 Icebreaker Beach
25 Gull Cliff
26 Twin Ponds
27 Attu's Point
28 Nuasornaq
29 Diana 3
30 Mosquito Ridge
31 Button Point
32 Lyon Hill
33 Parry Hill
34 Kapuivik
35 Uqalik
36 Stanwell Fletcher Lake
37 Roche Bay
38 Parker Site
39 Aston Bay
40 Kent Site
41 Site L 11
42 Seahorse Gully Site
43 Twin Lakes
44 Buchanan Site
45 Lagoon Site
46 Umingmak Site
47 Crane Site
48 Sites on Boothia Peninsula and at Gulf of Boothia

Denbigh sites:
49 Macharak Lake Site

Early Dorset sites:
50 Sites at Cape Farewell
51 Kangerlussorissunngup Kangia
52 Baculum Site
53 Phalerope Site

set contexts in the Canadian Arctic. However, a few miniature arrow foreshafts with blade bed like the one from Qa have been reported from the earliest Pre-Dorset terraces at Parry Hill, Igloolik (Meldgaard 1960: 74; Houmard 2011: Fig. 17) and from the QkHn13 site (Icebreaker Beach Complex (Helmer 1991: 307)) on Devon Island (Fig. 7.2). The wooden fragments of bows have, due to preservation conditions, no parallels in Independence I and Pre-Dorset.

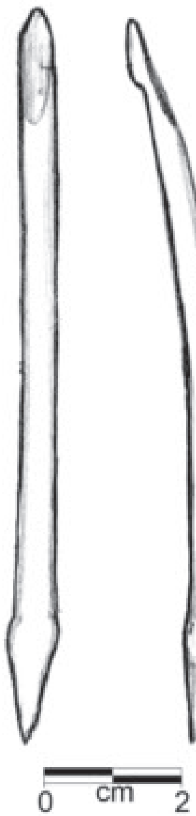


Fig. 7.2
Miniature arrow foreshaft from QkHn13, Devon Island. (Pencil sketch by BG of original artefact (1:1), 1991).

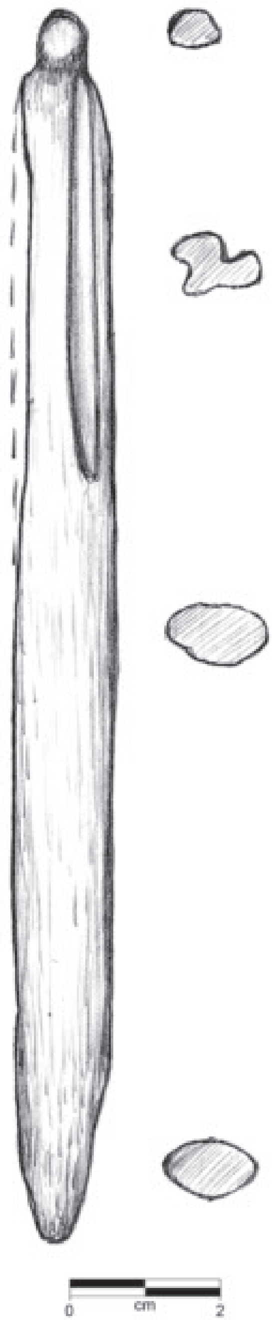


Fig. 7.3
Winged foreshaft from Icebreaker Beach, Feature 14. (Pencil sketch by BG of original artefact (1:1), 1991).

7.2.1.2 Darts

The Saqqaq darts included three-pronged bird darts, as well as darts fitted with a foreshaft with blade bed for a single projectile point. Remarkably, a single 'winged' foreshaft for a bird dart, exactly like the Greenlandic ones except that it was made from whalebone, is preserved in the collection from the Early Pre-Dorset site, Icebreaker Beach, Feature 14, Devon Island (Helmer 1991: 307) (Fig. 7.3). Together with finds of unilaterally barbed antler prongs from Pre-Dorset sites like Gull Cliff, Devon Island (McGhee 1979: 158–59); Lyon Hill, Igloolik (Houmard 2011: 94, no. 64); Buchanan Site, Victoria Island (Taylor 1967: 235); and Lagoon Site, Banks Island (Arnold 1981: 79, 99), the foreshaft from Devon suggests that the three-pronged bird dart was a common piece of hunting gear. Hitherto, only a single unilaterally barbed point has been found in an Independence I context: the Cold Site, Devon Island (McGhee 1979: 150–51). It must be stressed that some of these barbed points may have been components of fishing leisters and not necessarily from bird darts.

Counterparts to the Saqqaq dart foreshafts with unilateral blade bed are extremely rare. Only a single piece, probably of antler, was found by Jørgen Meldgaard at the early Pre-Dorset terraces at Parry Hill, Igloolik (illustrated in Houmard 2011: Fig. 17, no. 416). With its length of *c.*

170 mm, cross section diameter of 15 mm, a distal blade bed, and a bevelled proximal end designed for being lashed to a main (wooden) shaft, it fits the morphology of the Saqqaq dart foreshafts.

Symmetrical, bifacial lithic endblades, often with tanged proximal ends, are common within the entire range of the Pre-Dorset (e.g. McGhee 1979: 155; Pilon 1994: 63; Bielawski 1988: 60) and Independence I (e.g. Jensen and Grønnow 2003: 105, 235), and thus it is likely that light darts propelled by throwing board were common hunting tools. However, as mentioned above, it is difficult to distinguish between bifacial endblades for darts and light lances. The darts were probably used alongside bows and arrows to hunt terrestrial game like caribou.

7.2.1.3 Harpoon heads and harpoon accessories

The repertoire of harpoon heads of the Saqqaq includes, as we have seen, toggling heads of Type Qt-A and a variety of barbed, tanged heads (Qt-B, Qt-C and Qt-D). In particular, harpoon heads of Type Qt-A are found throughout the entire Pre-Dorset area. There are minor design variations, e.g. in the shape of the spur and the line hole, but due to the existing sparse material these variations cannot be associated with a certain geographical area or chronological phase within Pre-Dorset. The overall impression is that the Qt-A harpoon heads (the equivalent of Meldgaard's Type A in its early type states (Maxwell 1985: 87)) bind the Early ASTt together through place and time. A Saqqaq hunter would probably have immediately recognized a Pre-Dorset harpoon head of this type and been able to interpret its functional properties and visual symbols.

Within the Pre-Dorset range, Qt-A heads have been recovered from Devon Island (Helmer 1991: 306, 309, 311; McGhee 1979: 103), Igloolik (Parry Hill) (Meldgaard 1960: 74; 1962: 95; Houmard 2011: 82), Button Point (Mathiassen 1927: 206 ff.), Somerset Island (Bielawski 1988: 64), Prince of Wales Island (Murray and Ramsden 1995: 109, 111), south-western Hudson Bay (Seahorse Gully site) (Meyer 1977: 87, 89), Victoria Island and Banks Island (Taylor 1967: 235, 241; Müller-Beck 1977: 66) (Fig. 7.4). Practically all harpoon heads of this type are self-bladed, and it must be emphasized that variations in the shape of the distal end, e.g. the shape of and presence/absence of barbs, are in many cases due to different stages of resharpening – as was shown concerning the harpoons from Qt and Qa. Interestingly, at Devon Island (Port Refuge, Cold component) Qt-A heads have been recovered in an Independence I context (McGhee 1979: 48–49). The spur of the head depicted in Pl. 4t from Cold Feature 19 is designed exactly like the spur on one of the fragments from Qt (Fig. 7.5). This detail exemplifies that harpoon head designs are shared across all three geographical ASTt groups in the Eastern Arctic. A number of open-socketed harpoon heads with a significant design (elongated line holes, bilateral barbs, decorations) are known from the late Pre-Dorset ('Lagoon Complex') sites, Crane and Lagoon, in the westernmost Canadian Arctic (Arnold 1981; Le Blanc 1994a; 1994b). However, in these collections simple Qt-A-like specimens are present as well (Arnold 1981: 73, Fig. 13b).

Qt-B harpoon heads, the tanged, barbed harpoon heads, find their counterparts – even if they are very rare – in both Independence I and Pre-Dorset-contexts. Hitherto, the Canadian finds of Qt-B heads are limited to two specimens from the early Pre-Dorset terraces at Lyon Hill, Igloolik (Rowley and Rowley 1997: 271) (Fig. 7.6) and six specimens from Devon Island: three from the Independence I sites, Upper Beaches and Cold (McGhee 1979: 142–43 (Pl. 4q, s and v)), two specimens from the early Pre-Dorset Icebreaker Beach Complex (Helmer 1991: 306) and one from the middle Pre-Dorset Twin Ponds Complex (ibid.: 309). Thus, even if it is not possible to conclude anything about the original geographical distribution of Qt-B heads based on these few specimens, it is significant that these light harpoons – just like the Qt-A type – were integral parts of the hunting tool kit of all three ASTt groups. As we have seen, the small, isosceles lithic end blades were primarily used as interchangeable endblades for Qt-B-harpoon heads, and the presence of these characteristic

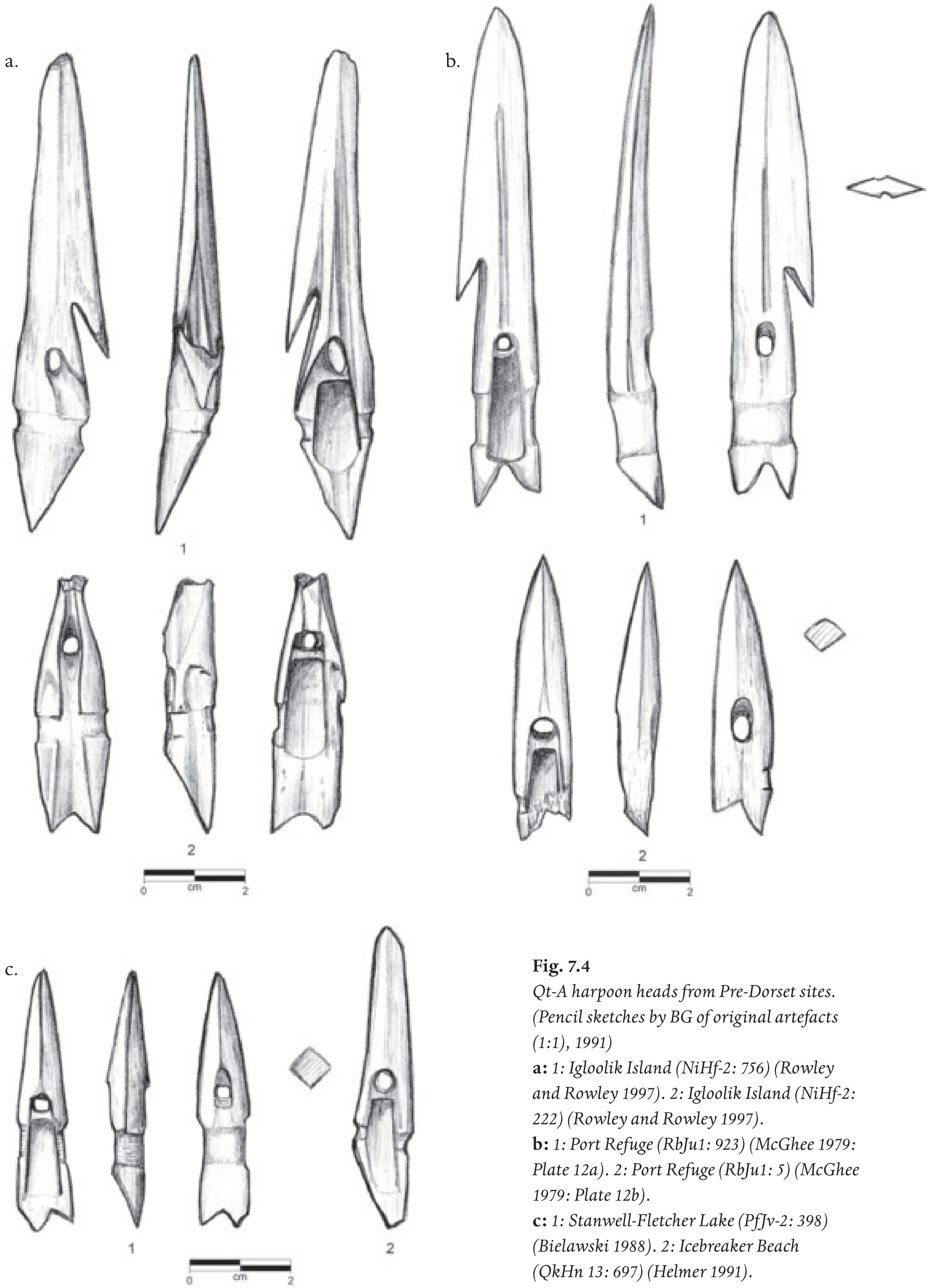


Fig. 7.4
Qt-A harpoon heads from Pre-Dorset sites. (Pencil sketches by BG of original artefacts (1:1), 1991)
a: *1: Igloolik Island (NiHf-2: 756) (Rowley and Rowley 1997). 2: Igloolik Island (NiHf-2: 222) (Rowley and Rowley 1997).*
b: *1: Port Refuge (RbJu1: 923) (McGhee 1979: Plate 12a). 2: Port Refuge (RbJu1: 5) (McGhee 1979: Plate 12b).*
c: *1: Stanwell-Fletcher Lake (PfJv-2: 398) (Bielawski 1988). 2: Icebreaker Beach (QkHn 13: 697) (Helmer 1991).*

endblades in Pre-Dorset inventories from the Mackenzie River in the west to Ellesmere Island in the east and to Manitoba and Labrador in the south (e.g. Schledermann 1990: 121, 124; Helmer 1991: 307, 309; Helmer and Robertson 1990: 110 ff.; Meyer 1977: 75; Taylor 1964: 50; Nash 1969: 39–41; Noble 1971: 107; Pilon 1994: 71; Hood 2008: 283–84, 294; Cox 1978: 100), and at Independence I sites in the High Arctic (e.g. McGhee 1979: 143; Schledermann 1990: 53, 55; Helmer 1991: 303, 306; Andreasen 1996: 184) gives an impression of the widespread use of light barbed, tanged harpoons among the Early ASTt groups. Hitherto, no parallels to the rare Qt-C and Qt-D harpoon head types represented at Qt have been found.

Concerning harpoon accessories, identifiable harpoon shaft components from Pre-Dorset and Independence I are extremely rare. Probably, foreshafts fitting the open sockets of the widespread Qt-A type are present at the Parry Hill site, Igloolik (e.g. Houmard 2011: 95 (no. 269)), at the Ridge Site, Ellesmere (Schledermann 1990: 122 (cc)), and at the Icebreaker

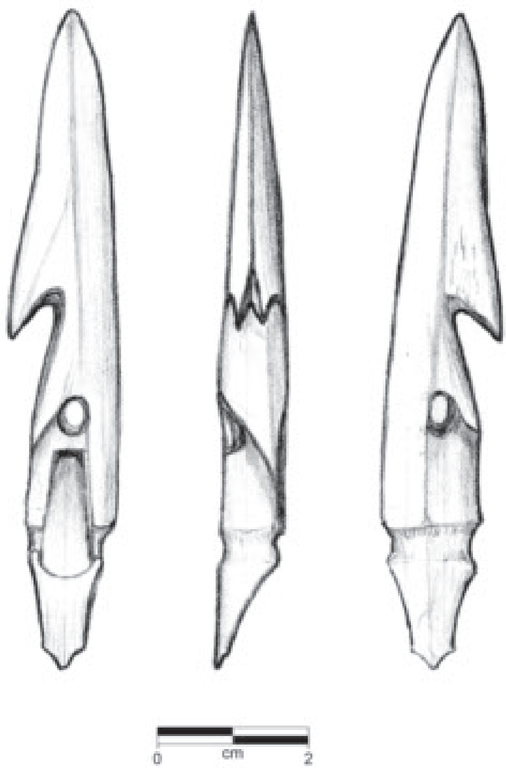


Fig. 7.5
Qt-A harpoon head from Cold Feature 19 (RbJu-1: 1660). (McGhee 1979: Plate 4t). (Pencil sketch by BG of original artefact (1:1), 1991).

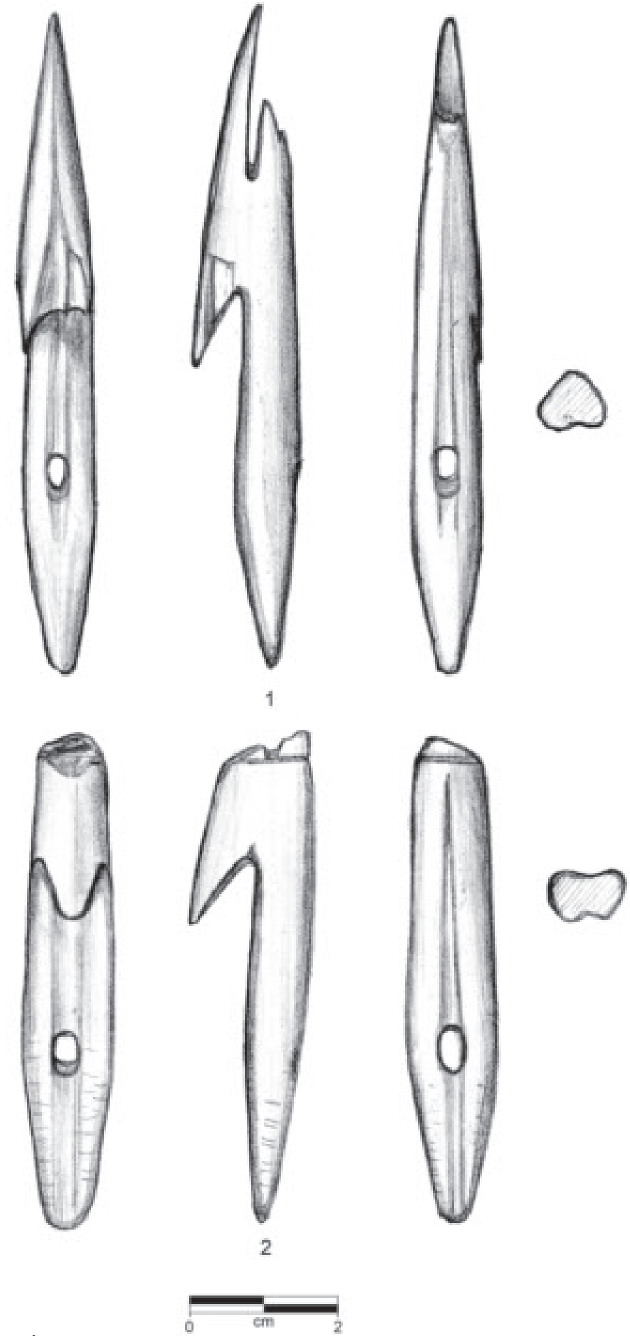


Fig. 7.6
Qt-B harpoon heads, Igloolik Island (NiHf-2) (Rowley and Rowley 1997). (Pencil sketches by BG of original artefacts (1:1), 1991)
1: NiHf-2: 310. 2: NiHf-2: 545.

Beach site, Devon Island (Helmer 1991: 307 (j, k, l)). Furthermore, a few antler foreshafts for harpoons with open sockets were uncovered at the two Lagoon Complex sites (Arnold 1981: 79; Le Blanc 1994a: 34).

The only probable socket piece for the tanged harpoon heads (Qt-B) comes from the Independence I site Upper Beaches, on Devon Island (McGhee 1979: 70–71, 143, Pl. 4r). This specimen is probably the distal fragment of a piece originally consisting of two halves, lashed together to form a socket into which the tapering tang of the 'male' harpoon head fitted.

As mentioned above, a thin-walled antler tube with a 'swallow-tail' end from Qa containing at least three harpoon points, found close to a fragmented skin bag, led to the assumption that these kinds of tube from Saqqaq served as nozzles for bags containing spare harpoon endblades and other small accessories. A couple of similar tube-shaped nozzles with 'swallow-tail', made from walrus tusk, are included in the early Pre-Dorset assemblages from Parry Hill, Igloolik (Meldgaard 1960: 74; 1986: 116; Houmard 2011: 89–90).

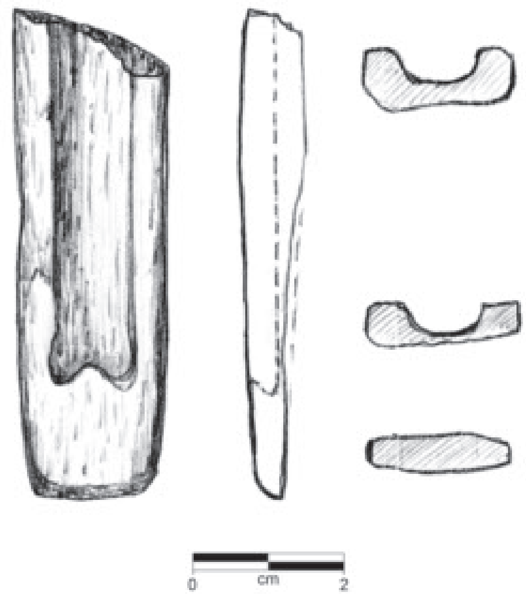


Fig. 7.7
Fragment of throwing board from Icebreaker Beach, Devon Island (QkHn 13: 697) (Helmer 1991). (Pencil sketch by BG of original artefact (1:1), 1991).

7.2.1.4 Throwing boards

As seen from the fragments from Qa and Nipisat, the Saqqaq light darts and harpoons were propelled by means of throwing boards. Two types were found: one with an integrated peg in the distal end and one with an elongated hole for a back shaft with a 'hook'.

A single find from Feature 14 at the Pre-Dorset site Icebreaker Beach, Devon Island (Helmer 1991: 307, Fig. 8h) confirms that throwing board technology was used in the Pre-Dorset as well. This is a distal fragment of very slender throwing board of whalebone, about 20 mm wide and 7 mm thick, used for throwing very light darts with a shaft diameter of only about 10 mm – in fact within the size range of arrows for bows (Fig. 7.7). The small dimensions of this Pre-Dorset throwing board are reminiscent of the Nipisat specimen, but it differs from its Greenlandic counterparts in that it has a carved, integrated hook at the distal end of the shaft groove, instead of a countersunk, inserted hook of hard organic matter.

7.2.1.5 Lances and other hunting gear

There are no parallels in the Canadian Early ASTt assemblages to the Saqqaq lance foreshafts with wedge-shaped proximal ends. A single 27 cm long foreshaft of antler with a distal blade bed and a 'swallow-tail' proximal end from the Lyon Hill Site, Igloolik, is probably the closest Pre-Dorset parallel to these lance foreshafts. This type of link to the main shaft would provide the lance foreshaft with the same ability as the ones with wedge-shaped bases, namely resistance to both pulling and pushing forces.

The early Pre-Dorset assemblages on the 48–50 m.a.s.l. terraces on Parry Hill, Igloolik, include a couple of 'loose' lance heads provided with a slot and a blade bed respectively for a lithic endblade (Meldgaard 1960: 74; Houmard 2011: 82, nos. 112 and 259). This type of open-socketed lance head, probably used for dispatching harpooned large sea mammals, is not yet known from Independence I or Saqqaq contexts.

In the Early ASTt inventories from Canada and High Arctic Greenland, bifacial, symmetrical endblades of many 'calibres' (larger than arrow points), with tapering and straight stems are quite common (e.g. Knuth 1967: 216; McGhee 1979: 141, 155; Helmer 1991: Bielawski 1988: 61; Pilon 1994: 63; Cox 1978: 100). However, as with the Saqqaq, it is not possible to distinguish dart or lance points from each other based on blade morphology and metric properties. But taking the wide size range of these symmetrical endblades, their different kinds of edge (straight, finely or coarsely serrated) and their occurrence on practically all kinds of sites into consideration, it is reasonable to assume that both weapon types were used for hunting marine mammals as well as musk ox and caribou by the Pre-Dorset and the Independence I hunters.

Probably due to preservation conditions, there are no Early ASTt parallels to the finds of paddle oars and frames of sea-going vessels from Qt and Qa. However, it is difficult to imagine hunting in Low Arctic Canada without sea-going vessels. A well-known indicator of the use of vessels by the Pre-Dorset is the fact that a number of sites, determined to be from the warm seasons by their fauna and/or dwelling structures, are situated on small islands (e.g. Hood 2008: 319 ff.).

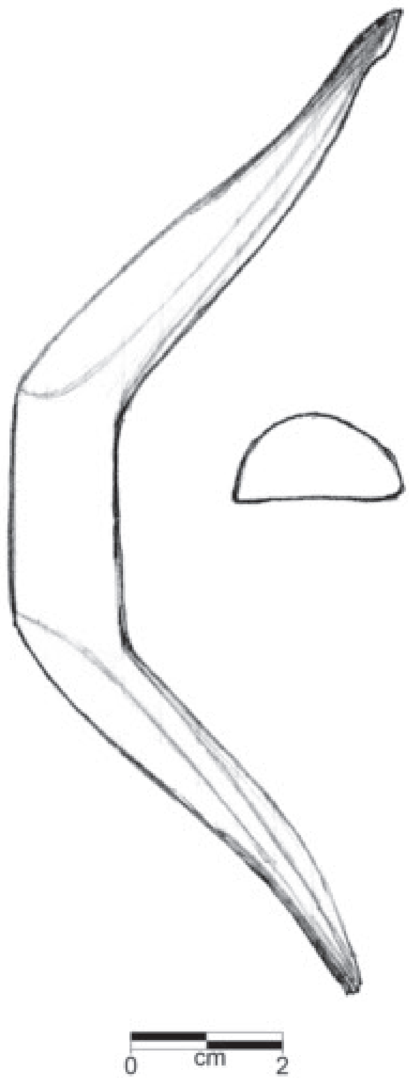


Fig. 7.8
The ivory scraper handle (P4801-114) from Parry Hill, Igloolik. (Meldgaard 1960, 1962). (Pencil sketch by BG of original artefact (1:1), 1991).

7.2.2 Hand tools, skin working and household tool kits

7.2.2.1 Knives, scrapers and burins

Owing to preservation conditions, Early ASTt hafted hand tools like knives, scrapers and burins have not been recovered at sites other than the frozen Saqqaq ones. However, a carefully made curved or open U-shaped object of ivory from the 48 m terrace at Parry Hill, Igloolik (Houmard 2011: 94, no. 285), is a scraper handle (Fig. 7.8). The specimen was originally interpreted by Jørgen Meldgaard (1960: 74) as a 'bow brace', but it shows all the characteristics of its two wooden counterparts from Qt. The size, the shape, and the dorsal blade beds in each distal end reveal that it is a scraper handle originally fitted with a lithic end scraper blade at each end.

Turning our attention to the lithic components of the ASTt hand tools, the situation is quite different. Lithic hand tools like knives/cutting tools, scrapers and burins are numerous at the sites and have been described from the entire ASTt range. It is important to stress again that the vast majority of lithic tools discovered at Pre-Dorset and Independence I sites are exhausted, fragmented and discarded specimens, just like their counterparts at Qt and Qa, and to firmly document functional sub-types comparable to the ones from the two Saqqaq sites would demand in-depth analyses of lithic assemblages from the other ASTt groups. This is beyond the scope of the present study. Thus the following comparative observations are of a more general character.

The Saqqaq bifacial knives, end scrapers and side scrapers could be divided into several sub-types primarily determined by the different functions they served: bifacial knives (four sub-types), end scrapers (four sub-types) and side scrapers (two sub-types). This degree of complexity partly reflects the quantity of the finds from Qt and Qa. Assemblages from smaller ASTt sites cannot be expected to show a comparable variability. However, the published lithic inventories and the authors' notes and drawings from studies of selected Pre-Dorset and Independence I collections curated by Canadian and Greenlandic museums and universities (Grønnow 1991) support the impression that the production and use of cutting and scraping tools by these two ASTt cultures were just as specialized and complex as those of the Saqqaq. A couple of examples:

Samples of Independence I end scrapers from Peary Land (Knuth's finds published in Grønnow and Jensen 2003) and a number of Canadian sites (Camp View, Tusk, Far, Cold and Upper Beaches (data from Grønnow's notebook 1991; Schledermann 1990; Helmer 1991; McGhee 1979)) were examined. Taken together, these end scrapers cover the entire spectrum of the types defined for Qt (Types A1, A2, B1, B2).

Likewise, variability among Pre-Dorset bifacial knife blades seems to match the specimens from Qt, i.e. they cover as broad a spectrum as the Saqqaq types A, B, C and D. This observation is based on studies of samples of knife blades from the following Canadian sites: Ridge, Gull Cliff, Icebreaker Beach, Stanwell Fletcher Lake, Roche Bay, Parker, Aston Bay (Grønnow's notebook 1991; Schledermann 1990; McGhee 1979; Helmer 1991; Bielawski 1988), supplemented with published specimens from Umingmak (Müller-Beck *et al.* 1971: 148; Müller-Beck 1977: 47 ff.).

It must be underlined that these comparative studies of lithics are preliminary, and that thorough analyses of lithic refuse and *chaîne opératoire*-inspired approaches to Pre-Dorset and Independence I artefacts (e.g. Milne 2000; Desrosiers 2009; Sørensen 2012a) must be applied in the future to create a basis for in-depth 'cross-cultural' comparisons of the lithic inventories.

Whereas knives and end- and side scrapers of the three Early ASTt groups overlap typologically, the burins are 'diagnostic' for each culture, as shown by recent studies of production, morphology and resharpening techniques of burins. The characteristic Saqqaq burins (and consequently the burin spalls), with their polished sides, generally slender shape, and slightly tapering proximal ends, are easy to distinguish from their Pre-Dorset and Independence I counterparts (Sørensen 2012a: 324, Sørensen 2012b; Desrosiers 2009: 389–91, see also Schledermann 1990: 344 ff.).

No systematic production of BLTs in the Saqqaq and Independence I existed, and thus Pre-Dorset was the only Early ASTt group which, probably in its terminal phase, produced both struck burins and BLTs with fully polished edges (Desrosiers 2009: 389).

7.2.2.2 Expedient cutting tools, saws, hammerstones, drills and grinding stones

Whereas the formalized and fully polished Saqqaq saws have no counterparts in the other Early ASTt groups, the most common and informal cutting tool at the Saqqaq sites – flakes with cutting edges, sometimes slightly modified by retouch or fine edge serration – are documented in Pre-Dorset contexts. Milne's thorough analysis of lithics from Mosquito Ridge on Baffin Island shows that such informal cutting-flake tools, together with microblades, were by far the most frequent tools at this site (Milne and Donnelly 2004: 103). Also Le Blanc (1994a: 89) emphasizes that many simple flakes from the Crane Site, Cape Bathurst Peninsula, had been used for cutting hard organic materials like antler. These inconspicuous flake knives have probably been overlooked in most Independence I and Pre-Dorset inventories and consequently their importance among Early ASTt hand tools is underestimated. The same probably goes for the inconspicuous hammerstones, which are identified only in small numbers in Saqqaq and are mentioned only occasionally in Pre-Dorset contexts as well (e.g. Arnold 1981: 68–69).

The quite rare, but very characteristic Saqqaq artefact, the fully polished drill bit or 'awl' of killiaq, is not found at sites from the other Early ASTt groups. Some burin spalls found in Pre-Dorset and Independence I contexts show distal retouch or use wear (Knuth 1978: 24), and probably such hafted burin spalls served as awls or drill bits.

The majority of grinding/polishing tools at Qt and Qa were made from black/grey pumice nodules, but due to the fact that this kind of pumice from prehistoric eruptions on Iceland drifted ashore only in certain regions in West and East Greenland (Jensen *et al.* 1997), not a single one of these grinding tools have been found in Independence I or Pre-Dorset contexts. Saqqaq's rare, slender whetstones showing rectangular cross section have only very few counterparts in Pre-Dorset (e.g. Arnold 1981: 68–69) and none in Independence I.

7.2.2.3 Wedges and adzes

Wedges of bone and antler for splitting wooden trunks and beams were quite common at the Saqqaq sites. In contrast, no wedges are preserved at Independence I sites, but the Pre-Dorset inventories from the high-lying terraces of Parry Hill and Lyon Hill, Igloolik, include six intact and fragmented, quite small wedges of antler (Houmard 2011: 87–89). A few antler wedges like the ones from Saqqaq are also known from the Crane and Lagoon sites in the western Canadian Arctic (Arnold 1981: 79, Pl. 9k; Le Blanc 1994a: 35, 38).

The Saqqaq adze heads of killiaq have counterparts in the other two groups. Sørensen's analysis of Independence I adzes (2012: 162 ff.) shows that the production of these heads differed from those of the Saqqaq in certain ways. But they share the quite narrow, ground and often quite steep angled edges. Likewise, several Pre-Dorset inventories from all over the culture's range include adze heads of stone with asymmetrical edges, both ground and unground (e.g. Arnold 1981: 50–51; Helmer 1991: 307; Grønnow 1991 (drawings of adze heads from Parker and Aston Bay sites (Bielawski 1988: 60, 66); Cox 1978: 100) (Fig. 7.9).

The organic artefacts and shavings from Qt and Qa showed the high-quality adze work of the Saqqaq. A single find from the Pre-Dorset site of Umingmak supports the notion that some adzes were made for very delicate chopping: a line-ornamented, T-shaped antler object just 20 cm long probably functioned as a shaft for a very narrow adze head (Müller-Beck *et al.* 1971: Pl. VII, 3).

7.2.2.4 Pressure flakers

The complete Early ASTt pressure flaker consisted of a handle and point. As we have seen, the flaker points are some of the most numerous hand tools of organic matter found at Saqqaq sites, due to the fact that they were frequently used during daily life for producing and resharpening all sorts of lithic tools, including microblades. The flaker points were made from solid bone, ivory or antler, giving them quite a good 'survival rate' in the archaeological record. However, pressure flaker points are surprisingly rare at Early ASTt sites outside the Saqqaq range.

In Independence I contexts, pressure flaker points like the Saqqaq ones of walrus ivory were parts of the inventory at, for example, Solbakken in Hall Land (Sørensen 2012a: 170–72). They are also relatively frequent at Pearylandville, Peary Land (Grønnow and Sørensen 2003: 108) and at Cold Site, Devon Island (McGhee 1979: 150–51, f, g, i).

The early Pre-Dorset terraces at Parry Hill, Igloolik, produced seven pressure flakers, most of them of antler (Meldgaard 1960: 74; Houmard 2011: 85–87). Morphologically they are similar to their Saqqaq counterparts, showing a pointed proximal end and a butt distal end (the active part). They were worn down to an

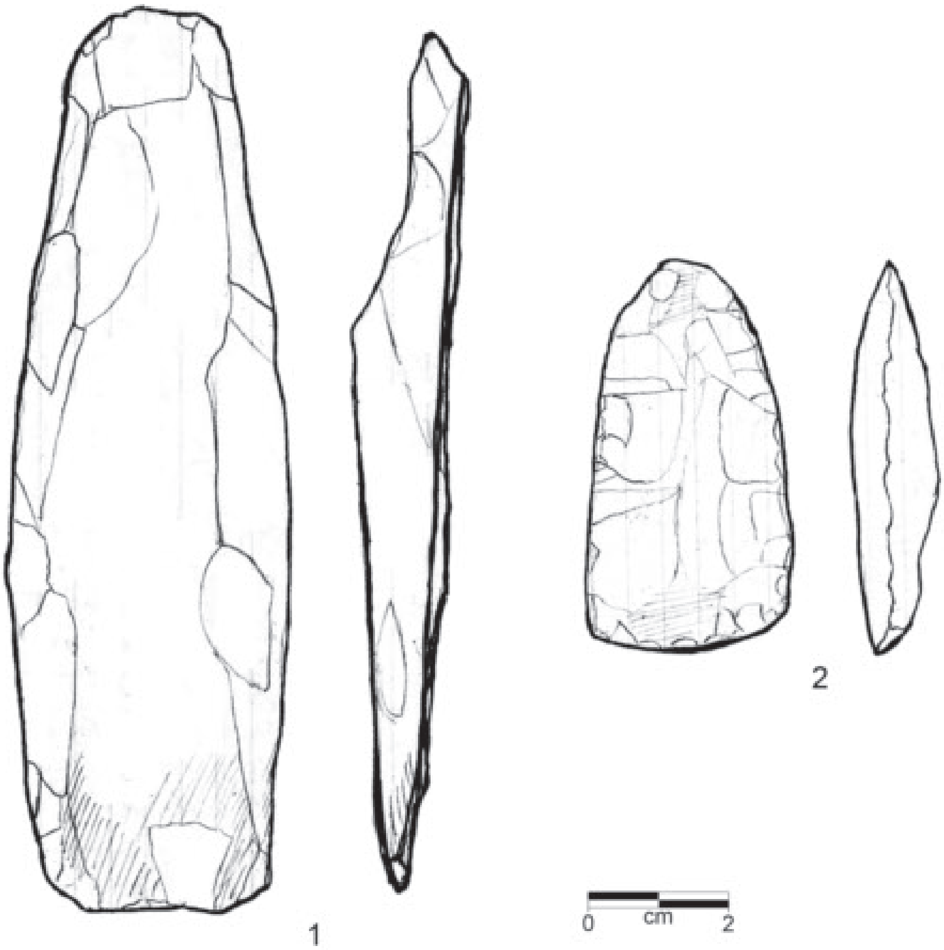


Fig. 7.9
Adze heads from Parker and Aston Bay sites (Bielawski 1988). (Pencil sketches by BG of original artefacts (1:1), 1991).
1: PkJv-1: 35
2: PeJv-3: 47

average of 54 mm, which is within the range of the ones from West Greenland. Moreover, a single Pre-Dorset pressure flaker has been found at Icebreaker Beach, Devon Island (Helmer 1991: 307) (Fig. 7.10), a couple at Buchanan Site, Victoria Island (Taylor 1967: 235), two at Umingmak, Banks Island (Müller-Beck *et al.* 1971: Taf. VII; Müller-Beck 1977: 67–70), and eight (quite heterogeneous) at Crane Site (Le Blanc 1994a: 44–45).

7.2.2.5 Strike-a-lights and blubber lamps/ stone vessels

Strike-a-lights, consisting of hammerstones or facetted pieces of pyrite, have not yet been reported from Early ASTt sites outside the Saqqaq range. This could be due to the fact that the hammerstone, at least, with its special use wear from making sparks, is inconspicuous and difficult to distinguish from an 'ordinary' small hammerstone.

Fragments of blubber lamps or vessels of either sandstone or soapstone, like the Saqqaq ones, are not present in Independence I contexts, and only very few are reported from Pre-Dorset assemblages. Hitherto, the heavy, roughly made informal Saqqaq lamps have been identified only in a single late Pre-Dorset context: a lamp made of a sandstone boulder at Lagoon Site (Arnold 1981: 66). The low-walled lamps or plates, as seen for instance at the Saqqaq site Itinnera (Grønnow *et al.* 2014), have counterparts at the late Pre-Dorset sites, Seahorse Gully (Meyer 1977: 90) (Fig. 7.11) and Twin Lakes (Nash 1969: 85, 89), both in northern Manitoba, not far from Churchill.

The formal, circular Saqqaq lamps have no direct Pre-Dorset parallels. The formal lamps of this culture are instead oval or asymmetrical. They are known from the two late sites mentioned above (Meyer 1977: 114, 236, 241–42; Arnold 1981: 66–69) and from the late Pre-Dorset terraces at Igloolik (Grønnow *et al.* 2014). It must be mentioned that a few fragments of an oval soapstone lamp and an angular, flat-bottomed pot or lamp with obtuse corners was found at the Uqalik site of northern Baffin Island. These lamp fragments have been dated archaeologically by the excavator to the early Pre-Dorset phase (Mary-Rousseliére 1977: 41), but, as the lamp types suggest, this assemblage might be a conglomerate of Pre-Dorset and Early Dorset inventories. In Labrador the earliest traces of stone lamps are later than 'classic' Pre-Dorset: a soapstone lamp preform is by context dated to the earliest Groswater (Structure 3 at Nuasornaq, 2900 ± 90 BP) (Cox 2003: 423). Summarizing the observations above, we conclude that the earliest stone blubber lamps are Saqqaq, there are none from Independence I, and lamps appear quite late in the Pre-Dorset sequence.

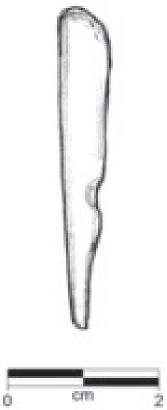


Fig. 7.10
Pressure flaker QkHi-5: 516, from Devon Island (Helmer 1991). (Pencil sketch by BG of original artefact (1:1), 1991).

Fig. 7.11
Pre-Dorset lamp from the Seahorse Gully site. (Reproduced from Meyer 1977: 90).

7.2.2.6 Bowls, spoons and ladles

As seen, portable containers, spoons and ladles made from a variety of organic raw materials played a prominent role in the material culture of the Saqqaq. These organic materials have rarely survived at the Early ASTt sites, and thus there are only few parallels to this artefact category. An insignificant rim fragment of a wooden bowl has been found at the late Pre-Dorset Lagoon Site (Arnold 1981: 98–99), whereas more informative fragments and intact specimens of spoons or ladles of bone and ivory were uncovered at a couple of eastern Pre-Dorset sites:

The assemblage from the Icebreaker Beach site, Devon Island, includes a small 'bi-lobate' spoon or bowl of whalebone. It is 105 mm long, 54 mm wide and 17 mm deep, carefully carved and with a flat bottom (Helmer 1991: 307) (Fig. 7.12). This bi-lobate type is not known from Saqqaq sites, but the design of the bowl of the spoon fits the Saqqaq 'design norm'.

The Pre-Dorset assemblage from Parry Hill, Igloolik, provides us with no fewer than six spoons, five of ivory and one from an undetermined raw material (Houmard 2011: 87–88, 99). The raw material, walrus tusk, has to a certain degree determined the design. Thus, both the three big spoons (l: 140–198 mm) and the small ones (l: 73–79 mm) are narrow and more-or-less follow the longitudinal outline of the tusk. As with the Saqqaq, the bowls of the spoons are elongate/drop-shaped, and the handles are integral parts of the design. Two spoons, nos. 286 and 413, have carved holes (for suspension?) at the proximal end of the handle, and the first-mentioned also shows a simple line ornamentation connecting the hole with the bowl of the spoon on both the upper and under side. This span

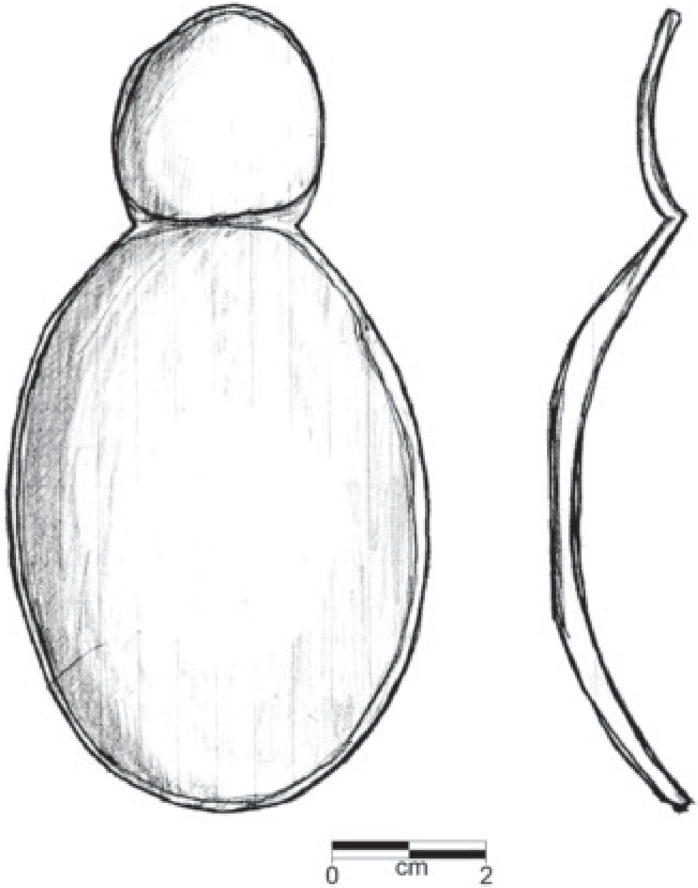


Fig. 7.12
Bi-lobate spoon (QkHn13: 357) from the Icebreaker Beach site, Devon Island. (Pencil sketch by BG of original artefact (1:1), 1991).

between some large, sometimes more roughly carved spoons, and small, very carefully made ones – almost too small to have a practical function – parallels the Saqqaq finds. Line ornamentation on the handle, like spoon no. 286 from Parry Hill, was observed on one of the wooden spoons from Qt.

7.2.2.7 Sewing gear, worked skin and microblades

The Saqqaq sewing gear included needles, probably prongs and needle cases. Microblades are grouped under this heading as well, as it is assumed that their most important function was the cutting of worked skins.

Parallels to the sewing needles with tiny drilled eyes and most often circular/oval cross sections are found at a number of Early ASTt sites from all areas of the tradition's range. In the High Arctic, needles of ivory and bones from bird, hare or fox are part of Independence I assemblages from i.a. Tusk Site, Ellesmere Island (Schledermann 1990: 54), Upper Beaches and Cold Sites (frequent), Devon Island (McGhee 1979: 48, 70), Portfjeldet and Pearylandville, Peary Land (Grønnow and Jensen 2003: 115 ff., 85 ff.; Knuth 1967: 62). Needles with round eyes, but sometimes with a rectangular cross section are frequently found at Pre-Dorset sites, for instance at Icebreaker Beach and Twin Ponds, Devon Island (Helmer 1991: 306–9); Gull Cliff, Devon Island (McGhee 1979: 103); Parry and Lyon Hill, Igloolik (Meldgaard 1960: 74; Houmard 2011: 79–80); Crane, Cape Bathurst Peninsula (Le Blanc 1994a: 39) and Lagoon Site, Banks Island (Arnold 1981: 77). As with the Saqqaq, grinding stones with grooves suited for resharpening these small needles are included in the assemblages from Pre-Dorset sites (e.g. at Crane Site (Le Blanc 1994a: 39 ff., 87)).

A mere five parallels to the small bone tubes interpreted as needle cases, of which the Qt assemblage contained two fragments, are known from other Early ASTt contexts. One of three needle cases from Parry Hill, Igloolik, is remarkably like the most complete Qt specimens, showing a carved triangle at the distal opening and longitudinal line ornamentation on the front and back of the tube (Fig. 7.13) (Meldgaard 1960: 74; 1991: 116; Houmard 2011: 89–90).

The two other needle cases from early Pre-Dorset at Parry Hill are of bird bone. They show a spectacular ornamentation: narrow, horizontal zig-zag bands covering the entire surface of the tubes (Fig. 7.14). A tiny fragment with this characteristic ornamentation is probably from such a tube as well (Houmard 2011: 95, no. 129). Almost exact parallels to these Igloolik specimens are known from the Pre-Dorset component at Button Point, Baffin Island (Mathiassen 1927: Pl. 62, 19) and from the 'pioneer phase' Independence I site, Midternæs Feature 6 (Grønnow and Jensen 2003: 150). The last mentioned, however, only shows two unfinished zig-zag bands (Fig. 7.15). These specimens are made from tubular bird bones as well.

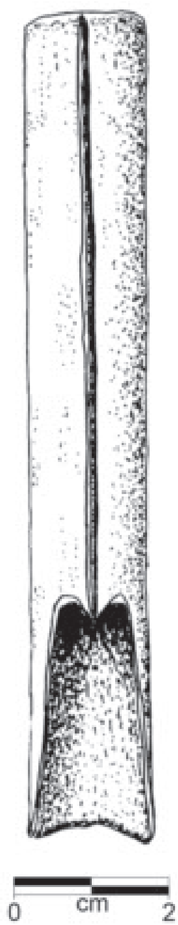


Fig. 7.13
Needle case from Parry Hill (P 5001), Igloolik Island. (Reproduced from Meldgaard 1991).

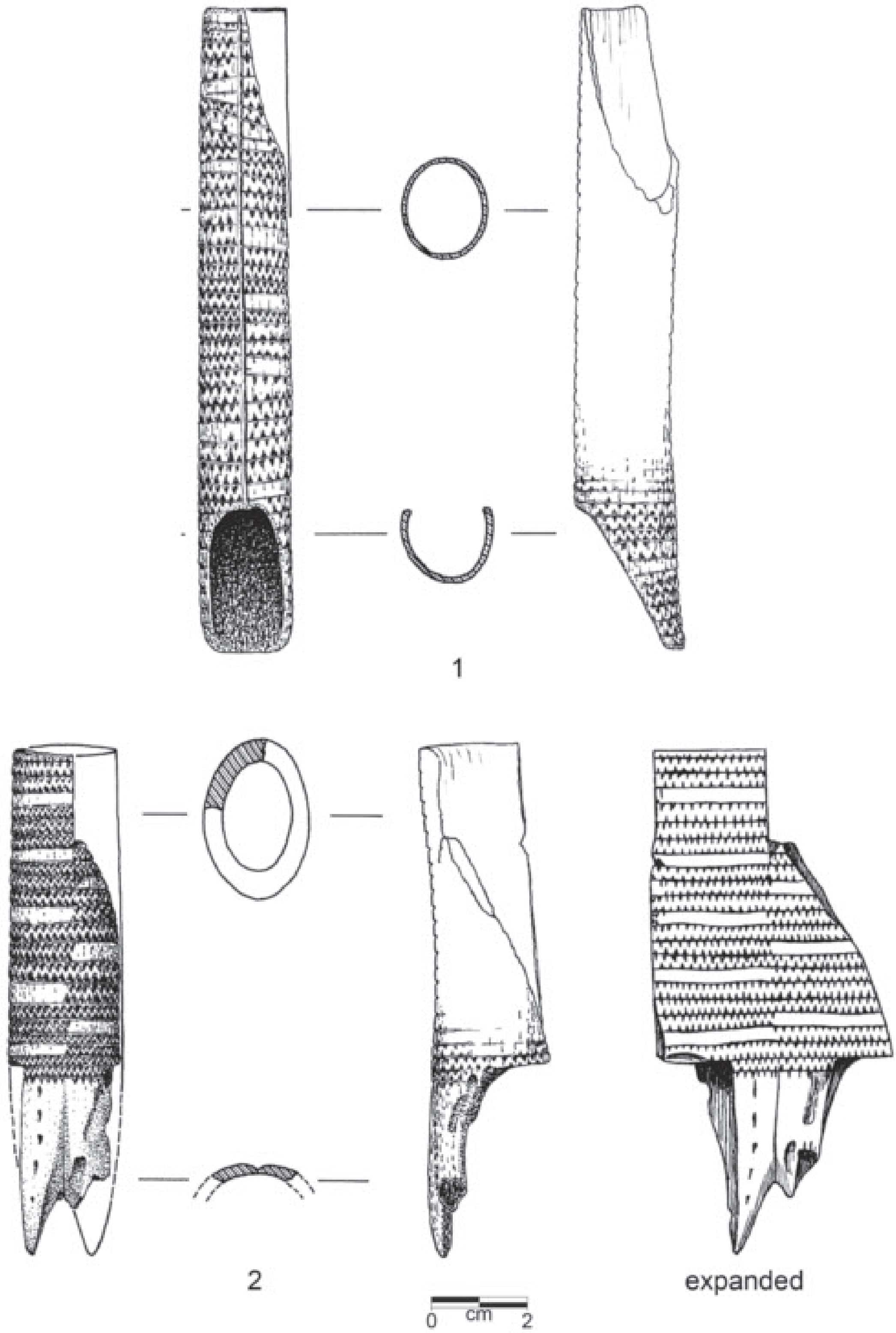


Fig. 7.14
Two needle cases from Parry Hill (P 5001), Igloolik Island, with zig-zag ornamentation. (Drawings by H.C. Gulløv and Jens Rosing).
1: P 5001-95
2: P 5001-96

Fig. 7.15
Needle case of bird bone (L1.7562) with unfinished zig-zag ornamentation from the Independence I site, Midternæs, Feature 6. The specimen is seen from three sides (a–c). Note the longitudinal ornamental line on the front as well as on the back side. The needle case is 65 mm long. (Photo: Bo Albrecthsen, the Greenland National Museum and Archive).

Through the preserved fragments of skin objects from Qt we get an impression of the efforts of the Saqqaq seamstresses. Such perishable objects are only preserved in a single Pre-Dorset assemblage from Banks Island, Lagoon Site, which is about a millennium later than the skin finds from Qt. An entire foot of a kamik and a fragmented skin bag were uncovered. The skin bag was quite roughly made and patched, whereas the child 'muk-luk' was carefully made and surprisingly well preserved: 'About 17 cm long, the small size of this boot suggests that it was made for a child. The haired side of the skin on the inside of the boot would have kept a small foot warm. On the outside, the sole is sewn to the upper part of the boot with a running stitch of sealskin. The inside seam has overcast sinew stitching. This stitching technique waterproofed the boot.' Together with the foot of the 'kamik-stocking' from Qt, these are the only certain skin garment fragments preserved from the Early ASTt (Arnold 1981: 102–3; Freeman 2013).

The microblades of the ASTt, which appear frequently in Pre-Dorset as well as Independence I assemblages, have attracted much attention from a typological/chronological point of view (e.g. Owen 1988), and more recent studies applying a *chaîne opératoire* approach have treated the microblade complex as well (Sørensen 2012a: 136, 178). Taken together, these studies show that it is possible to distinguish larger microblade assemblages from Saqqaq, Independence I and Pre-Dorset from each other based on details concerning metric properties, blade and core morphology, as well as the technological concepts behind the blade production. The last criterion applies only to Saqqaq versus Independence I, as the Pre-Dorset microblade production has not yet been studied from a systematic *chaîne opératoire* perspective. The Saqqaq preference for quartz crystal in the microblade production is not paralleled in Pre-Dorset, even though this raw material was used occasionally for these razor-sharp cutting tools (e.g. Tuck 1975: 129; Hood 2008: 286, 296).

There are no finds of hafted microblades at Early ASTt sites apart from those from the frozen Saqqaq sites.

7.2.2.8 Amulet boxes, drums and symbolic representations

Hitherto, the small elongate containers, which were tentatively interpreted as amulet boxes, have only a couple of counterparts beyond the Saqqaq range. At the Independence I site, Cold, Devon Island, McGhee (1979: 49, 150–51, c) uncovered 'a fragment of a bone or antler object shaped like a small ladle or scoop'. This thin-walled piece is composed of two halves and it is provided with a knob (for holding the lashing which held the two parts together?) and two gouged perforations. It shows the characteristics of the small containers from Qt. Gouged, narrow, elongated holes with seemingly no practical function are found on a couple of the ornamented bone objects from the Pre-Dorset Umingmaq site, Banks Island (Müller-Beck 1977: 62). One of these is spatulate, whereas the other and most richly ornamented piece is shaped like a long, narrow scoop – somewhat like the largest of the 'amulet containers' from Qt. It must be added that a specimen which is quite like a small spoon-like container from Qt (20/20: 3) showing gouged 'non-functional' holes and a small handle was found by Meldgaard at Kapuivik (Jens Munk Site) in Foxe Basin on the 23 m terrace, which is dated to the late Pre-Dorset (Houmard 2011: 177, no. 563; Savelle *et al.* 2009).

The wooden drum rim parts from Qt and Qa have no direct parallels. However, it is tempting to view a fragment of a whale(?)-bone object from the Pre-Dorset terraces at Parry Hill, Igloolik, as a drum/tambourine rim fragment (Houmard 2011: 95, no. 305). This specimen is a 140 mm long, 28 mm wide and 16 mm thick list with a broad longitudinal groove on one side. These dimensions would fit a drum rim and the longitudinal groove could have been made for a thong holding a drum head.

The symbolic representations of the Saqqaq do not include obvious depictions of beings (except perhaps the tiny carving of a seal head from Itinnera (Fig. 6.3b)), and hitherto only five figurines are known from the vast Pre-Dorset range: a tiny bird figurine carved in ivory, portraying a raven or a falcon, from Ridge Site on Ellesmere Island (Schledermann 1990: 43); an elaborate ivory maskette of a human face showing facial wrinkles or tattoos from Icebreaker Beach, Devon Island (Helmer 1986); a tiny seal figurine from the 47-metre beach ridge at Jens Munk Site (Meldgaard, unpublished); an oblong antler object with incised decorations probably depicting seal flippers; and a phallus-like antler 'bead'. The two last-mentioned are from Crane Site, Cape Bathurst Peninsula (Le Blanc 1994a: 36, 46). As suggested in Chapter 6.5 above, we assume that for the Saqqaq culture as well as for the Early ASTt in general, the material expressions of the spiritual worlds were an integral part of the morphology, design and sparse decoration of the artefacts. These kinds of symbolic expression include 'cloven foot' barbs and spurs on harpoon heads, swallow-tails and triangles on tubes, and simple longitudinal lines (sometimes parallel lines) often emanating from *carved* elongated holes (Grønnow 2012a).

Even if the find material is very sparse, there seems to be a single decorative/symbolic element which Pre-Dorset and Independence I do not share with Saqqaq: the dense, delicate zig-zag patterns on a few needle cases described above. Furthermore, assemblages from the westernmost range of the Pre-Dorset include some elaborately decorated objects which have no parallels in the east: five ornamented bone objects – a 'meat fork', three spatulas and a list – from the Umingmak site (Müller-Beck 1977: 58 ff.) and a number of ornamented harpoon and lance heads and pendants from the very late Pre-Dorset Lagoon and Crane sites (Arnold 1981: 73, 83, 85, 90, 101; Le Blanc 1994a: 32, 36).

Through the common ASTt ornamentation technique – incised lines and carved, elongated holes – the Umingmak specimens, dated by their context and three radiocarbon dates to about 3400 BP (Müller-Beck 1977: 5), provide a glimpse of a complex spiritual world. Some of the incised motifs are interpreted by the excavator as images of caribou, flying birds and other creatures (ibid.: 59, 63), but it is also likely that the most densely ornamented 'denticulate object' shows skeleton patterns – crosses and short lines marking links: vertebrae and ribs, respectively. These became common symbolic trends in the subsequent Dorset culture. In contrast, the late Pre-Dorset 'Lagoon Complex' ornamentation – delicate lines, often paired and parallel, covering the entire object (e.g. Arnold 1981: 90) and spiral motifs (ibid.: 80, 85) – does not point towards the Eastern Arctic.

7.2.3 Raw materials and processing

7.2.3.1 Organic matter

The Saqqaq assemblages have provided new information on the Early ASTt concerning utilization and working processes of organic materials. Comparisons with the other ASTt groups are difficult due to the low frequency of preserved organic matter at these sites, but some differences and parallels, in particular between Saqqaq and Pre-Dorset, can be observed.

Direct traces from working (drift)wood are only preserved at a couple of Pre-Dorset sites in the shape of a few split pieces, pegs and posts with chopping marks (Le Blanc 1994a: 51; Arnold 1981: 36, 99, 101), but, as described above, wood-working tools like wedges of antler and ivory and adze heads of stone have been recovered at several Canadian sites, indicating the original importance of wood as a tool raw material and, obviously, as firewood.

Studies of Saqqaq antler/bone/ivory working in a comparative perspective are more fruitful. At a few Pre-Dorset sites we recognize elements of the systematic Saqqaq reduction of antlers into regular fillets that were chopped into sections intended for tool production. The most illuminating parallels are from the westernmost range, Crane Site, where antler beams and rose ends are removed by chopping, followed by forceful breaking, and where fillets of antler were produced by means of a burin. In line with Saqqaq practice, they were sectioned by chopping (Le Blanc 1994a: 26–27; see also Arnold 1981: 86). There are no preserved parallels at Pre-Dorset sites to the characteristic Saqqaq production of whalebone fillets, but Houmard's detailed study of working processes of organic matter at the Igloolik sites (2011) have revealed that the Pre-Dorset people there treated their dominant local material, ivory, in the same manner: the walrus tusks were cut into fillets by means of deep parallel burin grooves (ibid.: 104, 107). An adze was used to chop the fillets into sections, as well as to remove the ends of the tusk. By studying work traces Houmard shows that five different working techniques were used: grooving by means of burin, chopping, scraping, sawing, and – probably – chisel-working, and furthermore that most, if not all, circular as well as elongated holes were made by means of a burin corner or the like and probably not with a bow drill (ibid.: 105–13). Apart from possible traces of 'indirect chopping' (chisel-working) we recognize all of these techniques in the Saqqaq material. However, grinding and polishing of the artefacts of hard organic matter, which was carried out by the Saqqaq 'artisan', does not seem to have been done in the early Pre-Dorset phase at Igloolik.

The characteristic production of sewing needles of bird bones has close counterparts in Pre-Dorset. Tubular bird bones with two longitudinal parallel burin grooves, thin 'fillets' with groove facets along the edges, and preforms are, for instance, included in inventories from Crane Site (Le Blanc 1994a: 29), Parry Hill (Houmard 2011: 104) and Ridge Site (Schledermann 1990: 106, 124).

The only preserved lashing materials beyond the Saqqaq range come from the Lagoon Site, where four knotted (probably simple overhand knots) baleen and musk ox hair string fragments were uncovered (Arnold 1981: 99, 102–4).

7.2.3.2 Lithic raw materials

As described above, the Saqqaq lithic production was characterized by a preference for a specific raw material, killiaq, and by a very consistent lithic *chaîne opératoire*. The Pre-Dorset has not yet been analysed in the same detail as in Sørensen's work (2012a) covering the lithic processing in Saqqaq and Independence I, but results from analyses by Milne (2000) and Hood (2008), among others, indicate that Pre-Dorset raw material choice and processing are characterized by the same consistency.

Raw material preferences differ between regions, obviously depending on the access to lithic sources. But in general the Pre-Dorset lithic technology is based on the utilization of opaque, grey/white cherts and argillites (e.g. Cox 1978: 98; Maxwell 1973: 299 ff.; Nash 1969: 47; Plumet 1994: 113; Meyer 1977: 121; Le Blanc 1994a: 52, 86 ff.; Arnold 1981: 89; Müller-Beck *et al.* 1971: 147). Like the Saqqaq, this ASTt group compensated for restricted access to these functionally and, not least, culturally important 'marker' raw materials by exchanging/trading them over vast areas. The utilization and spread of Mugford chert in Labrador is a striking example comparable to the role of killiaq of West Greenland (Hood 2008: 273 ff., 345). Another example is the processing and distribution of grey chert from the Nettiling Lake area in southern Baffin Land (Milne and Donnelly 2004: 102–7) and of argillite in the westernmost Pre-Dorset range (Pilon 1994: 75). The use of grained quartzites for some bifaces and Saqqaq's selection of sometimes colourful micro crystalline quartz and/or transparent quartz crystal for microblades are paralleled in Pre-Dorset, whereas the processing of coarser raw materials and production of 'large tools' from coarse-grained lithic raw materials, as seen in northern Manitoba (Nash 1969: 103 ff.; Meyer 1977: 85 ff.), is absent in Saqqaq. The spectacular, but sparse, evidence of metal use – native copper – in the western Pre-Dorset range (Taylor 1967: 221) is not paralleled in Saqqaq either. Research on lithic raw material sourcing and distribution should be intensified in future, as it holds a key to understanding regionality and interrelations in the vast Pre-Dorset range.

7.3 A comparative perspective on Saqqaq architecture and spatial organization

7.3.1 Architectural components, complexity and variation

The Independence I and Pre-Dorset sites show great architectural variation and the 'iconic' midpassage dwelling is only one of several dwelling types appearing on the ancient sites. For instance, only about half of the dwelling remains (29 out of 61) of the Independence I culture in northern Ellesmere Island were of the midpassage type, whereas the others represented tent rings with and without central hearths, as well as shallow depressions in the surface of gravel ridges (Sutherland 1996: 276). Dwellings described by Knuth from Peary Land (Grønnow and Jensen 2003) and by McGhee (1979) and Helmer (1991) from Devon Island confirm the wide range of variation. However, it must be noted that it is the different *combinations* of a few basic 'building blocks', including stone-lined midpassages, stone-framed hearths of different shapes, hearths without frame, tent rings and depressions, which make up the variation among these Independence I dwelling structures.

Within the Pre-Dorset, architectural components (supplemented with sod walls and gravel berms) and variations in dwelling plans are similar to Independence I (Ryan 2003: 36–38, Table 1). Sites on Igloolik Island (Rowley and Rowley 1997: 273), on Jens Munk Island (Savelle *et al.* 2009: 214), on Prince of Wales Island (Murray and Ramsden 1995: 107), at Baker Lake (Harp 1961: 12–13), in south-eastern Hudson Bay (Meyer 1977) and in Labrador (Cox 2003; Hood 2008: 9 ff.) provide representative examples from the Pre-Dorset range. All these Pre-Dorset dwelling types are found in the Saqqaq culture as well. Even the inconspicuous low depressions and/or trampled areas, which probably represent snow-lined tents or veritable snow houses of the Pre-Dorset (e.g. Murray and Ramsden 1995: 107), are described within the Saqqaq range in north-east Greenland (Sørensen 2012b: 190).

Some Saqqaq features differ from structures of the other Early ASTt groups. The midpassages at Qt, including A8 with its complex internal division into zones of different function, complex stratigraphy, and heterogeneous content reflecting frequently shifting functions, are not directly paralleled beyond the Saqqaq range, where midpassage structures generally seem to be relatively simple, showing less complex 'histories'. The huge quantities of fire-cracked rocks and 'frying flagstones', which in some of the Saqqaq midpassages went through several use phases and which ended up in conspicuously large refuse heaps, are not seen at all in Independence I contexts. This phenomenon probably reflects differences in mobility, as well as Saqqaq pyrotechnology based on 'unlimited' access to firewood.

Practically no substantial data concerning the quantities of fire-cracked rocks used at Pre-Dorset sites have been published, but from feature plans and descriptions it appears that fire-cracked rocks were not 'consumed' on a scale matching the West Greenland Saqqaq sites. It must be mentioned, however, that large concentrations of fire-cracked rocks (up to 1,000 per square metre) were reported from the Crane Site in the western Canadian Arctic (Le Blanc 1994a: 111; see also Pilon 1994: 66).

Flagstone-paved platforms covering one side of the (midpassage) dwellings seem to be an architectural feature that is occasionally seen on sites from all three cultures (e.g. Dyke and Savelle 2009: 379, 381).

At Dwelling A8 from Qt the distribution of distal fragments of poles/stakes marked the periphery of the dwelling and probably a central drying rack (see 5.1.1.6 and 5.1.1.9 above), but due to lack of preservation of wooden objects, parallel phenomena are more than rare. However, wooden stake fragments have been uncovered from a few western Pre-Dorset sites including Umingmak (Müller-Beck 1977), Crane Site (Le Blanc 1994a; 1994b) and Lagoon Site, but only at the last-mentioned locality were wooden posts found in primary position and traces of posts in the subsoil described. Here three heavy upright post-ends (average diam.: 20 cm) in the periphery of a hearth pit were interpreted by the excavator as central supports for a larger tent construction. There were more, but less well preserved, structures like this in adjacent areas at the site (Arnold 1981: 36–39).

7.3.2 Size of dwelling floor areas

It is quite difficult to measure with accuracy the original sizes of Early ASTt dwelling floors due to reuse, scavenging and post-depositional processes influencing the archaeologically visible outline of the structure. However, analyses of data from the seven well-preserved, documented, and constructed Saqqaq dwelling floors (Table 5.3.3) with substantial inner structures like midpassages or central stone-lined hearths showed two classes according to floor size: 15–18 m^2 and 23–26 m^2. Due to the complexity of the architecture, the extensive use of fire, heated rocks, and the comprehensive and varied artefact assemblages connected with these structures, they were interpreted as dwellings used for most of the year, except perhaps for a period during summer.

It is not straightforward to identify relevant comparative data from Independence I and Pre-Dorset. As described above, the remains from these cultures include a wide spectrum of dwellings, from the lightest constructions to substantial architecture. But if we select well-documented structures containing thoroughly built stone-lined midpassages or central hearths and well-defined peripheries, we are able to pinpoint dwelling floors from Independence I and Pre-Dorset which are comparable to the group of seven Saqqaq 'houses' from West Greenland, including Dwelling A8 at Qt. Relevant data can be extracted from a couple of publications which list ASTt dwellings from a large geographical area (Renouf 2003; Ryan 2009: 557 ff.). A sorting selection for well-documented and substantial dwellings was conducted and the data validated by consulting published plans and descriptions.

Concerning Independence I, 23 from Peary

Land, 5 from Ellesmere Island and 1 from Devon Island, in total 29 dwelling remains, meet the criteria. From Pre-Dorset, 1 from Ellesmere Island, 1 from Somerset Island, 4 from southern Hudson Bay, 6 from eastern Hudson Bay, 1 from Ungava and 3 from Labrador, in total 16 dwelling floors, were selected. The quantity of data is limited, but nevertheless from the histogram, Fig. 7.16, the following observations can be made:

The floor-size data show a skewed normal distribution with a top around 9–11 m^2 and a long 'tail' including large floor areas. That no dwelling floors belong to the class of 13.0–14.9 m^2 is probably a coincidence.

The overall picture shows three different distributions, determined by cultural affiliation:

With an average floor area of 11.6 m^2 the substantial dwellings of the Independence I generally belong to the cluster of the smallest dwellings. They show great variation as well (range: 4.4–23.8 m^2). The Pre-Dorset dwellings show an average floor area of 16.5 m^2 and the greatest variation of the data examined (range: 7.1–28.3 m^2). There is a tendency to a division into three size groups (*c.* 7–12 m^2, 15–23 m^2, and 27–29 m^2), but it must be underlined that the data are sparse. Finally, the seven substantial Saqqaq dwellings, which were divided into 'small and large' (see above) clearly cluster in the high end of the total distribution. The average floor size is no less than 20 m^2 and the range is 16–26 m^2.

Whereas no Saqqaq dwellings belong to the cluster of 'small dwellings', a couple of them are found among the largest ones. Geographically

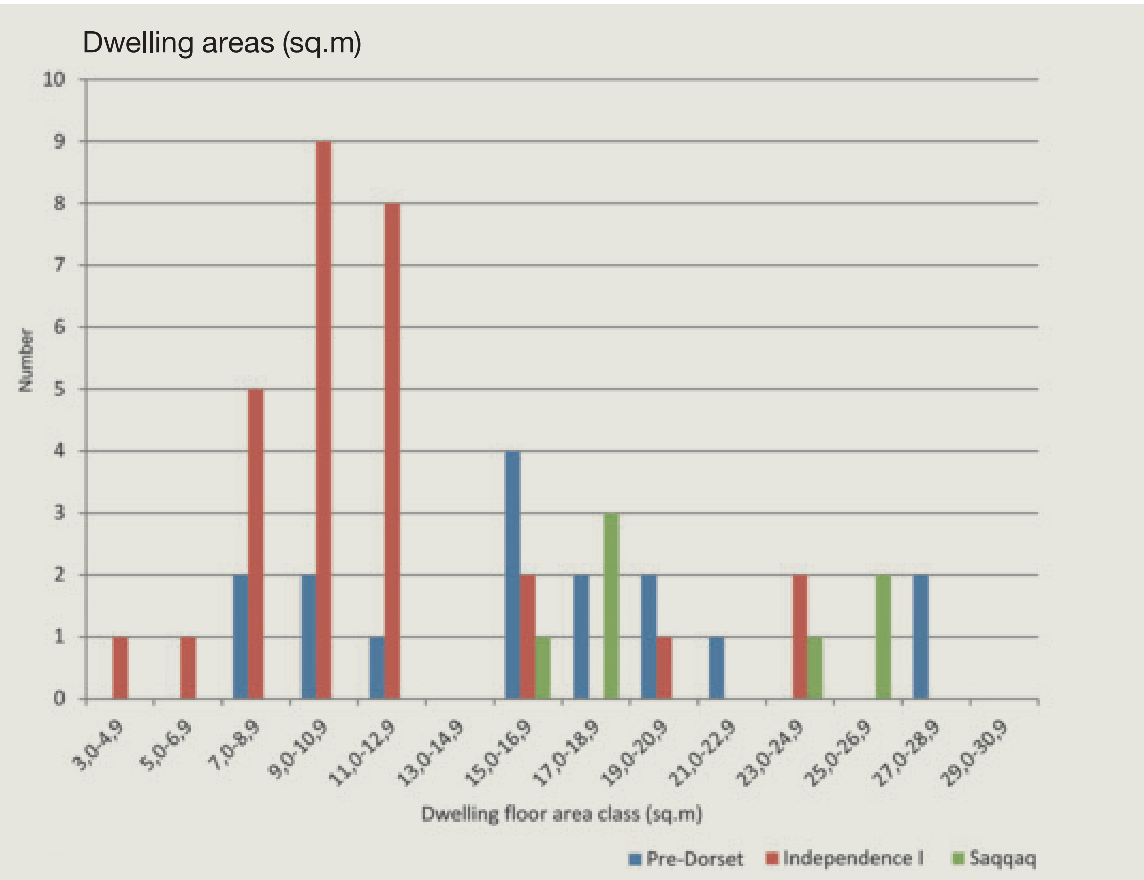


Fig. 7.16 *The size classes of dwelling floor areas of the three Early ASTt cultures in the Eastern Arctic. Blue: Pre-Dorset; red: Independence I; green: Saqqaq.*

these very large dwellings are widespread: from Peary Land and Ellesmere Island (Grønnow and Jensen 2003: 89, 231; Schledermann 1990: 101 ff.), to central West Greenland (Appelt and Pind 1996: 131–32; Kramer 1996b: 65–73) and to Somerset Island in the central Canadian Arctic (Murray and Ramsden 1995). It must be added that other conspicuously large dwellings have been reported, but not yet described, from Pre-Dorset contexts (Dyke and Savelle 2009: 385–86; Savelle *et al.* 2009: 226; Harp 1997; Mary-Rousseliere 1964; Rowley and Rowley 1997).

Thus our comparative studies show that all three cultural groups shared the motivation to construct very large dwellings with floor areas ranging from *c.* 23–29 m^2 – probably multi-family dwellings – and, concerning Pre-Dorset, some even larger dwellings.

7.3.3 Spatial distribution of artefacts and refuse

Based on spatial analyses within and around Saqqaq dwellings, with Dwelling A8 at Qt as the prominent case, it was concluded that in many cases artefacts and refuse concentrated along the sides of the midpassage and on top of and in the fringe zone of one of the platforms. The opposite platform was almost 'clean'. Detailed investigations of the area outside Saqqaq dwellings are few, but it was seen that 'door dumps' occur. These artefact patterns resulted from the spatial organization of activities like toolmaking, repairing, food processing and consumption, dumping and, most important: clearing of the dwelling floor and midpassage. Can comparable spatial patterns be observed in and around the dwellings of the Independence I and Pre-Dorset, thus indicating common perceptions of space among the Early ASTt cultures?

Concerning Independence I, McGhee's now classic study (1979: 52–55) of artefact and refuse distribution within dwellings from the Cold Site, Devon Island, is informative. His spatial analysis of twelve floor plans shows a pattern that in many respects is in accordance with the observations from the Saqqaq dwellings: a tendency towards larger concentrations on one side of the midpassage than the other and concentrations of refuse (in particular bone refuse) close to the central hearth. At a more detailed level, McGhee shows that different tool categories are represented with different frequencies on each side of the midpassage, which is interpreted by the excavator as a possible reflection of a division of activities according to gender (ibid.: 55). However, such exact patterns, which could be ascribed to a gender division of space, are not common for the Independence I. But it must be mentioned that the bone needles – the tools of 'the mistress of the house' (Knuth 1967: 200) – from Feature II,1 at Adam C. Knuth Site were mainly located on one side of the midpassage (Jensen and Pedersen 2002: 79–80; Grønnow and Jensen 2003: 228).

Most important, the overall trend from Cold Site, the bipartition of the dwelling floor into an 'activity side' and a 'sleeping platform side', plus an 'activity zone' close to the hearth, seems to be corroborated by substantial data from several Independence I sites. Examples are provided by features like Ruin C3 at Old Nuulliit (Sørensen 2010: 84), Features 4a and 7 from Pearylandville, and Ruin III,1 from Adam C. Knuth Site (Grønnow and Jensen 2003: 231). As the last example shows, this division of the dwelling floor is valid even if only a central hearth, and not a midpassage construction, is present. In a few cases, where the excavator has plotted the artefacts outside the structure, a 'door dump', like those in front of some Saqqaq dwellings, is seen (ibid.: 232) (Fig. 7.17).

Artefact distributions inside Pre-Dorset dwellings vary a lot, but if we turn our attention to well-documented features that were not reused, scavenged or disturbed by frost actions, a general pattern of a bipartition of activities emerges, in accordance with the one described from the two other Early ASTt groups. Fine examples of this are found across the entire Pre-Dorset range (Fig. 7.18):

Starting in Labrador, the habitation features L-1 and L-7 at Attu's Point (Hood 2008: 276, 298 ff.) showed bipartition of the artefact distribution. More than 80% were found on one side of the midpassages, in contrast to the other, almost

a.

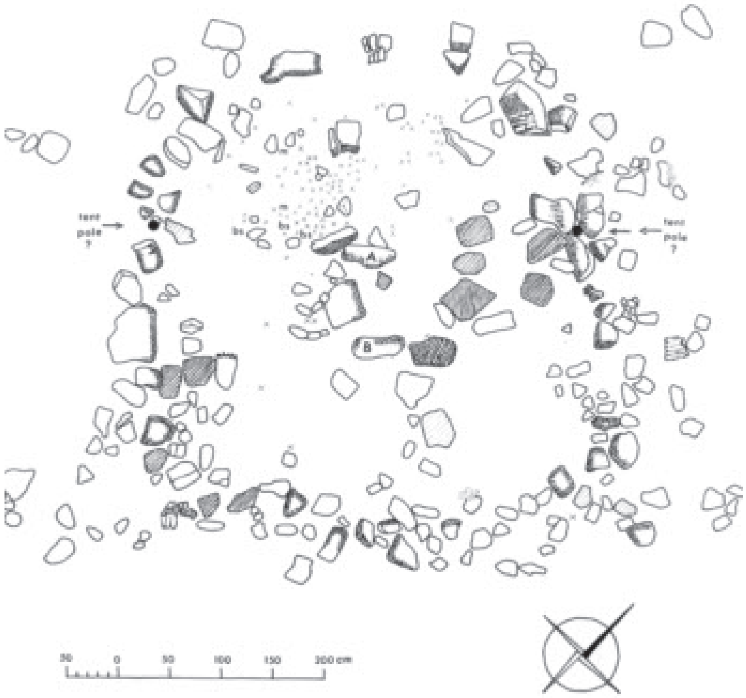
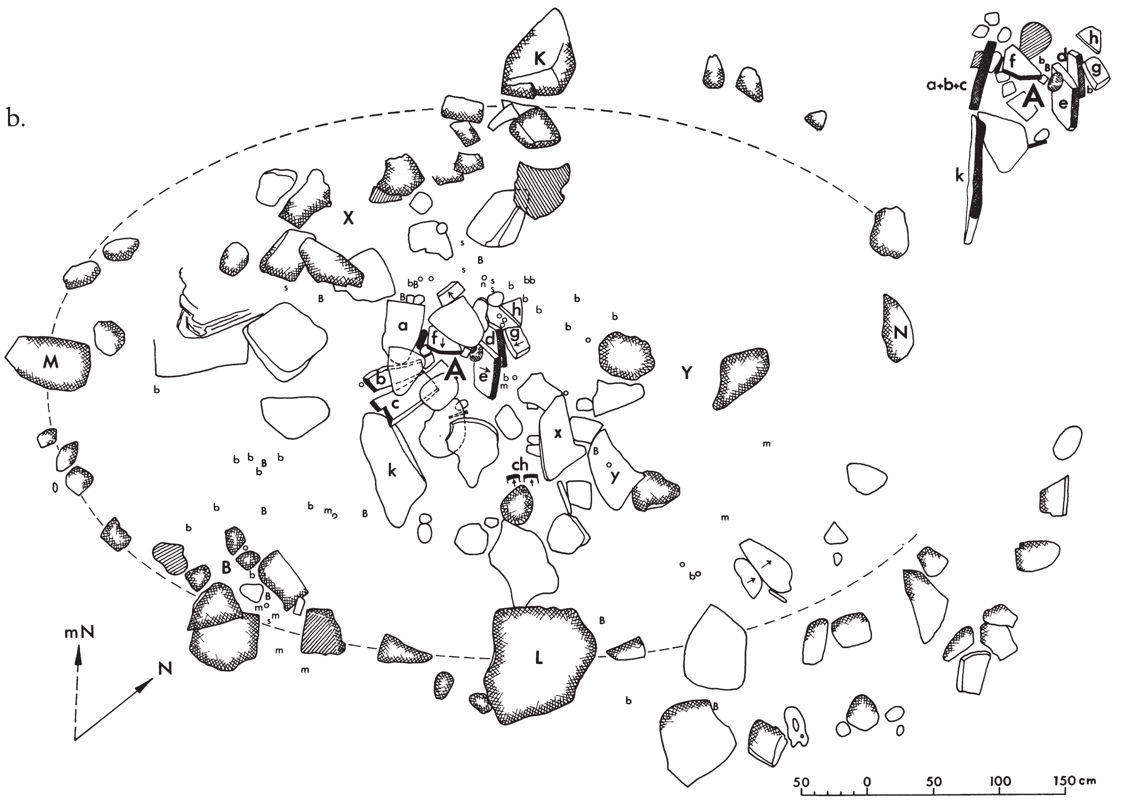


Fig. 7.17
Spatial distributions of artefacts from selected Independence I dwellings. (1b–e are reproduced from Grønnow and Jensen 2003).
a: *Gl. Nuulliit, Feature C3. (From Sørensen 2010: 84).*
b: *Pearylandville, Feature 4a. (Drawing by Knuth).*
c: *Pearylandville, Feature 7. (Drawing by Knuth).*

b.



'clean' side. From Ungava, Plumet (1994: 112–13) described a midpassage dwelling (Diana 3, Structure A) with concentrations of artefacts around the passage and in the eastern half, whereas the western half was empty. Meyer's well-documented habitation floors from the Seahorse Gully site in southern Hudson Bay must be mentioned: Houses 1, 2 and 7 showed a clear 'activity side' and a side with 'non-technological activities' like sleeping/eating (Meyer 1977: 96 ff., 102–21, 187). From the interior, at Baker Lake, Harp presented a dwelling at Site BL-11 showing concentrations of flakes around the midpassage itself and on the southern floor half (1961: 12–13). And, as a final example, Feature 1 from Kent Site, Prince of Wales Island: 'The outline of the artefact distribution appears to demarcate an activity area in the central and western parts of the feature from what may have been a sleeping area occupying the remainder of the structure' (Murray and Ramsden 1995: 110). There is no midpassage in this dwelling, and thus this case is analogous with e.g. the Ruin III,1 from the Independence I site, Adam C. Knuth, mentioned above. It must be added that Cox (2003: 421–22) made the following observation concerning the midpassage dwelling Structure 4 at Nuasornak-2 in northern Labrador: 'within the structure all of the triangular points and scrapers are found on the right (NE) side of the structure [the midpassage], while microblades are more numerous on the left (SW) side'. In accordance with McGhee, Cox suggests that this distribution could reflect gender-divided space in this Pre-Dorset habitation.

In conclusion, the comparative investigation indicates that several of the well-documented and more substantial Saqqaq, Independence I and Pre-Dorset dwellings share a common principle concerning spatial organization, whether

c.

d.

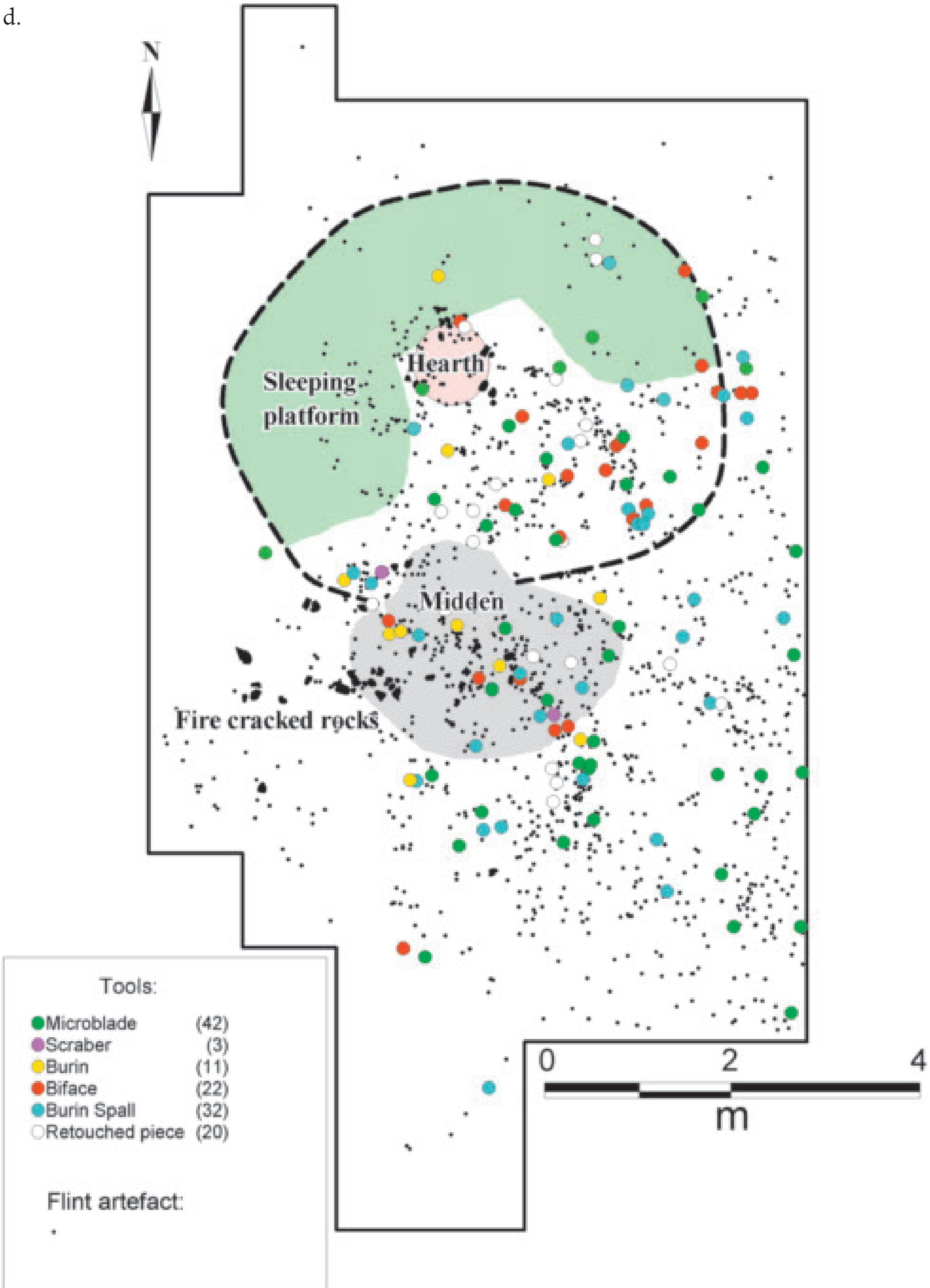
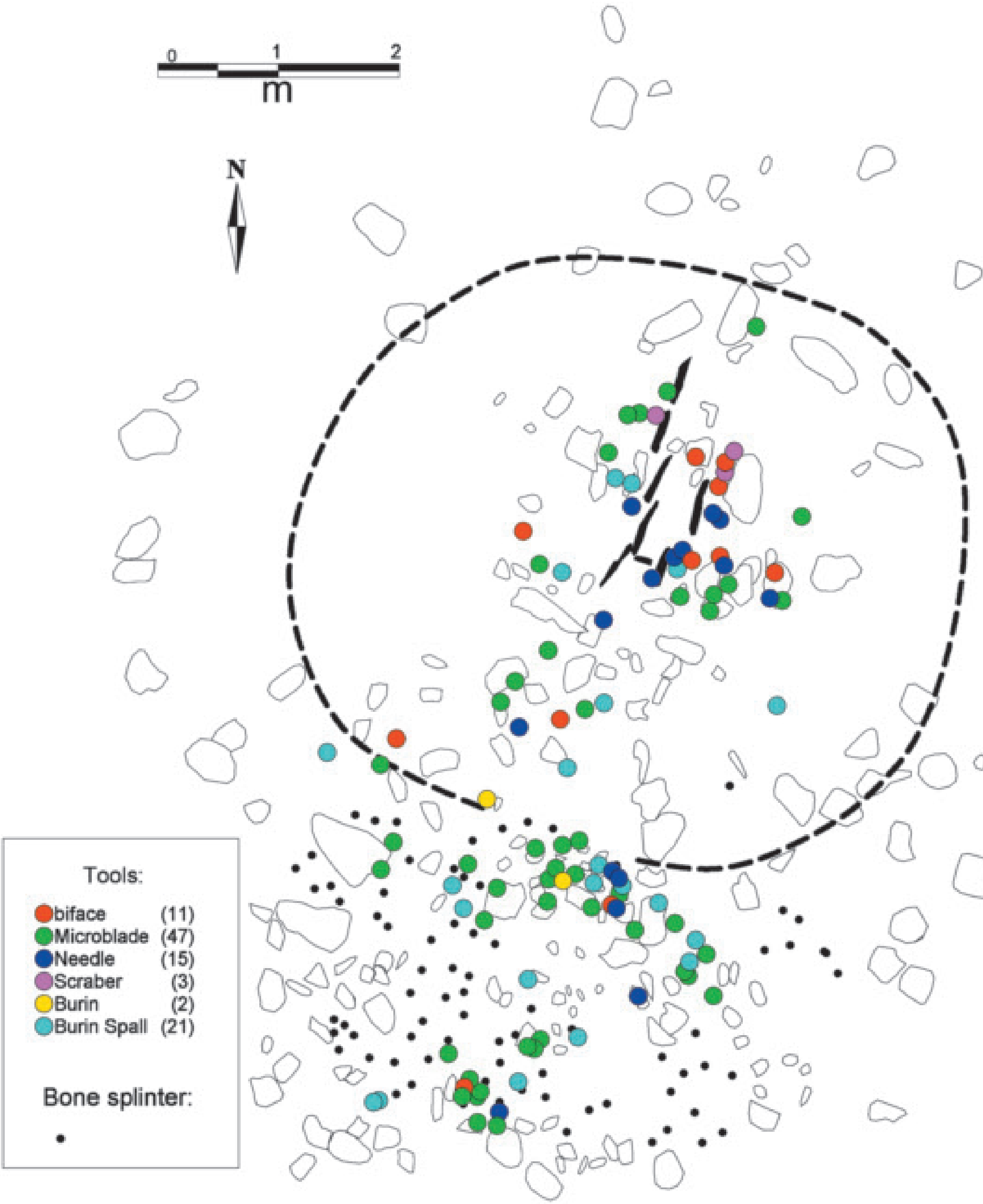


Fig. 7.17
d: *Adam C. Knuth Site, Ruin III,1. (Drawing by K. Buck Pedersen).*
e: *Adam C. Knuth Site, Ruin II,1. (Drawing by K. Buck Pedersen).*

e.


0
1
2
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Tools:
biface (11)
Microblade (47)
Needle (15)
Scraber (3)
Burin (2)
Burin Spall (21)
Bone splinter:

they include a midpassage structure or not: indoor activities were divided between an activity side, an activity area on top of or along the sides of the hearth/midpassage, and a sleeping/resting area on the opposite side. Evidence for 'door dumps' is hitherto most clearly seen from a few Saqqaq and Independence I sites. There seemingly existed no general norm among the Early ASTt groups that determined which half of the dwelling area was assigned to the activity side or to the sleeping/resting side.

a.

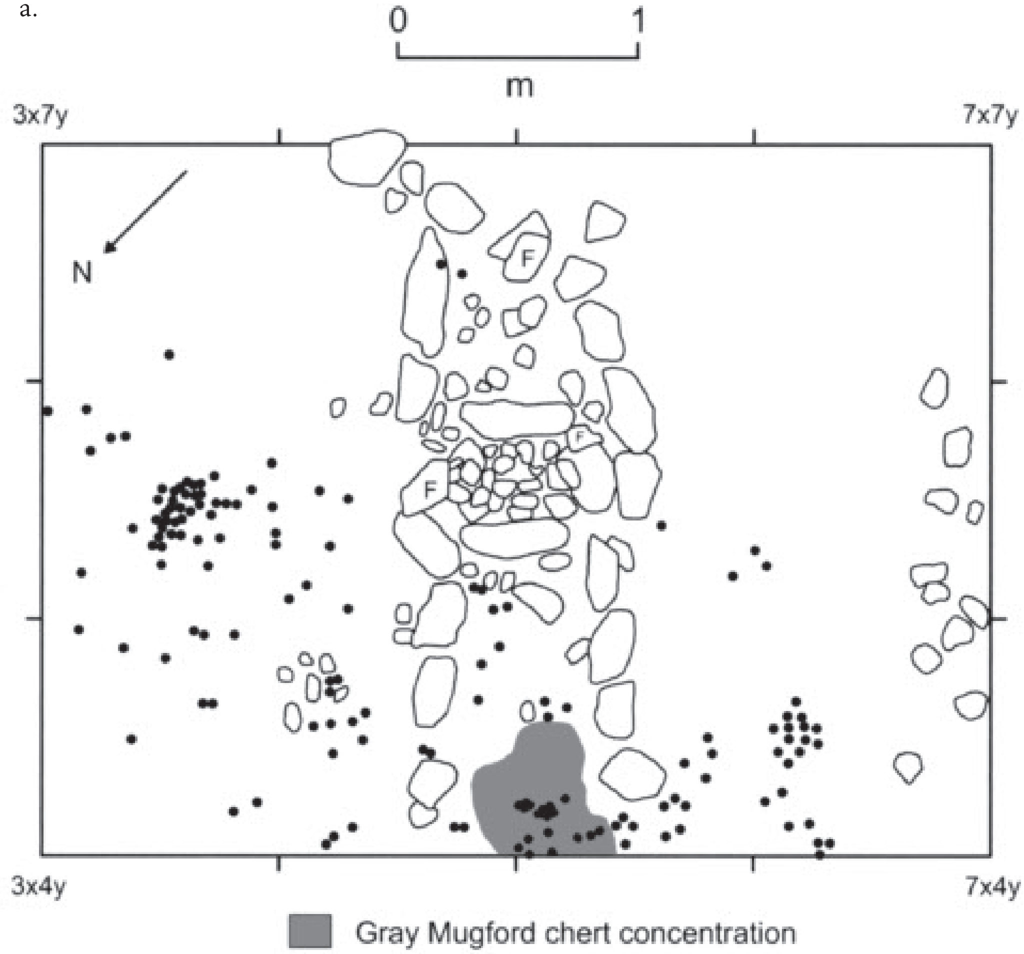
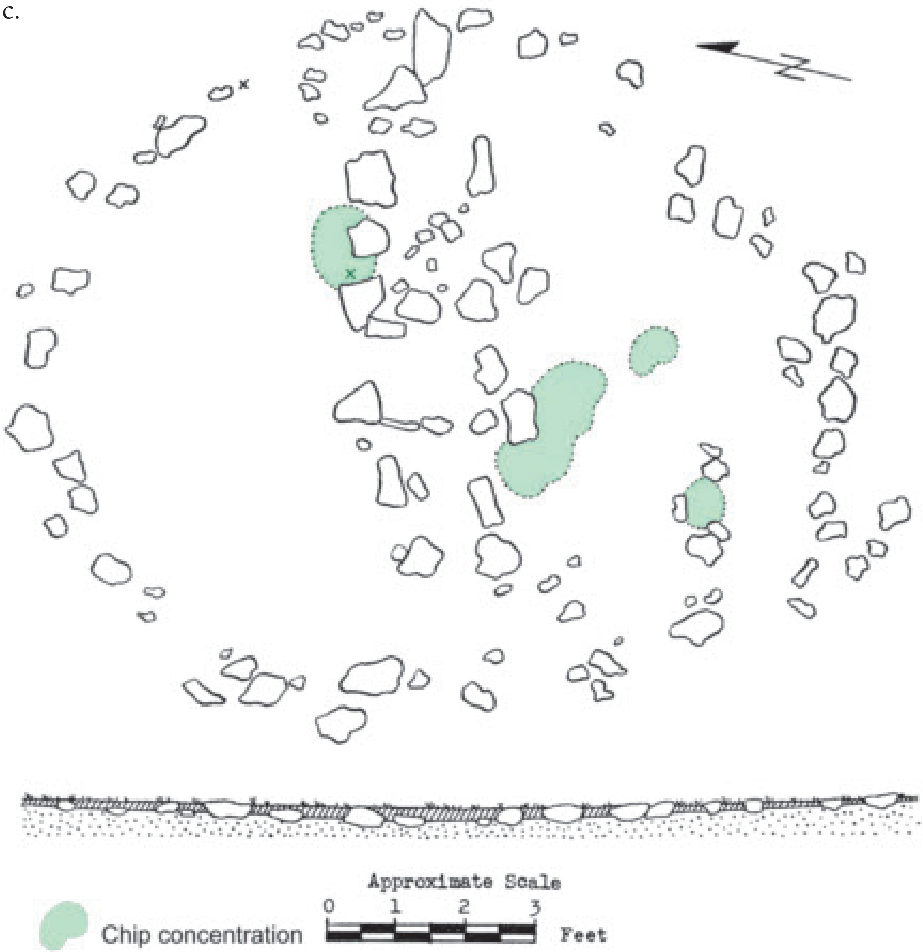


Fig. 7.18
Spatial distributions of artefacts from selected Pre-Dorset dwellings.
a: *Dwelling L-7 at Attu's Point, Labrador (Hood 2008).*
b: *Dwelling 1, Seahorse Gully, Southern Hudson Bay (Meyer 1977).*

b.


13a
13b
13c
13d
3 feet
13a-d : Artifacts
X : Lithic Flakes
------ : Edge of sod (completely burned off to north)
: Alignment rocks
N

c.



d.

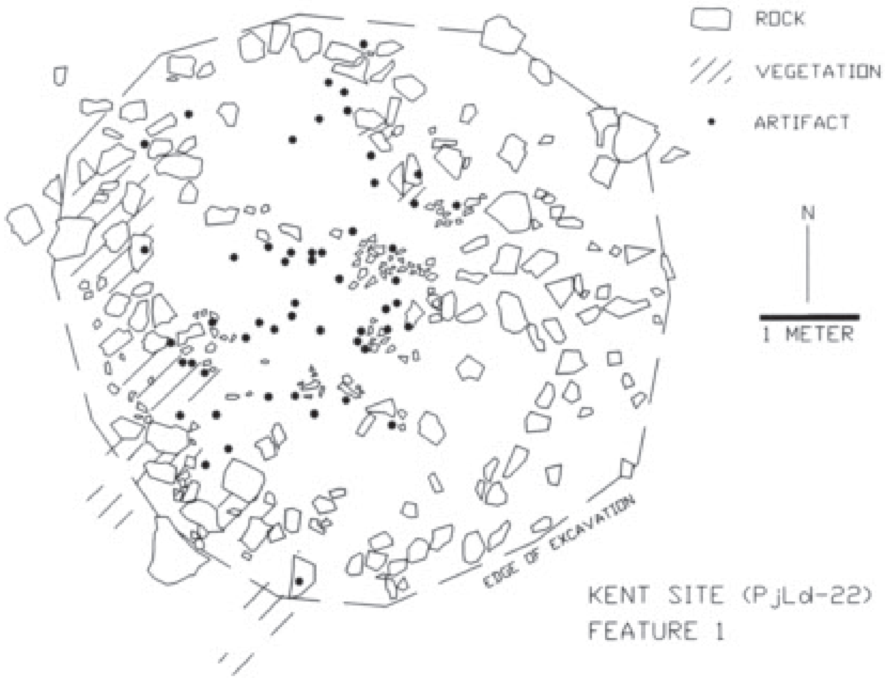


Fig. 7.18
c: *Dwelling BL-11, Baker Lake (Harp 1961).*
d: *Dwelling 1, Kent Site, Prince of Wales Island (Murray and Ramsden 1995).*

7.3.4 Comparisons of Early ASTt camp types and settlement patterns

The more than 200 Saqqaq sites in Disko Bay are the result of complex seasonal movements within 'territories' of local groups (Jensen 2006). The sites included central camps/base camps, a wide variety of smaller satellite sites of different functions connected to the base camps, and a few remarkably large aggregation camps (see Chapter 5.4 above). It was also argued that comparable complex settlement systems existed in other regions in West Greenland (e.g. Gotfredsen and Møbjerg 2004; Hinnerson-Berglund 2004; Appelt 2006). Interregional and cross-cultural comparisons of settlement patterns can obviously only be conducted at a very general level due to the fact that the preconditions – e.g. resource distribution, topography, demography – differ from area to area. Nevertheless, it is informative to put some of the basic properties of the Saqqaq settlement patterns, in particular the different camp types, into a wider comparative perspective.

Comparative materials from the Independence I are provided by the investigations of Eigil Knuth in Peary Land, from which data were subsequently analysed by Jensen (Grønnow and Jensen 2003: 333 ff.). Concerning Wandel Dal in central Peary Land, Jensen describes a settlement pattern that is obviously different from the Saqqaq pattern in Disko Bay. In Peary Land resource exploitation revolved around musk ox hunting, probably through all seasons. But the basic types of site seem to be the same as in Saqqaq. Taking all sites in Peary Land into consideration, and with the reservation that probably not all dwellings on the large sites were necessarily contemporaneous, the relative quantities of sites within each category seems to resemble the Saqqaq ones as well: four aggregation sites (Pearylandville with 35 substantial dwellings, Adam C. Knuth Site, Deltaterrasserne, and Gammel Strand Nord with 10–25 dwellings each), ten to fifteen base camps (e.g. Bob's Site, Kap Holbæk and Vandfaldsnæs with 3–10 dwellings each), and about thirty specialized, small settlements (with only 1–2 dwellings each).

The archaeological and faunal evidence concerning the seasons of the sites and features is often contradictory, which is probably an effect of the consumption of stored food, and at present it is not possible to reconstruct a coherent settlement pattern for the Independence I. However, for our comparative purposes it can be argued that the 'building blocks' of the settlement pattern, the types of camps, are the same as those of the Saqqaq.

A few of the substantial Independence I dwellings stand out due to their extraordinarily rich and diversified find material (Grønnow and Jensen 2003: 335). Without going into details, this resembles the Saqqaq pattern, where a few dwellings are unusually rich in finds and show a high architectural complexity, like Dwelling A8 at Qt. Here, it was argued that this richness and diversity resulted from intensive, multi-seasonal use (autumn, winter, spring) of the same dwelling.

On Ellesmere Island the Independence I sites were primarily aimed at hunting of marine resources in polynyas and fishing for char in lakes, probably supplemented with musk ox hunting (Schledermann 1990; Sutherland 1996). But, except that aggregation sites have not been documented here, the camp types seem to fit with the Peary Land pattern. It must be added that at least some sites in northern Ellesmere could belong to a category of 'pioneer camps' marking the route of the initial Independence I migration into northernmost Greenland (Grønnow and Jensen 2003: 333).

We conclude that the Independence I and Saqqaq societies both established base camps within their regions – sites that were probably used throughout most of the year. These were important nodes in a network of small, often single dwelling camps, which were used for short stays, when single families or task groups moved out of the base camps to conduct specialized hunting at different seasons. Periodically, base camps were probably totally abandoned. Finally, most or all of the Independence I population within a region gathered, probably once a year, in remarkably large aggregation camps, which, measured by all archaeological standards, stand out quantitatively, just as with the Saqqaq. It must be emphasized that large communal dwellings such as longhouses have not been documented on sites belonging to these two cultures.

Are such patterns found within the Pre-Dorset range as well? Published empirical data concerning site surveys and topography are generally sparse, but due to recent literature it is possible to cast at least some light on this question.

There is no doubt that (yearly) gatherings in very large aggregation camps were part of the Pre-Dorset settlement system. Even if this statement is only based on topographical inference and not backed up by radiocarbon dates, Savelle and Dyke convincingly argue for the presence of such aggregation camps, each consisting of 10–25 or even more contemporary dwellings, in the regions that they have surveyed (e.g. Savelle *et al.* 2012: 169 ff.; Dyke and Savelle 2009: 382; Savelle and Dyke 2014). These very large camps were established in particular during the conspicuous boom-period of the very early Pre-Dorset. Interestingly, a few very large, rectangular and slightly countersunk 'communal houses', with a floor area of 30–50 m^2 each, have also been located. Judging from their position on a series of raised beaches, they could date to the Pre-Dorset era (Dyke and Savelle 2009: 385–86; Savelle *et al.* 2009: 226). The 'communal house phenomenon' has not been documented in the eastern range of this culture, and it is, as mentioned above, unknown in Independence I and Saqqaq contexts. This suggests that some differences in social organization and complexity existed between the western and eastern Early ASTt groups. This should be explored in the future by careful documentation and excavation of some of these presumed earliest communal dwelling structures in the Arctic.

Pre-Dorset sites comparable to the base camps of the Saqqaq, consisting typically of three to six contemporary dwellings, are frequently found within the geographical range of the culture, not only along the coasts but inland as well (e.g. Müller-Beck 1977; Harp 1961; Milne and Donnelly 2004). However, the most numerous site class consists of only a single or a couple of tent rings – like in Saqqaq and Independence I – sometimes containing a midpassage, a central hearth or a paved area, but most often without internal structures (e.g. Savelle *et al.* 2012: 169, 173; Savelle and Dyke 2009; Dyke and Savelle 2009; Dyke *et al.* 2011; Murray and Ramsden 1995: 108–9; Hood 2008: 9). This flexible settlement pattern involving several moves between camps containing only a single family, camps with three to six contemporary units and finally remarkably large aggregation camps allowed the Pre-Dorset societies to make fast expansions into uninhabited territories and to consolidate themselves there.

We conclude that during a (yearly) settlement cycle the families of all three Early ASTt cultures moved between camps of very different sizes: very large aggregation camps, base camps of three to ten dwellings, and small, specialized camps consisting of just one or two tents. It is not possible to generalize across the ASTt range about the seasonality of these camps, partly because the existing archaeological record is sparse and somewhat contradictory, and partly because the specific seasonal rounds must obviously have varied greatly among the different regions and through time.

7.4 The place of the Saqqaq culture in the Early ASTt chronology and the peopling of the Eastern Arctic

7.4.1 Introduction

The understanding of the Saqqaq culture as one of three pioneering cultures in the Eastern Arctic can be enhanced through analysis of the absolute chronology and changing geographical ranges of these cultures. Weight is put on the timing and character of the initial human expansion into the Eastern Arctic, as well as on the demographic dynamics from the beginning until the time of the abandonment of West Greenland by the Saqqaq societies.

7.4.2 Application of radiocarbon dates

It is necessary to screen the accessible radiocarbon dates concerning the Early ASTt. In accordance with Grønnow and Sørensen (2006) and Jensen (2006), only 14C samples which meet the following criteria are applied in the discussions. Firstly, the samples must come from reliable contexts, i.e. the dating material and the remains of the archaeological event must be within the same find context, and the dating material must be of terrestrial origin in order to avoid serious problems concerning corrections for marine reservoir effects. There all still all too many unknown factors concerning the ways radiocarbon from different marine reservoirs of different ages are incorporated into the tissues of marine game, fish, shells and other marine organic materials utilized by humans in the Arctic (see also earlier discussions, e.g. by McGhee and Tuck 1977).

Secondly, it is important to address the problems with charcoal as a source for radiocarbon dates in the Arctic. The errors connected with using driftwood for dating archaeological structures and finds are well known: driftwood had often 'survived' for centuries on the surface of raised Arctic beach ridges before it was utilized for fuel and raw material in tool production. But even thin stems and branches from local shrubs, in particular in High Arctic environments, can be of a remarkably high age: ages of well over 100–200 years have been measured by counting growth rings in north-east Greenland *Salix* stems which were just a couple of centimetres in diameter. This goes for stems of the heather plant *Casiope tetragone* as well (Baittinger 2012). Moreover, dead stems and branches from *Salix* and other local dwarf shrubs lying on the surface were collected by prehistoric High Arctic settlers in want of driftwood, and the 'survival rate' of even thin branches is much higher here than in the Low Arctic, where the natural turnover of organic matter is significantly faster. Based on experience from fieldwork, the present author expects that dead *Salix* stems and branches could 'survive' for centuries lying on the surface in High Arctic environments. Accordingly, many radiocarbon dates on *Salix* firewood from this part of the Arctic might in fact be too old in relation to the archaeological event that they are supposed to date. This must be taken into consideration when evaluating the screened dates presented below. Charcoal from thin twigs or leaves forms a more reliable basis for dating, but only rarely do the published data reveal whether the samples are from stems, branches or twigs.

Finally, there are problems in translating uncalibrated BP dates into solar years. In relation to the timing of the initial migration into Greenland around 4000 BP and the transition from Early to Late ASTt (the Dorset sequence), it is essential to address the following problems:

1. We are not safe in simply referring to the BP measurements and avoiding calibrations in our analyses. It is well known, and it will be documented below, that the BP dates do not necessarily reflect logical time sequences of solar years.
2. Whereas the precision calibration curve is relatively even throughout most of the Early ASTt period, it shows plateaus and wiggles exactly around the time of the initial expansion into the Eastern Arctic and around the transition from Early to Late ASTt. The last plateau is well known (e.g. Grønnow and Sørensen 2006: 59; Desrosiers 2009: 412 ff.; Guilderson *et al.* 2005), but the archaeological consequences of it are rarely seriously considered.

From the high-precision calibration curve (Reimer *et al.* 2004) (Fig. 7.19), it is seen that absolute dating of the pioneer phase of the ASTt is hampered by no less than four important plateaus. The present author has thus defined Plateaus A through D, and a wiggle, Wi. I. At the opposite end, we find Plateau E and the wiggle, Wi. II (Table 7.4.2).

We conclude that BP dates within 4560–4350 BP, 4200–3840 BP, 2550–2400 BP, and 2260–2150 BP do not translate into logical solar temporal sequences. Short time spans expressed in BP dates often cover considerably longer time periods in solar years. Plateaus C and E are remarkable in this respect: 140 radiocarbon years in Plateau C cover 300 solar years, and the 150 radiocarbon years of Plateau E span no fewer than

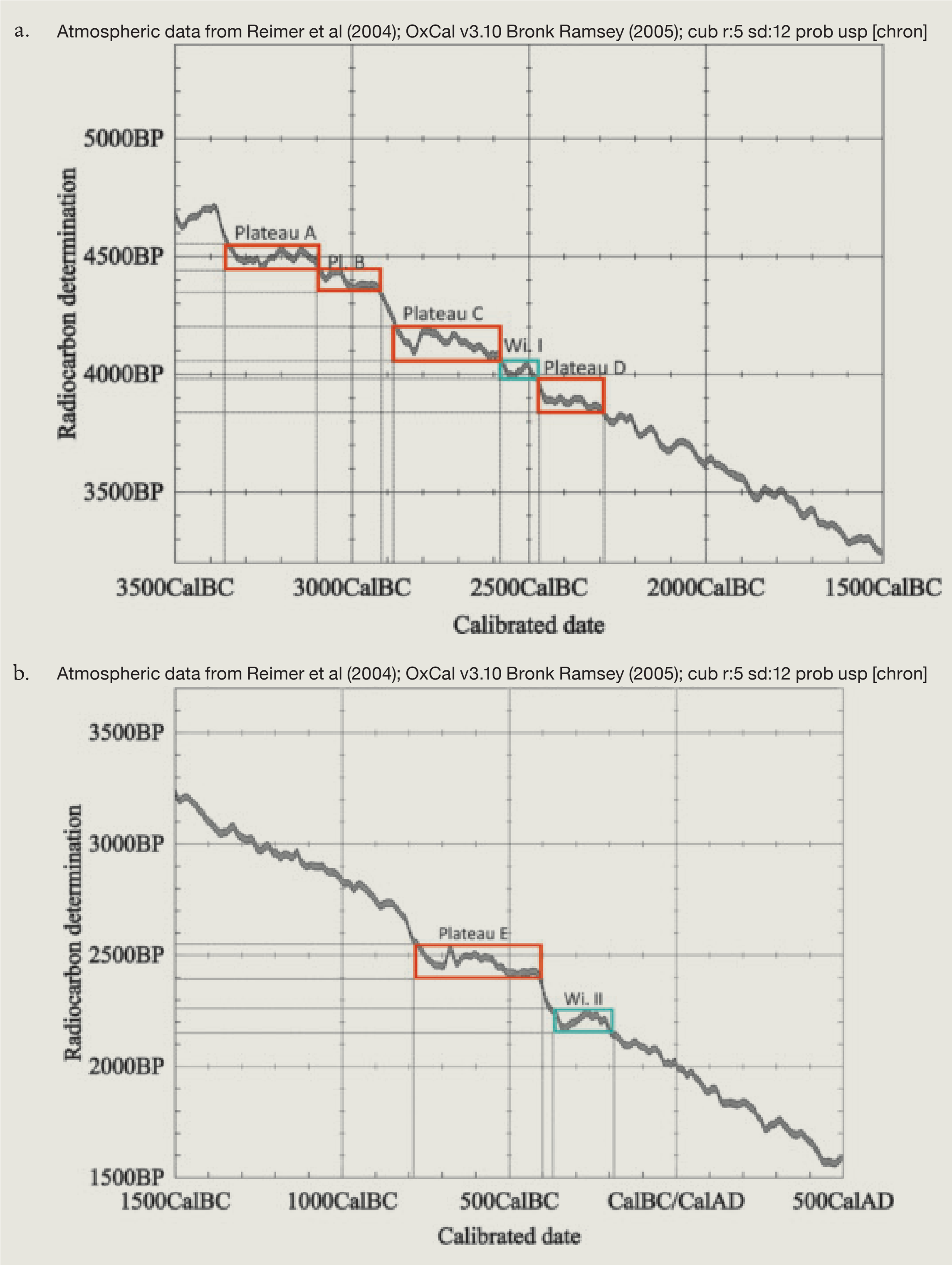


Fig. 7.19
a: *The definitions of the Plateaus A–D and Wiggle I on the 14C calibration curve. Based on the high precision calibration curve from Reimer et al. 2004.*
b: *The definitions of Plateau E and Wiggle II on the 14C calibration curve. Based on the high precision calibration curve from Reimer et al. 2004.*

390 solar years. Consequently, what might seem a series of temporally close historical events, for instance the initial expansion of the ASTt in the Eastern Arctic, measured by BP dates, could just as well have been played out over several centuries. However, as will be seen, precision BP measurements, where one standard deviation is only 20–40 years, can be very useful in dating the timing of events within this 'problematic' period.

In conclusion: the most reliable radiocarbon dates are those made on bones from terrestrial animals like musk ox, caribou, ptarmigan and hare recovered in unambiguous archaeological contexts. Uncontaminated, charred remains from short-lived local plants and very thin twigs (typically from *Salix arctica* and *Betula nana*) are generally considered reliable radiocarbon dating sources as well, whereas dates based on stems from these dwarf bushes must be treated with some reservation, in particular concerning dates from the High Arctic. This leaves us with fairly few reliable radiocarbon dates as a starting point for interpretations, but nevertheless it is worth while attempting.

7.4.3 Saqqaq beginnings and the pioneer phase in the Eastern Arctic

7.4.3.1 Timing of the Saqqaq beginnings

From Table 7.4.3-1 it is seen that the only sample measured on terrestrial bone (musk ox) comes from the northernmost Saqqaq range, Ellesmere Island. This date of 3840 BP, with its standard deviation of ± 70 BP, hits Plateau D on the calibration curve (Fig. 7.20; Fig. 7.21). Thus the dating of the sample cannot be determined with any certainty within the time span of 2470–2290 cal BC. The dates on twigs from local plants and grass turf from the Low Arctic West Greenland are considered reliable as well. Due to the large standard deviations of the BP measurement, the earliest dates (4010 BP and 3980 BP) cannot be calibrated with any precision within Wiggle I and the adjacent plateaus. However, the date from Narsatsiaq of 3890 BP made on local twigs was measured with a standard deviation of only ± 23 years, and this makes it possible to determine the date within Plateau D to 2470–2340 cal BC (one standard deviation). This is at present the closest we can get to the timing of the earliest Saqqaq expansion into West Greenland. Below we will compare this with the earliest Independence I dates in the far north.

7.4.3.2 Dating the earliest Independence I

Turning to the Independence I in the High Arctic, the screened dates of the earliest sites of this culture are presented in Table 7.4.3-2. The data from this table and the overview in Fig. 7.22 show the consequences of the plateaus and wiggles. As with the Saqqaq, all early BP dates translate into very broad time spans of calibrated years. The earliest Independence I radiocarbon date made on terrestrial bone (musk ox), the most reliable dating material, is from the Kettle Lake site in northern Ellesmere Island. At 3920 ± 85 BP it falls within Plateau D. Accordingly, the calibration (Fig. 7.23) shows a very broad time frame: 2570–2280 cal BC. All seven earlier dates, including a sample from Pearylandville and three from the southern part of north-east Greenland (Røde Hytte and Silja Ø) are based on *Salix* sp./*arctica* charcoal. The earliest screened Independence I dates are from West Wind, Ellesmere Island and from Røde Hytte, Scoresby Sound, which fall within Wiggle I and reach both Plateau C and D on the calibration curve, and thus they span a broad time period within one standard deviation. Due to the precision measurement of the Silja Ø sample the date of 3946 ± 25 BP translates into the period of 2550–2340 cal BC, with the highest probability (41.9%) being within 2490–2450 cal BC, i.e. within Plateau D (Fig. 7.24).

In conclusion, with the uncertainties concerning dates on *Salix* charcoal from the High Arctic taken into consideration, the timing of the first peopling by Independence I of Ellesmere Island, Peary Land and north-east Greenland can be set to some time within 2550–2340 cal BC. At present, there is no convincing evidence of earlier human presence in the easternmost High Arctic. It is not possible, based on the available radiocarbon dates, to follow the spread of the pioneer

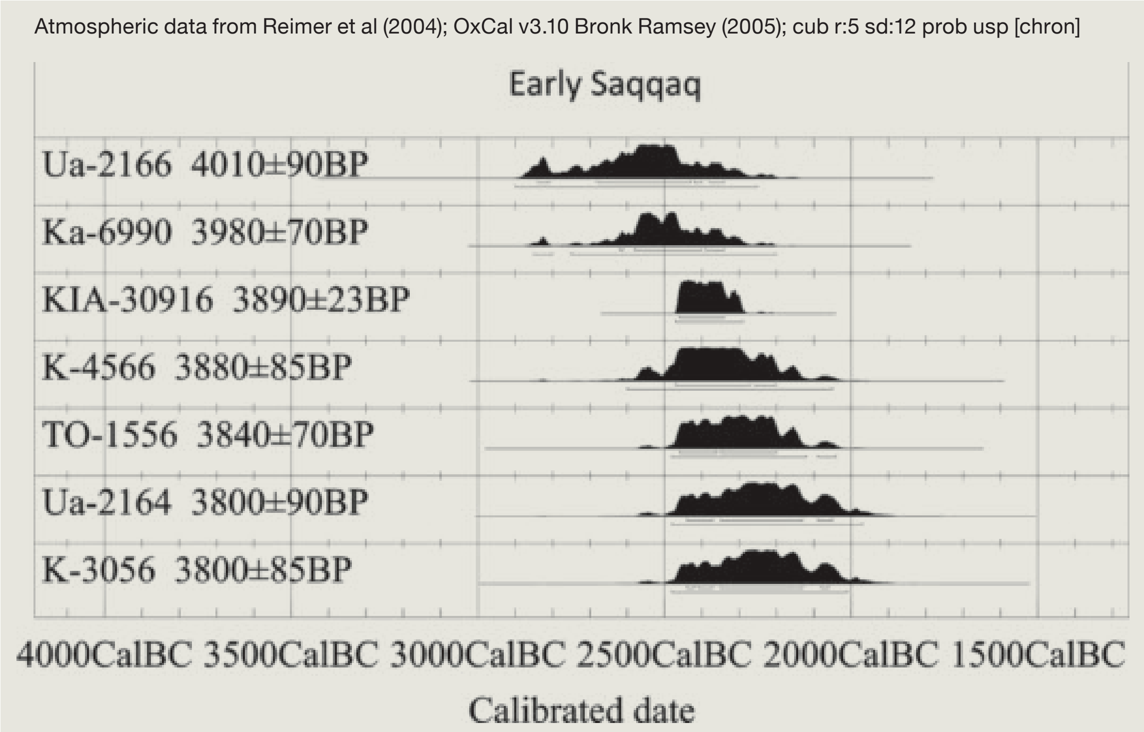


Fig. 7.20
Calibration of screened radiocarbon dates: Saqqaq, earlier than 3800 BP.

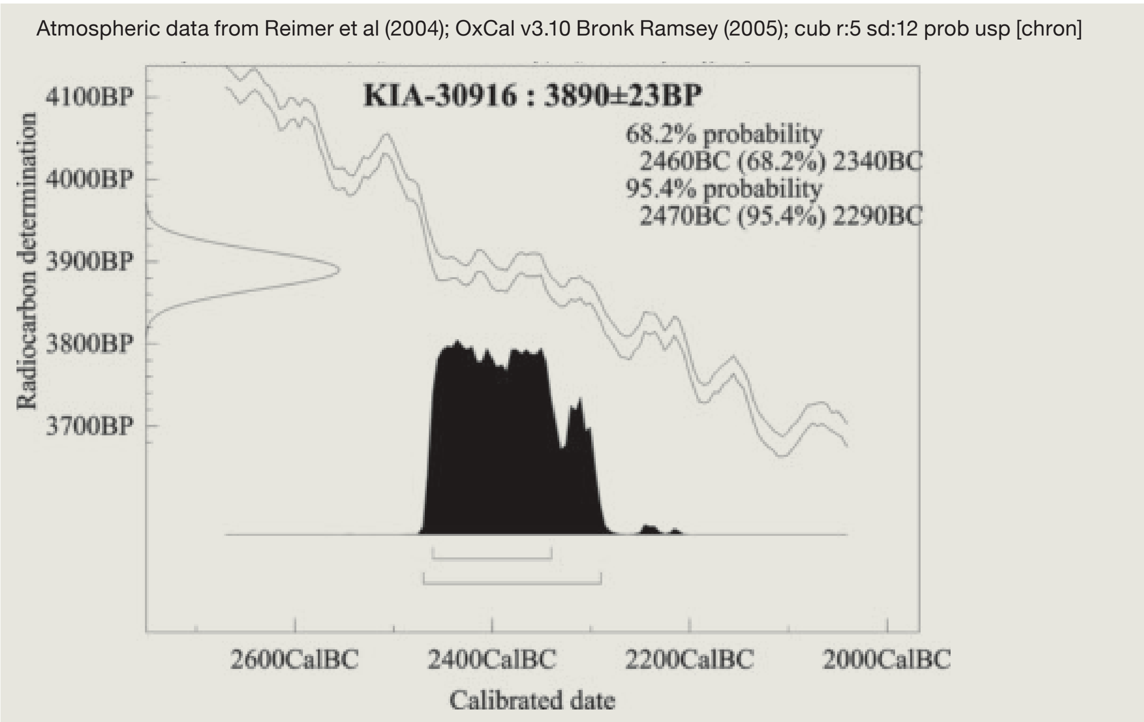


Fig. 7.21
Calibration of sample KIA-30916, Narsatsiaq.

settlements from the very north of the Independence I range – the Canadian High Arctic archipelago and Peary Land – towards the south around King Oscar's Fjord and Scoresby Sound in north-east Greenland. Moreover, this time frame contains the span within which the earliest Saqqaq societies came to West Greenland at some point in time. Thus, through radiocarbon dates it is at present not possible to determine which part of the country was first inhabited by the pioneer societies from the Canadian High Arctic archipelago.

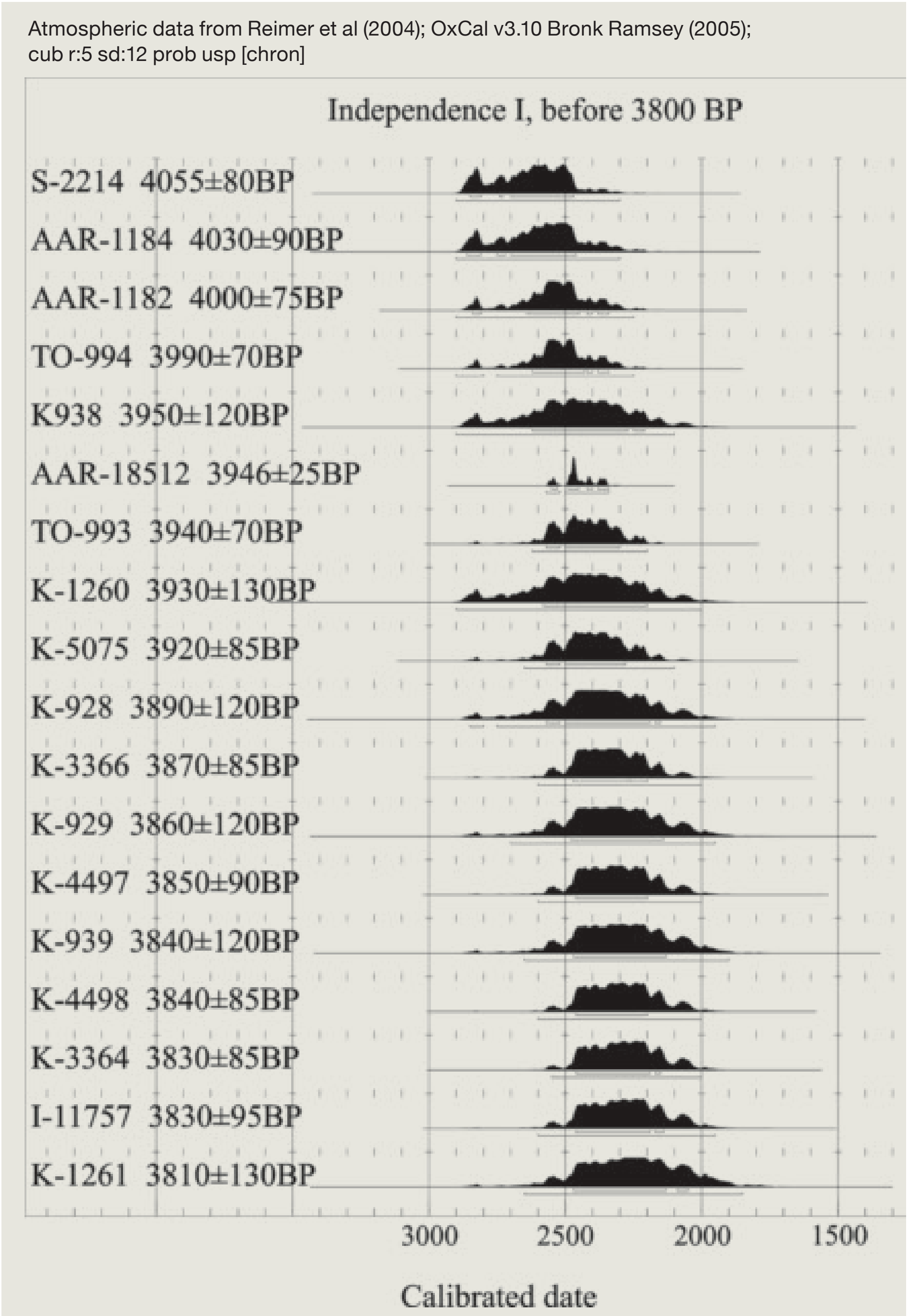


Fig. 7.22 *Calibration of screened radio carbon dates: Independence I, earlier than 3800 BP.*

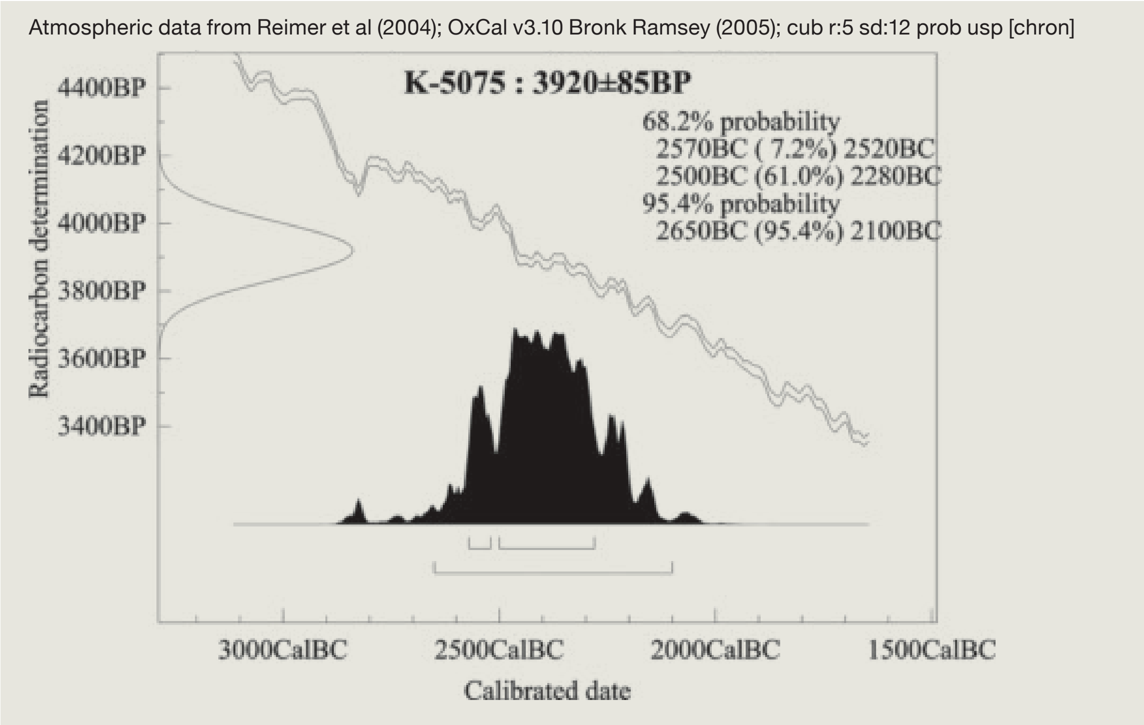


Fig. 7.23
Calibration of sample K-5075, Kettle Lake.

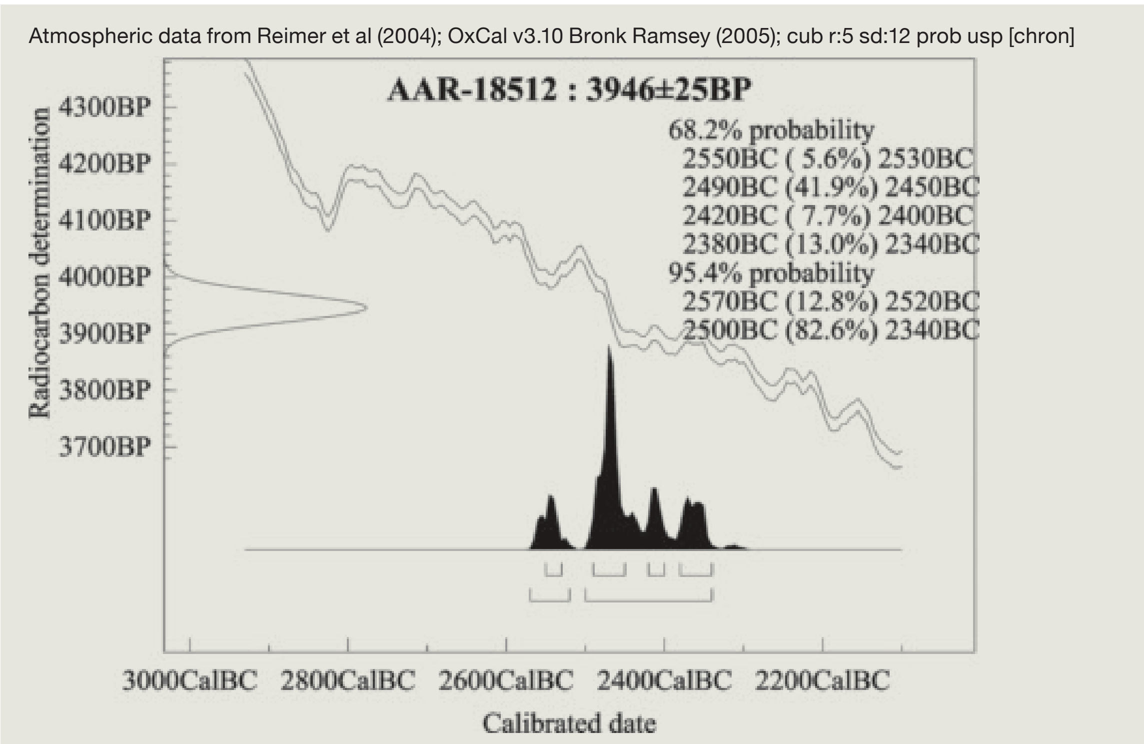


Fig. 7.24
Calibration of sample AAR-18512, Silja Ø.

7.4.3.3 Saqqaq roots? Dating the beginning of Pre-Dorset

Archaeological and genetical evidence, as well as the geographical position of Greenland as the easternmost extension of the Queen Elizabeth Islands, point to the fact that the ancestors of the Saqqaq/Independence I cultures must be sought west of Greenland. The Nares Strait area between Ellesmere and the northern Thule area is considered the 'Gateway to Greenland' for every Arctic-based human expansion into the country (e.g. Schledermann 1990; Meldgaard 1986: 24; Grønnow and Sørensen 2006; Appelt and Gulløv 1999). Consequently, we turn to the earliest Pre-Dorset in Canada in search of the roots of the earliest pioneers in Greenland.

The task of dating the initial Pre-Dorset in Canada is facilitated by the systematic work by Savelle and Dyke carried out through the past decade in the western and central part of the High and 'Middle' Arctic (Dyke and Savelle 2009; Dyke *et al.* 2011; Savelle and Dyke 2002, 2009; Savelle *et al.* 2009). A screening of their published radiocarbon dates before 3800 BP, supplemented by a few dates from other Pre-Dorset features, results in Table 7.4.3-3.

As seen from the table, and Fig. 7.25, the radiocarbon dates of the earliest Pre-Dorset 'hit' the plateaus A and B on the calibration curve. The two earliest dates fall well within Plateau A, but it must be noted that one of them (AA-61958 from Boothia Peninsula) was made on caribou bone with a ∂^{13}C content that could indicate that the bone was contaminated by blubber or other matter of marine origin containing 'old carbon'. The next date (UCIAMS-30358 from Kent Peninsula) falls within Plateau B (Fig. 7.26), and thus this small group of dates is an indication of the first arrival of Pre-Dorset pioneers in the western Canadian Arctic some time within *c.* 3360–2920 cal BC. The earliest date pointing in the direction of the central part of the Arctic archipelago is UICAMS-43960 (4230 ± 15 BP) from the Gulf of Boothia, which translates into the remarkably narrow time span of 2895–2875 cal BC (one standard deviation) (Fig. 7.27). Several dates fall within the following Plateau C, Wiggle I and Plateau D, demonstrating the continued presence of early Pre-Dorset in the western part of the archipelago.

The earliest date hitherto from the Foxe Basin area further east is Beta-171162 (4020 ± 40 BP) made on a goose bone from the highest beach ridges on Igloolik Island. This date falls within Wiggle I and translates into the period 2580–2470 cal BC. However, Savelle and Dyke (2014) have recently shown that this date is far too old. It is not in accordance with the relative sea level curve at Igloolik and probably biased by a 'hardwater effect'. According to Savelle and Dyke's investigations, only a few small islands in the Foxe Basin had emerged from the sea at the time of the earliest Pre-Dorset expansion eastwards, and the earliest significant Pre-Dorset settlements in this area are in fact later than 3700 BP.

In conclusion: the earliest Pre-Dorset pioneers migrated into the western Canadian Arctic at a point in time which at present cannot be determined with higher precision than some time within 440 solar years, c. 3360–2920 cal BC. The Foxe Basin area seems not to have attracted these earliest migrants, and we lose track of them further east, where no reliably dated sites of this high age have been documented. This could be because the initial expansion stalled for some centuries in present day western Arctic Canada and the further spread of the population eastwards was a quite abrupt event. The (admittedly few) reliable dates of the earliest Pre-Dorset from Labrador and Nunavik and north into Queen Elizabeth Islands suggest such a scenario. Importantly, all of them fall within Plateau D on the calibration curve, i.e. within the time span 2470–2290 cal BC (Helmer 1991: 307; Gendron and Pinard 2000: 136; Cox 2003: 432).

7.4.3.4 Conclusions on the timing and character of the initial ASTt phase

A critical screening and calibration of the available radiocarbon dates on Early ASTt sites shows that the initial peopling by the Pre-Dorset of the western part of the Canadian Arctic took place some time within the period 3360–2920 cal BC.

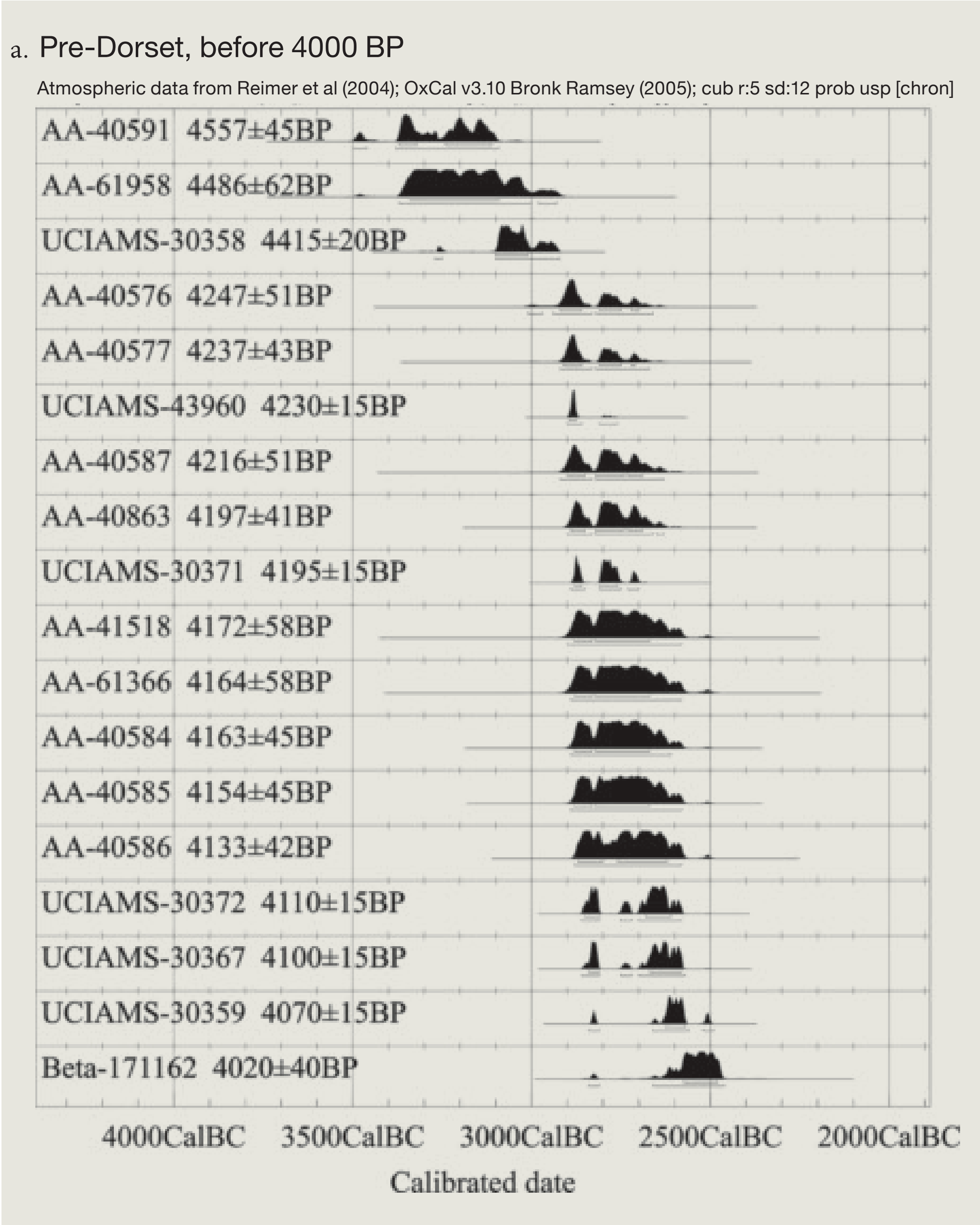
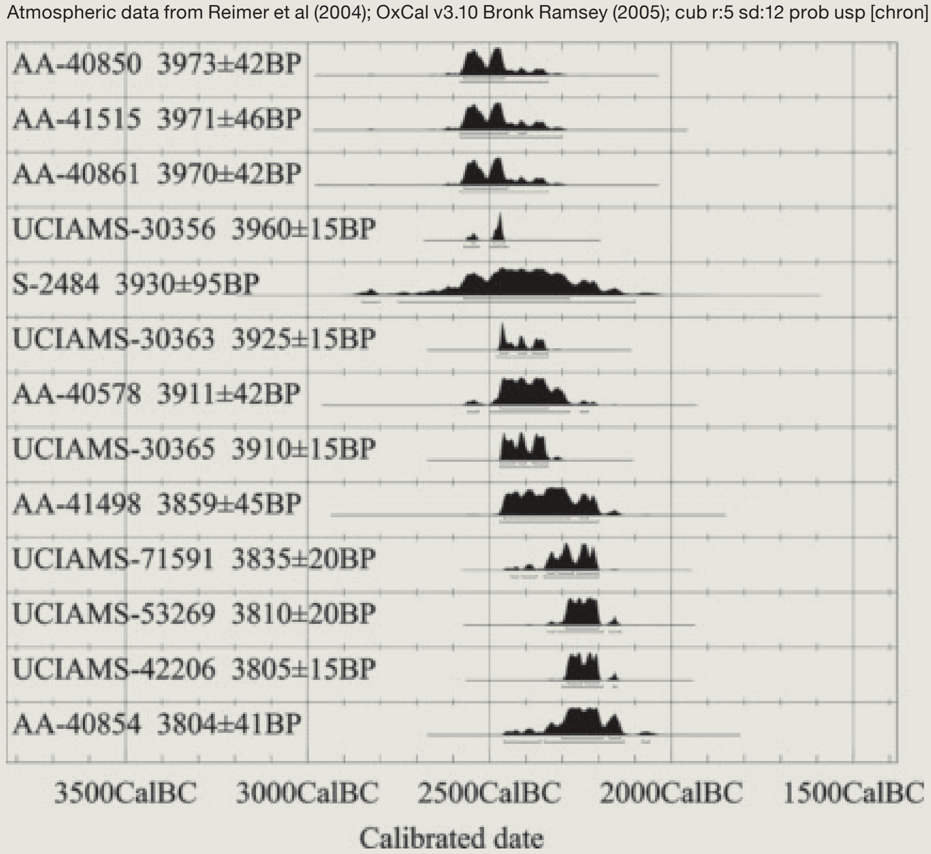


Fig. 7.25
a: *Calibration of screened radiocarbon dates. Pre-Dorset, earlier than 4000 BP.*
b: *Calibration of screened radiocarbon dates. Pre-Dorset, between 4000 and 3800 BP.*

Settlement west of the Gulf of Boothia region continued, while there are indications that further eastward expansion paused here for at least five centuries before the early Pre-Dorset spread further into 'virgin' areas: south-east to Nunavik and Labrador, and to the High Arctic via Queen Elizabeth Islands to Greenland some time within 2470–2290 cal BC. The radiocarbon dates of the earliest Pre-Dorset in the easternmost and northernmost Canadian Arctic fall within the same range as the earliest Independence I in Greenland and Saqqaq, namely within Plateau D. The presence of this 180-year-long plateau makes conclusions on temporal overlaps, continuities or discontinuities between the earliest phases of these three cultures very difficult. However, it is likely that this last important step in the initial peopling of the Eastern Arctic – from the Gulf of Boothia region to East Greenland – lasted only 180 solar years or even less, i.e. seven human generations or less.

b. Pre-Dorset, before 4000 and 3800 BP



7.4.4 The end of the Saqqaq culture in relation to the development in the Eastern Arctic

7.4.4.1 The abandonment of the High Arctic c. 3600 BP and concentration of Saqqaq occupations in West Greenland

The long series of screened Independence I dates from Peary Land is rounded off by the latest dated dwelling feature, Vandfaldsnæs F 15: 3570 ± 80 BP (K-5740) (Grønnow and Jensen 2003: 331). Hitherto there is no firm evidence in the shape of reliable radiocarbon dates that this Early ASTt group continued life either in north-west (Sørensen 2010: 130) or in north-east Greenland south of Peary Land beyond the *c.* 3600 BP limit (Grønnow and Sørensen 2006), but that might reflect the fact that reliable dates of Independence I are very sparse in the culture's southern ranges (e.g. Andreasen 1996). From Ellesmere Island there is a very late date on willow charcoal from the Independence I site West Wind (TjFd-3): 3260 ± 70 BP (Beta-36447) (Canadian Archaeological Radiocarbon Database; Sutherland 1996), but this is an odd 'outlier', and is not coherent with the series of other late Independence I dates.

The suggested depopulation of the eastern High Arctic after *c.* 3600 BP is in accordance with the evidence from Canada collected by Savelle and Dyke further west and south. The temporal distribution of sites based on a combination of radiocarbon dates and beach line chronology shows a remarkable decline in settlement intensity and in some cases complete regional abandonment following the 3600 BP limit (Dyke and Savelle 2009; Dyke *et al.* 2011; Savelle and Dyke 2002, 2009; Savelle *et al.* 2009).

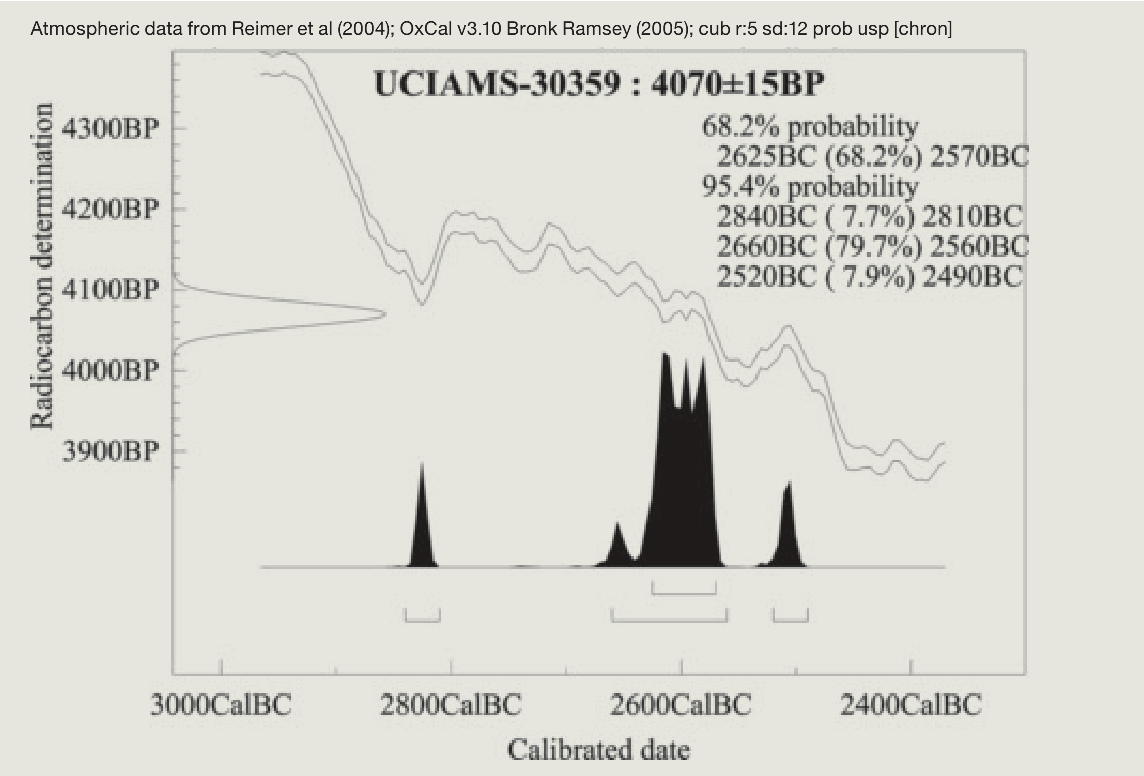


Fig. 7.26
Calibration of sample UCIAMS-30359, Kent Peninsula.

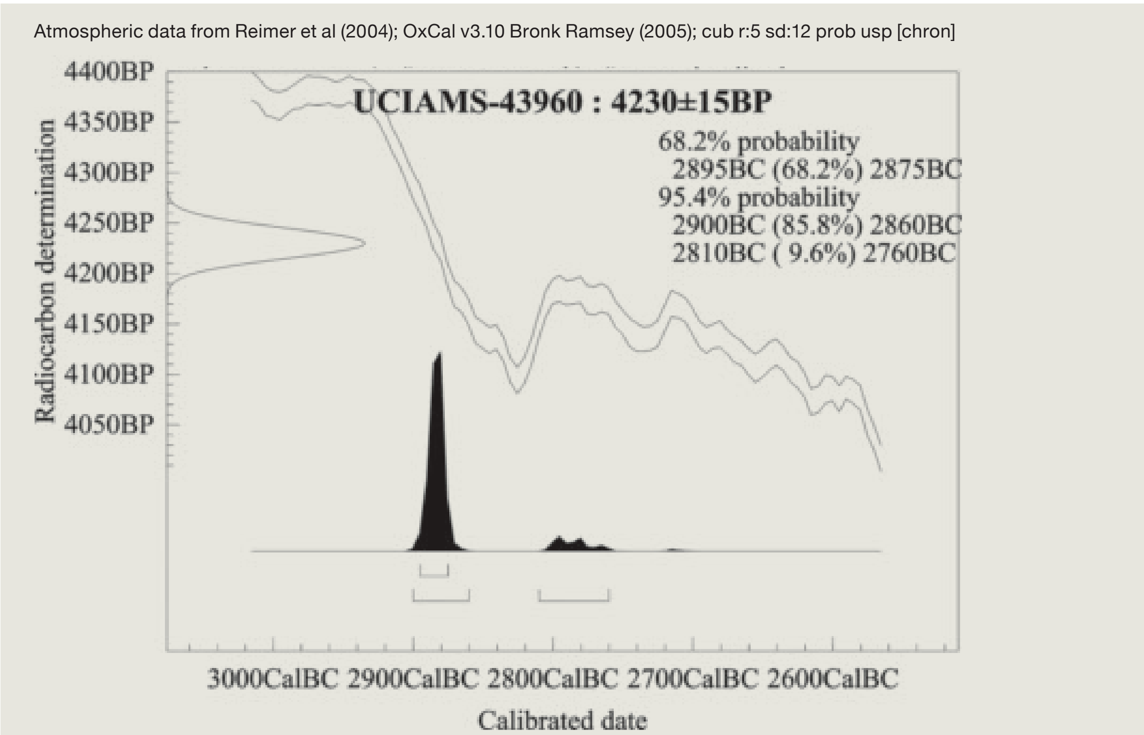


Fig. 7.27
Calibration of sample UCIAMS-43960, Gulf of Boothia.

As described before, High Arctic Saqqaq sites are found in north-west Greenland (the Thule area), in the neighbouring Ellesmere Island, and in north-east Greenland south of *c.* 74° north, but at present there is only a single reliable radiocarbon date on *Salix* sp. charcoal (Topo Site, Ellesmere Island: 3420 ± 60 BP (TO-992)), which indicates Saqqaq visitors in the High Arctic after the general decline of settlements here (Schledermann 1990: 75 ff.). It must be added that the calibration curve does not form significant plateaus or wiggles within the range *c.* 3800–2550 BP and in this respect the evidence from screened dates is not problematic.

It has been suggested that the geographical range of the Saqqaq culture was severely reduced during its terminal phase (see, for example, Jensen 2006: 180 ff.; Grønnow and Sørensen 2003). This idea is based on the fact that all the latest radiocarbon dates of Saqqaq sites are from central West Greenland (see below). However, one must be aware of the biased sources in relation to this apparently plausible interpretation:

First, we lack dates of Saqqaq sites outside West Greenland. The only ones are the above-mentioned dates from Topo Site on Ellesmere Island, and Ikaasap Ittiva in the Ammassalik area, East Greenland (Møbjerg 1987: 86–88). (The last-mentioned site produced the following dates of a Saqqaq layer: K-3938 B: 3490 ± 165 BP and K-3939: 2820 ± 85 BP, but the charcoal in the turf mix that was dated was not determined to species, and thus this date does not meet the screening criteria.)

Secondly, most beach ridges – at least along the outer coasts – from Saqqaq times in West Greenland south of the Nuuk area have been washed away due to wave erosion since Saqqaq times. This part of West Greenland has been exposed to a significant rise of the relative sea level within the last millennium (Weidick 1996). There are unpublished finds of a few high-lying Saqqaq sites in the Narsaq area, and a couple of lithic Saqqaq artefacts have been located in turfs from excavated Thule sites in South Greenland (Mathiassen and Holtved 1936: 73–75), but, as surveys have shown, typically no Saqqaq layers and only fragments of Greenlandic Dorset sites have survived (Raahauge *et al.* 2005).

Thus changes in the geographical range of the late Saqqaq can only be followed in detail in West Greenland. Outside this area firm data are lacking.

7.4.4.2 The Saqqaq/Early Dorset transition in West and South Greenland

Following the stratigraphic separation of the Saqqaq and Dorset in West Greenland (Larsen and Meldgaard 1958; Mathiassen 1958) the question of continuity/discontinuity between these two cultures was discussed (e.g. Taylor 1967; Kramer 1996a). The latest and most substantial contribution is by Jensen (2006: 180 ff.). Based on a combination of an overview of screened radiocarbon dates, observations of stratigraphy and typological identification of late Saqqaq traits, Jensen concludes that 'there was no local development from the Saqqaq to the Dorset cultures' concerning West Greenland, and that the Greenlandic Dorset most probably represents a migration of new people into West Greenland (see also Sørensen 2012a).

Concerning the timing of the disappearance of the Saqqaq and the beginning of the Greenlandic Dorset we face serious problems with the radiocarbon dates: the well-known 'pre-Roman plateau' on the calibration curve – defined here as Plateau E (Fig. 7.19) – makes it difficult to use radiocarbon dates to throw light on this transition. Plateau E covers the time span 2550–2400 BP or 790–400 cal BC. To make things even more complicated, there is a less-noticed but nevertheless important wiggle (Wiggle II) on the calibration curve almost in prolongation of the plateau, covering 2260–2150 BP or 370–190 cal BC. This implies that almost any BP date of late Saqqaq/Pre-Dorset and early Dorset covers several centuries of solar years within one standard deviation. However, some dates are quite informative, and we will analyse these below.

First, focusing on West Greenland, the following screened radiocarbon dates are relevant for the discussion of the latest Saqqaq occupations (Table 7.4.4-1, Fig. 7.28).

Clearly, a single late Saqqaq site, Nipisat in the Sisimiut area, provides the most relevant dates, but one could have wished for a far better coverage of the late Saqqaq from Disko Bay as well as Nuuk. However, the dates suggest the following:

– The series of dates from Nipisat shows that the Saqqaq stayed in the Sisimiut area throughout the entire late phase (Gotfredsen and Møbjerg 2004: 34 ff.). A single date, AAR-3574 (2455 ± 50 BP), hits Plateau E on the calibration curve, which means that the Saqqaq abandoned the site some time between 790 and 400 cal BC. As this is the only Saqqaq date within the plateau it is either a misleading outlier or an indication that the Saqqaq probably disappeared from the area at an early stage within Plateau E.
– All reliable dates of the latest Saqqaq – even if they are few – from north and south of the Sisimiut area fall well before Plateau E. The latest in the Disko Bay area are within the time span of *c.* 1000–800 cal BC and in Nuuk they are clearly before 1000 cal BC.

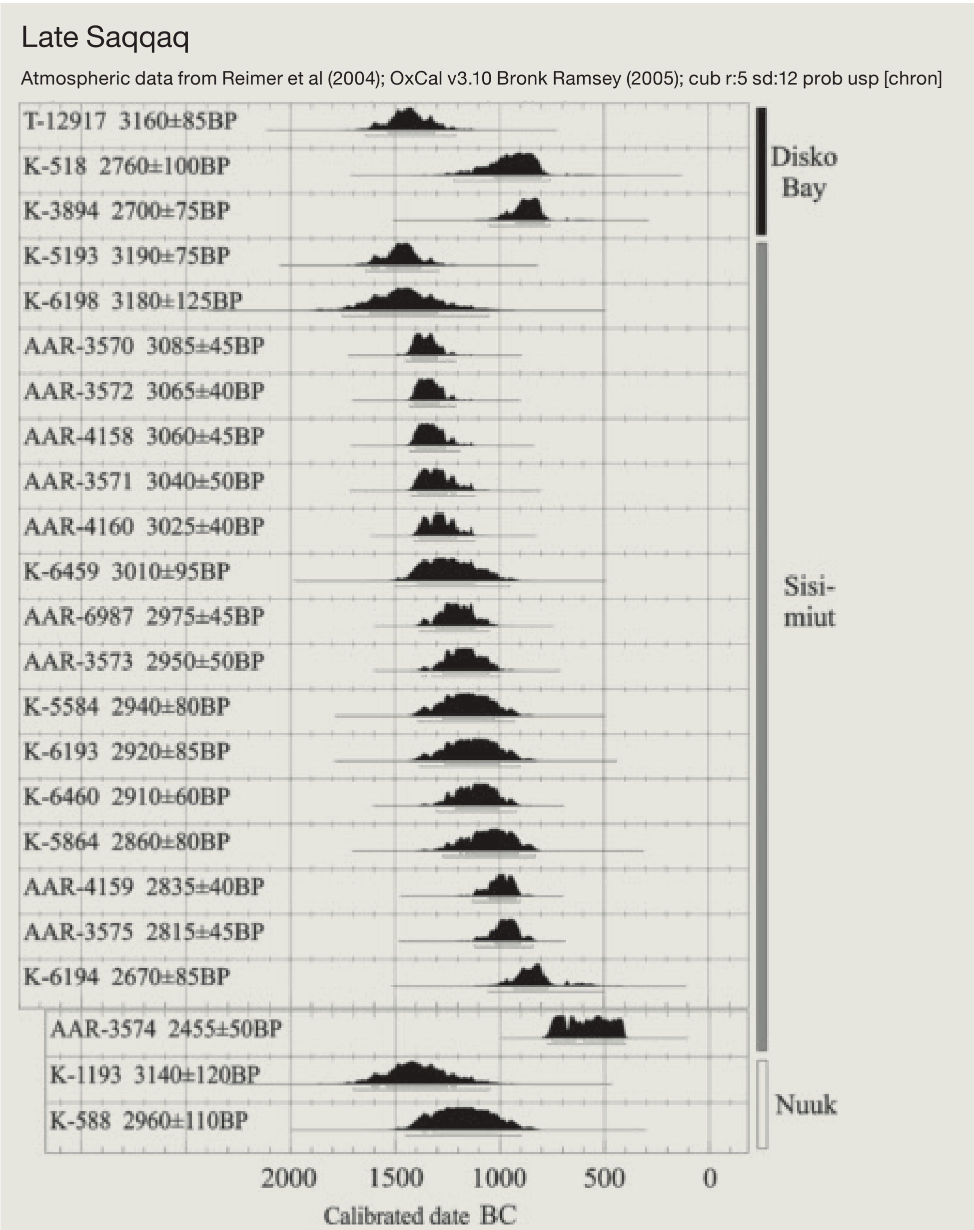


Fig. 7.28 *Calibration of screened radiocarbon dates. Saqqaq, later than 3200 BP.*

This analysis indicates that the late Saqqaq societies in West Greenland first abandoned the Nuuk area, next – one or two centuries later – Disko Bay, to end their almost two-millennia-long occupation of West Greenland in the Sisimiut area. However, it must be underlined again that additional reliable dates from a larger number of sites and from more regions are needed to confirm this picture of how the Saqqaq 'faded out' of the cultural history of Greenland.

As mentioned earlier, in Greenland there is no continuous or gradual development from Saqqaq to Early Dorset. Is this reflected in the dates?

Table 7.4.4-2 and Fig. 7.29 present the entire material of screened samples from Greenlandic Dorset in West and South Greenland:

In total 19 dates meet the screening criteria. A few of these dates are on 'herbal peat', but as they are from mosses and grasses which grew on the surface where the prehistoric activities took

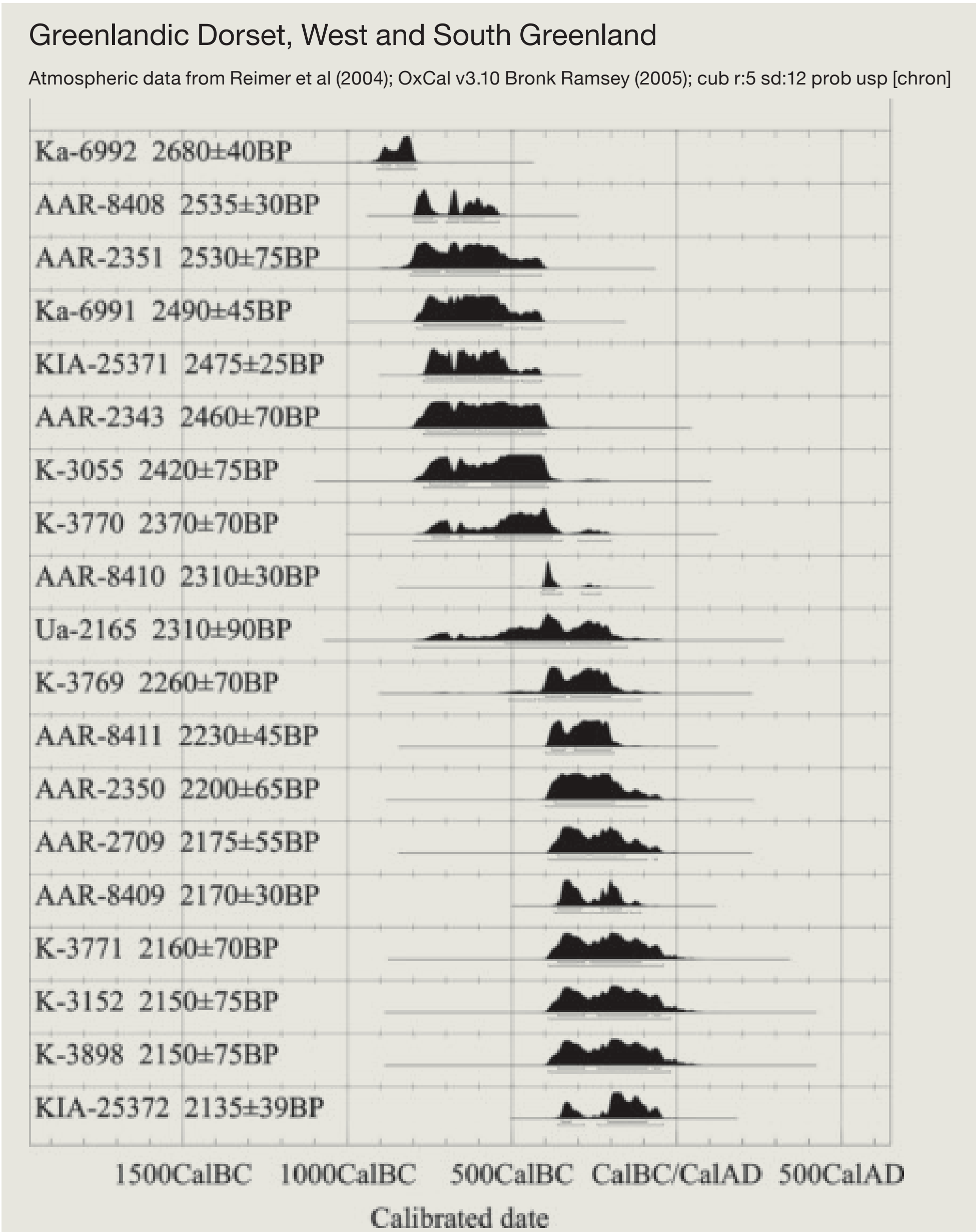


Fig. 7.29 *Calibration of screened radiocarbon dates. Greenlandic Dorset in West and South Greenland.*

place, and as they are sampled from well-documented sections, they have passed the screening. Regrettably, there are no reliable Greenlandic Dorset dates from Nuuk and south of there until we reach the very southern tip of the island, the Cape Farewell area, where two reliable dates have been made on *Betula nana* charcoal from the Itilleq site (Raahauge *et al.* 2005: 39–42, 59–60).

Fig. 7.29 shows a bipartition of the series of calibrated dates. This does not indicate two phases or 'population fluctuations' during the Dorset period. It merely reflects the effects of Plateau E and Wiggle II, which tend to concentrate the BP dates within two clusters. However, the earliest date (Ka-6992: 2680 ± 40) from the Kangerlussorissunnguup Kangia site indicates the presence of Greenlandic Dorset in Disko Bay just before Plateau E, i.e. some time within 895–800 cal BC (within one standard deviation) (Fig. 7.30). The other Dorset dates from the Disko Bay area and the earliest from Sisimiut, as well as one of the dates from the Cape Farewell area, belong to the plateau, i.e. 790–400 cal BC. A single date (AAR-8410) falls exactly inside the slot between Plateau E and Wiggle II and is thus very precise (Fig. 7.31), and the remainder, except one, within Wiggle II, i.e. 370–190 cal BC. The exception is the second of the dates from the Cape Farewell area, KIA-25372, which is dated to 2135 ± 39 BP. As seen from Fig. 7.32 this date covers with 62.4% probability the time span 210–90 cal BC, which is an indication of Dorset presence in South Greenland, which might be a little later than further north.

In conclusion, the earliest indications of Greenlandic Dorset in West Greenland are from Disko Bay dated to the 800s BC. During the following centuries, until some time within 370–190 cal BC, the Dorset occupied West Greenland, i.e. during a period of at least *c.* 400 years and at most *c.* 600 years. A single date from the southernmost tip of the country indicates that Dorset in fact lasted here until some time between 210 and 90 cal BC. This would mean that the Greenlandic Dorset occupied these parts of Greenland at least 600 years and at most 800 years. This is,

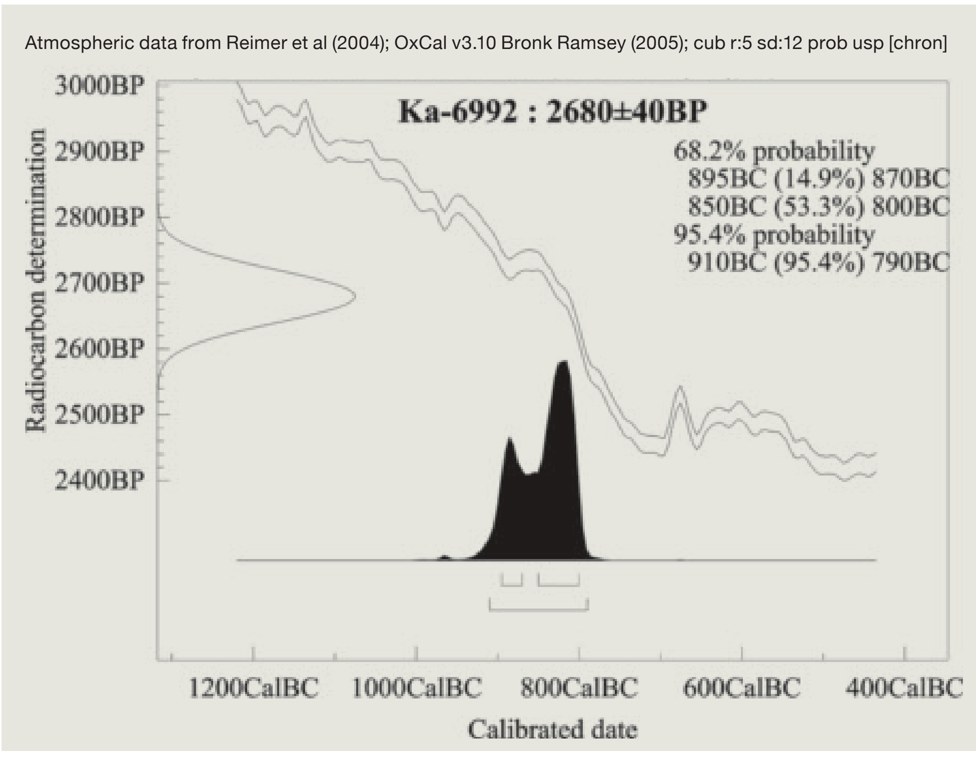


Fig. 7.30
Calibration of sample Ka-6992, Kangerlussorissunnguup Kangia.

at any rate, a considerably shorter time period than the Saqqaq.

The following conclusions concerning the relations between Saqqaq and Dorset in West and South Greenland based on radiocarbon dates can be made: the latest Saqqaq date (K-3894) and the earliest Dorset date (Ka-6992) in Disko Bay show almost identical BP age (2700 BP ± 75 BP and 2680 ± 40 BP respectively). They both fall within the time frame *c.* 900–800 cal BC, i.e. before Plateau E. However, no other dates from these two cultures in Disko Bay overlap each other, and this indicates that Greenlandic Dorset in this area replaced Saqqaq immediately, without any significant co-existence (see also Jensen 2006: 180 ff.).

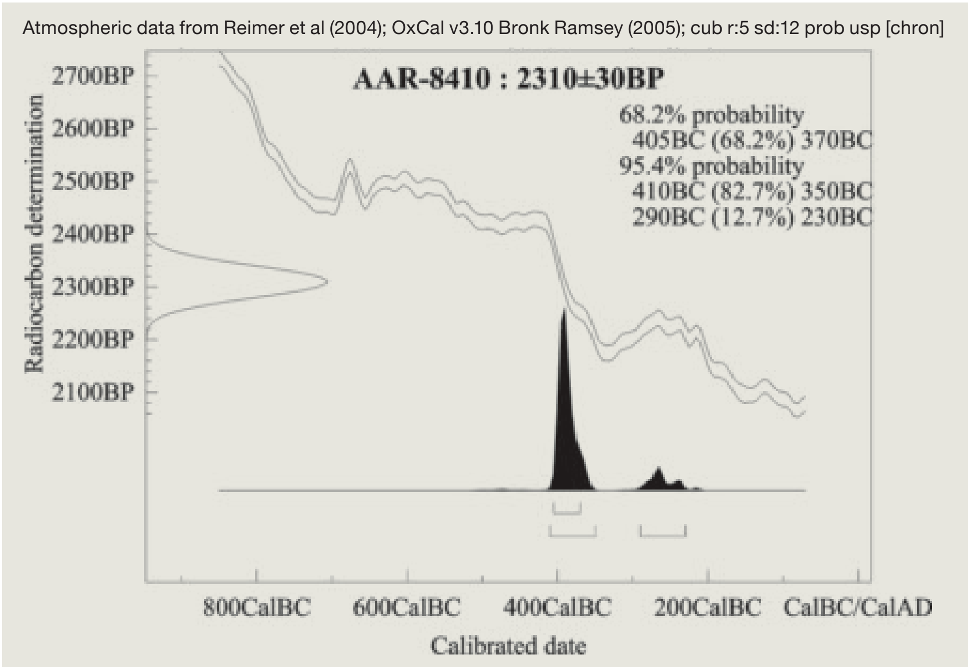


Fig. 7.31 *Calibration of sample AAR-8410, Nerukinnera.*

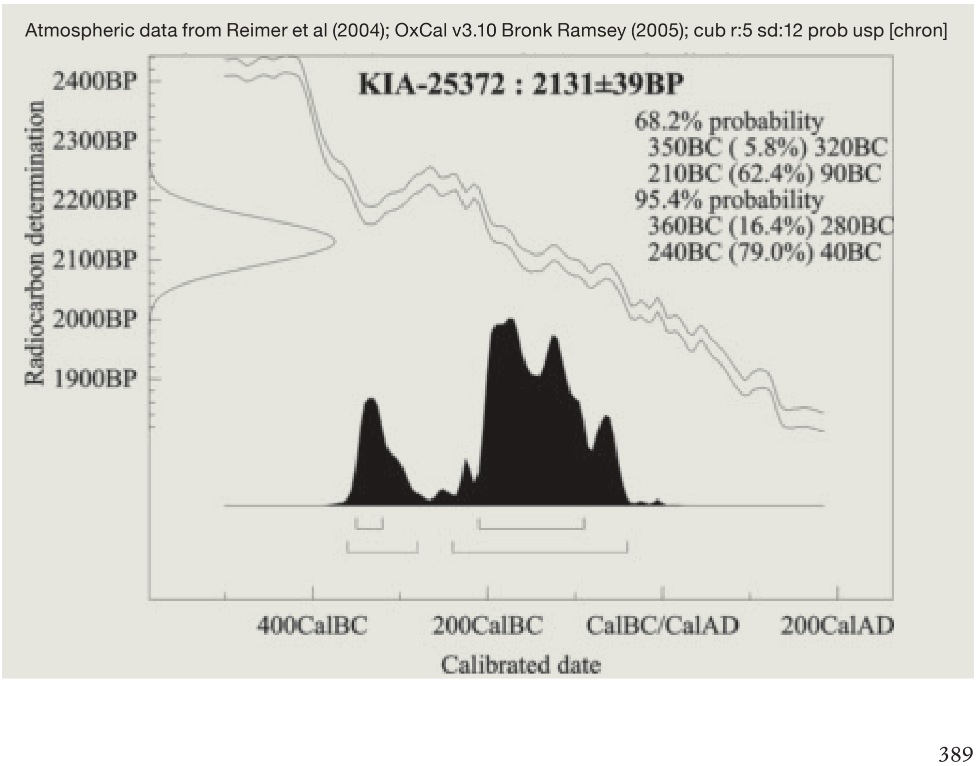


Fig. 7.32 *Calibration of sample KIA-25372, Itilleq.*

In the Sisimiut area the Saqqaq continued longer, into the period of Plateau E, but we do not know the exact point in time within the plateau when the culture disappeared. However, all the other Saqqaq dates from this area fall before the plateau and accordingly it is likely that the Saqqaq, as argued above, abandoned the area quite early within the period 790–400 cal BC. The earliest Greenlandic Dorset dates from this area fall within Plateau E, and thus it is not possible to draw firm conclusions about temporal overlaps between Saqqaq and Dorset here. But it is quite likely that the Saqqaq, as in Disko Bay, had abandoned the Sisimiut area before the arrival of the Dorset.

As the Saqqaq disappeared from the Nuuk area probably before 1000 cal BC (latest date is K-588), it is unlikely that cultural encounters between Saqqaq and Greenlandic Dorset took place here or further south.

7.4.4.3 The Saqqaq/Dorset shift and some remarks on the Early to Late ASTt transition in the Eastern Arctic

The Saqqaq/Dorset shift in West and South Greenland must be viewed in a larger perspective, as this abrupt event is contemporary with profound cultural changes encompassing the entire Eastern Arctic just before and within the period of Plateau E (*c.* 800–400 cal BC). Here we will not enter into details concerning the debated transition in the Eastern Arctic (overviewed and discussed in Nagy 1997; Desrosiers 2009), but evidence of direct relevance for understanding the Saqqaq/Dorset shift in Greenland will be discussed below.

In Peary Land and north-east Greenland there is a temporal gap of almost a millennium between the disappearance of Independence I and the appearance of Greenlandic Dorset. In Peary Land, Greenlandic Dorset is framed by radiocarbon dates within 2610 ± 100 BP (K-1522) and 2350 ± 70 BP (K-3864). Due to their large standard deviations both dates fall within Plateau E (calibrations shown in Grønnow and Jensen 2003: 331) and thus it can only be deduced that the northernmost Greenlandic Dorset were present within the period 790–400 cal BC, probably not earlier.

However, the cultural historical situation around the Nares Strait (the 'Gateway to Greenland') is much more complex. The chronological evidence from both sides of the strait is summarized by Grønnow and Sørensen (2006) (see also Schledermann 1990; Sørensen 2010, 2012a). It is concluded that, following settlements of different intensity by Independence I, Saqqaq and Pre-Dorset within the period from *c.* 2470–2290 cal BC (Plateau D) to *c.* 1000 cal BC, Early Dorset groups entered the gateway around 800 cal BC (just before the beginning of Plateau E). This is supported by a date showing 2780 ± 140 BP (1130–800 cal BC, GEO-6072) (Schledermann 1990: 343) on local plant material from the Baculum Site on Ellesmere Island and a high-precision date on caribou bone, 2610 ± 25 BP (810–785 cal BC), from the Early Dorset Phalarope Site on Somerset Island to the south-west of Nares Strait.

Sørensen's analysis of the lithic inventories from Early Dorset sites in the Nares Strait area suggests a scenario where different groups of Early Dorset from Canada, distinguished by differences in the style and production of their BLTs, sporadically visited both sides of the Strait (Sørensen 2012a: 302 ff., 324; see also Andreasen 2000; Jensen 2006: 83; Grønnow and Sørensen 2006: 66). Schledermann assigned such sites to his Transitional phase, as well as to his Early Dorset phase (1990: 127 ff., 344 ff.). Only one of these Early Dorset groups, which we now designate Greenlandic Dorset, spread beyond the North Water. By a remarkably comprehensive and fast expansion of their range, members of this society managed to settle the entire island, just like the Saqqaq/Independence I pioneers had done about 1600 years before, within a maximum of four centuries (Plateau E), probably much more quickly.

As mentioned above, the shift between Early and Late ASTt cultures was a general phenomenon in the entire Eastern Arctic, which took place just before and within the time span of Plateau E. In the case of Greenland the shift was abrupt: the artefact inventory, raw material preferences, designs and *chaînes opératoires* completely changed (Sørensen 2012a), and this is, as seen above, supported by conclusions based on absolute chronology.

In Arctic Canada, the shift from Pre-Dorset to Dorset is complex and the transition and the origins of the Dorset culture have, as mentioned above, been intensively discussed since the identification of the Dorset. Whereas the late Pre-Dorset population in some regions seems to have been displaced by expanding Early Dorset societies (Savelle and Dyke 2014), recent research suggests that in other regions – e.g. Nunavik (Desrosiers 2009: 389–91) – Early Dorset culture developed stepwise and *in situ* out of late Pre-Dorset. However, further systematic archaeological research along the lines of these recent studies, including modern lithic studies (e.g. dynamic technological studies), as well as analyses of settlement patterns and dwellings, beach ridge chronologies, and stratigraphy, are needed before we are able to move beyond qualified guesses about Dorset origins and the Pre-Dorset/Dorset transition. In this respect, radiocarbon dating is, as we have seen, regrettably not always useful.

8. Synthesis and Conclusions: a Holistic View of the Frozen Sites

8.1 Introduction: Saqqaq life in Disko Bay

The variety and richness of the archaeological evidence at Qt and Qa, as well as connected data derived from bones, soil samples, etc., open a window into the hitherto little-known 'life world' of the Arctic pioneers of the Arctic Small Tool tradition. This concluding chapter attempts to combine the wealth of information from the two frozen sites and to paint a more complete picture of this distant world.

The firm stepping stones of the synthesis consist of the archaeological materials presented in the present volume, the analyses of the subsistence economy at Qt (Meldgaard 2004), the plant and arthropod analyses (Böcher and Fredskild 1993), and the analyses of ancient DNA carried out during recent years (Gilbert *et al.* 2008; Rasmussen *et al.* 2010; Raghavan *et al.* 2014). Furthermore, the synthesis draws on recent studies of the non-material dimensions of the Early ASTt (Grønnow 2012a; 2012b).

The most consistent and varied information comes from a brief period at Qt, some time within the frame of *c.* 2200–1900 BC, i.e. the time of the formation of H4 and Fauna Component II – designated by Meldgaard as the 'heyday' of the site (2004: 165–69). This period is represented by a settlement surface with well-defined stone-built structures, including dwellings and hearths, dwelling floors and extremely rich and well preserved refuse layers. The interpretations, and thus the following 'holistic picture' of Saqqaq life in Disko Bay, are primarily based on evidence from this particular phase at Qt.

8.1.1 Qeqertasussuk during the H4 period

8.1.1.1 The surface of the site area

The surface from the chronological horizon H4 in Area C at the Qt site represents a complex but meaningful picture of a Saqqaq settlement surface. This is due to the fact that the surface was probably formed during a brief period and that it was covered quite fast by natural dense grass vegetation leading to the formation of a 'sealing' turf layer. Several stone-built structures on this H4-surface show signs of reuse and scavenging of stones and rocks, and the features overlap to a certain degree, but nevertheless they and the related refuse and artefacts form meaningful patterns.

When the Saqqaq inhabitants of Qt moved around on the H4-surface they would have walked on top of abandoned dwelling floors and fireplaces. They would also have trampled flat heaps of waste, often a mixture of wood shavings, heather twigs, charcoal cleared from fireplaces, broken and discarded tools and small heaps of bone refuse. Some waste, cleared from inside platforms and fireplaces, would accumulate both in front of and at the back of the dwellings as the floor was swept and the refuse eased out of the entrance or under the tent cover. Analyses of macrofossils and insect remains show that all these human activities caused heavy wear of the H4-surface, and generally only grasses preferring nutritious soil (*Poa* types, including *Elymus*, i.e. 'midden indicators') survived all this activity in the areas between the dwellings (Böcher and Fredskild 1993: 13–14, 24–27).

Flat heaps of refuse characterized the northern, trafficked settlement area of Qt during the time of H4. But in addition a remarkably thick and 'untrampled' midden heap accumulated in the shady, moist and cool far north-western corner of the site, situated between the vertical north-facing cliff and the beach. Here massive quantities of waste that was hampering traffic, daily activity and food processing in and around the dwellings ended up: dumped, exhausted, fire-cracked rocks from fireplaces, blubber-soaked twigs of dwarf shrubs (*Betula nana* and *Empetrum*), bones and blubber from butchering as well as food consumption, split pieces of driftwood and some broken tools. The matrix of the midden layer – the dwarf-shrub twigs – originate from repeated renewal of 'twig-mats' covering the platforms inside the dwellings situated at a distance from this midden area. Quantities of fly puparia and fox faeces testify to the scavengers attracted by the stinking blubber and meat decaying in the midden during the warm seasons.

On the highest, windswept area of the settlement probably some open-air midpassage structures containing fireplaces were situated. However, it is not possible to correlate each of these structures chronologically exactly with the H4 horizon. Likewise the traces of activities in the shape of lithic flakes and broken tools sporadically distributed on the cliff head of the tombolo cannot be dated exactly, but obviously this 'lookout' must have been included in the settlement area at the time of H4.

8.1.1.2 The Saqqaq dome

The stone-built structures of H4 include a complete dwelling floor (Dwelling A8), which holds new and quite unique information on a Saqqaq dwelling. Due to permafrost, wooden tent poles and other hitherto unknown components of the superstructure of the tent dwelling are preserved, and studies of details like microstratigraphy and construction phases of the platforms, the midpassages and fireplaces yield new information.

Dwelling A8 represents the most complete dwelling floor on the H4-surface. The dwelling is interpreted as a big dome-shaped tent construction with a floor plan of about 6 m by 3.5 m with the broad side parallel to the northern beach and the entrance towards the north. The partly preserved tent ring and the positions of the tent poles show that the tent had a straight front (towards north) and a curved back wall. The edge of the tent cover was weighted to the ground by a number of angular boulders and flagstones, many of which were scavenged from abandoned fireplaces and tent rings nearby. A number of distal fragments of pointed wooden poles or stakes in vertical or slanting position were stuck into the turf ground along the tent ring, showing that the superstructure of the tent consisted of slender stakes. They were originally lashed together from several shorter components, making the stakes flexible. Taken together with the large floor area, this indicates that the superstructure of the Saqqaq dwelling was a rounded 'basket' or dome construction rather than cone-shaped. A large fragment of a sealskin with a nicely crafted seam found in the midden area (Area B) was interpreted as the remains of a tent cover. Thus Dwelling A8 was one of probably several sealskin-covered domes, which, if the hair side was turned outwards, would have gleamed in the light on the northern part of the settlement area. Perhaps guy ropes secured the tent, as finds of wooden pegs suggest.

The major area of the bi-lobate floor inside the dome was occupied by two low platforms at opposite sides of a stone-built midpassage. The platforms were constructed from grass turfs, which were covered by mats of gathered bundles of lyme grass, dwarf-shrub twigs and moss. The layered structure of the platforms – alternating thin layers of turfs and twigs – shows that the platforms were often cleared and renewed. A half-metre-broad zone between the slightly elevated platforms and the stone-built midpassage was interpreted as a floor area providing both a passageway into the dwelling from the entrance zone on the northern side and an area from where the inhabitants could attend to the fireplaces and activities connected with the midpassage itself.

8.1.1.3 The heart of the dwelling: the midpassage, its 'life' and connected activities

The midpassage, A8, cuts across the dwelling floor. This 2.8 m × 0.8 m, originally rectangular structure, framed with large flagstones on their edges, was the epicentre of the inhabitants' life inside the dwelling. First of all, studies of the different construction and renovation episodes and the microstratigraphy of the sediments inside the midpassage show that this structure served different purposes in the course of the dwelling's history. Taken together with observations on the distribution of refuse and artefacts in and around the midpassage, a dynamic picture of life around this 'heart' of the dwelling is outlined.

A spectacular find of a complete, intact knife deposited inside the flagstone frame at the same time as the very first stage of the building of the midpassage was interpreted as a sign of the symbolic importance which the Saqqaq assigned to this structure. Bifacial knives were symbolically, as well as practically, associated with food processing.

From the beginning, the central part of the midpassage was used for food preparation. For the first time in Saqqaq archaeology there is ample evidence (patches of animal (caribou) hair in the lowermost micro-layer of the midpassage) for the boiling of food in skin bags by means of fist-sized rocks, which were probably heated to high temperatures in fireplaces outside the dwelling. A large, oval hearth (Structure A1), built after the abandonment of Dwelling A8, is an example of this type of outdoor hearth used for heating rocks and thus providing smoke-free boiling of meat and heating (convection) inside the tent. Wooden bowls and trays with singed patches on the inside and along the rims suggest that the hot rocks for boiling were transported from outdoor fireplaces into the dwelling in these wooden containers, some of which were quite large.

The hot meat, blubber and soup from the skin containers were prepared and shared by means of various carefully made and streamline-designed spoons and ladles of wood, antler and ivory, and oval trays and bowls of driftwood. Several of these show use wear and some were carefully repaired by means of baleen lashings. Spatial analyses suggest that spoons and bowls appear in sets that were deposited close to the midpassage, thus they were a curated and appreciated part of the tool kits connected to the midpassage. Through them we might, in accordance with historic analogies, get a glimpse of the women's sphere to which bifacial knives probably also belonged.

As mentioned above, the bifacial knives seem to be connected with butchering and food preparation. These knives were all hafted the same way: the endblade was mounted in a two-sided blade bed in a haft of driftwood, longitudinally split in two and secured with baleen string, and sometimes lashed all over to provide a firm grip. However, the knife endblades were of different designs, and the Saqqaq used at least four morphological types, which were probably connected with different work during the processing of meat and blubber.

Food preparation and consumption in and around the hearth area is also seen from concentrations of fragmented bones from sea mammals and birds contained in the sediments inside the midpassage.

After several cycles of heating and cooling, the fist-sized 'boiling stones' cracked and lost their ability to absorb heat. Exhausted fire-cracked rocks were dumped in many places at the site. They form part of the matrix of the heavy layers in the north-western midden area (Area B), and they form a pavement in the area in front of the dwelling. But they were also dumped in small heaps, each containing about 14 kg of stones, behind dwelling A8, as seen from Structures A6 and A7 on the H4-surface. These dumps are 'clean', i.e. without charcoal, and they might each reflect a typical amount of stones used for a single meat-boiling episode inside the dwelling.

It is likely that the dome was lit up by a combination of small fires fed with twigs and driftwood inside the midpassage and a blubber lamp. At least a single, heavy, irregular sandstone blubber lamp was located in the front part of Dwelling A8, where it had been reused as tent ring stone, weighing down the front tent cover of the dwelling.

The flagstone frame of the midpassage was probably stable through the period of use of Dwelling A8, but the functional aspects of the midpassage were certainly dynamic. Microstratigraphic studies show that, following the initial phase, the inhabitants radically changed the function of the midpassage.

During the next phase remarkably large quantities of fist-sized rocks were heated. More than 200 kg of fire-cracked rocks, many of them exhausted, accumulated in the structure. A veritable heap of charcoal in front of the dwelling, lots of fire-cracked rocks from clearing processes, as well as charcoal heaps in the back of the midpassage show that heating of rocks now took place inside the dome. It demanded an effective system of controlled draught to avoid smoke indoors, when large quantities of driftwood and twigs were fired to heat the rocks. Remains of firewood in the shape of heaps of split driftwood pieces and twigs of dwarf shrubs were found adjacent to the hearth. The many kilos of heated rocks and the flagstone frame of the midpassage absorbed heat and the entire construction worked as a convection oven during this phase. The sheer heating capacity of the hearth fits the interpretation that the tent was a voluminous construction.

However, the point of producing intense heat might also be connected with drying of clothes and gear and, perhaps, meat. Pointed slender, vertical stakes around the back end (southern part) of the midpassage A8 were interpreted as remains of a drying rack with a platform raised above the heated stones. Here, meat could have been dried and/or smoked. The brownish 'blubber-cemented' subsoil beneath the central midpassage indicates that much heat and large quantities of meat and blubber were involved in these processes. This phase of use included intensive food consumption as well. The result was that large quantities of bone refuse (disarticulated and fragmented) accumulated in dumps in front of the dwelling as the refuse was swept and thrown out of the entrance. Some bone refuse ended up along the wall, both inside and outside the dome.

Once more the inhabitants changed the function of the midpassage. They now constructed a cobble-stone pavement in the front part of the midpassage (close to the entrance) including two shallow pits, which fitted the size and shape of the wooden containers mentioned above. This cobble-stone paved platform was probably related to food preparation and serving, but the spatial distribution of artefacts also suggests that the platform served as the dwelling's 'working table'. Here tabular grinding stones and other tools show that all sorts of craft activities – production and repair of skin, wood, bone and antler items – took place. These activities inside the dwelling will be described later.

During the last stage the dwellers shifted from boiling to frying meat and blubber in the midpassage. Large flagstones with charred blubber crusts on one side were located in the top layer of the structure covering the platform/work table. Such 'frying stones' are common at the site, but in Dwelling A8 they were mainly used during the last phase of the dwelling's 'life cycle'.

Finally, the dwelling was dismantled. The wooden poles of the roomy dome-shaped superstructure were pulled up, at which point the sharp ends of some of the poles, which were anchored in permafrozen soil, snapped. The ruin was scavenged for usable stones: flagstones in the back part of the former regular midpassage were pulled up and many stones of the tent ring were removed.

After this abandonment the rounded western turf platform became a perfect foundation for another structure: the aforementioned oval fireplace, A1, which in its first stages probably served a central hearth in a small, round tent. Later, the Saqqaq used this fireplace for heating large quantities of 'boiling stones', probably to be used for heating nearby domes.

It is difficult to estimate the duration of the different archaeologically recorded episodes of the A8 midpassage, let alone the total 'life span' of Dwelling A8. One could suggest that the many alternating thin layers of grass, moss and twigs forming the platforms of the dwelling resulted from several years or decades of use, but the thin layers could just as well reflect several episodes of clearing and re-establishment of the platforms during coherent use of the dwelling. Thus, the traces of Dwelling A8 could be interpreted as resulting from just a single yearly cycle of activities. According to this line of thought, it would make sense to interpret the layer with huge numbers of fire-cracked rocks in A8 as remains of winter activities, when it was crucial to keep the dome well heated. This would imply that the first stage of the A8 midpassage, seen in the layer below the 'winter rock heap', was constructed before the winter season – probably during the autumn. A8 was initially made partly from scavenged stones from earlier structures on the H4-surface (like A3–5 and A9). In this initial (autumn) stage, the boiling of food in skin bags by means of hot rocks was an important activity. At the other side of the winter activities, during the following spring, activities continued with a radical clearing of the midpassage: charcoal and many fire-cracked rocks used during the peak of winter were now dumped in front of the dwelling, adding material to the already established refuse heap (door dump) there. The front sector of the midpassage was now turned into a 'worktable', and new indoor activities dominated. Food preparation and serving, as well as craft activities, now took place in the front part of the midpassage. During the last stage, which in this line of argument could reach well into the warm season, the 'worktable' changed function: flagstones were introduced and blubber-rich meat was roasted on these 'frying pans' lying on top of the table. Finally, perhaps with the coming of summer, the dome was dismantled, and people moved into smaller tents at the site and/or dispersed to other summer sites in Sydostbugten. When the occupants returned to the site later that summer or autumn they would, before frost and snow bound rocks and turf to the ground, have constructed a new foundation for a roomy cold-season dome somewhere else at the site, and for that purpose they would have scavenged A8 and other visible structures on the H4-surface for usable materials like flagstones and 'fresh' boiling stones. A new yearly cycle of a Saqqaq dome at Qt began, and dense grass vegetation soon covered the old floor and midden heaps of Dwelling A8.

This interpretation of the archaeological remains of Dwelling A8 as reflecting primarily a one-year succession of episodes is consistent with evidence from the spatial distribution of artefacts and bone refuse, as well as from the faunal analyses.

It would be of great interest to know if only a single of these characteristic domes stood at the site or if there were several contemporary dwellings during the 'time slice' of H4. But with the relatively small 'window' that Area C has opened on the site surface, it is not possible to determine the number of contemporary dwellings with any certainty. Furthermore, the number of domes at Qt probably varied from year to year. However, judging from the distribution of the H4-surface as detected by test pits on the northern site area – H4 was identified within an area of *c.* 300 square metres – and taking the size of the Dwelling A8 (18–20 m^2) into consideration, there could have been a *maximum* of about ten Saqqaq domes at the same time on the site, allowing space for refuse heaps and activities in between the dwellings. Probably, fewer dwellings, perhaps two to five, were erected at Qt each year.

8.1.1.4 Food consumption and blubber lamps

In continuation of the description of the Saqqaq dwelling it might be useful to sum up the evidence on 'household utensils' before the remainder of the Saqqaq 'tool package' is presented.

A wide range of containers made of driftwood was found. A few were complete, but obviously most of these large wooden objects are broken and/or partly burnt after use. However, it is possible to identify a class of carefully made, thin-walled oval bowls (up to 20 cm wide and 30–40 cm long) and a class of more roughly made dug-out sections of trunks, which are narrow and in some cases very long (exceeding 60 cm). Some of the finely made bowls show careful repair: they were patched up by means of countersunk lashings. Many bowl fragments, in particular from the coarser ones, show burnt patches on the inside, and it was assumed that these are marks from their use as containers for transporting hot rocks from fireplaces to 'smoke-free' hearths inside the dwellings. However, such traces could also originate from fire-making with strike-a-lights and tinder inside the bowls. The finer bowls were assumed to be food containers for consumption of boiled meat and soup.

Boiling soup in skin bags was, as we have seen, an important part of Saqqaq food processing, and obviously spoons and ladles are part of this complex as well. Carved from different materials – whale tooth, antler and driftwood – the carefully made spoons show elongate shapes with a short, flat handle, which originally could have been lashed to a longer shaft, integrated in the design. Large ladles of driftwood, which were not necessarily connected to food consumption (they could have been ice scoops) were found as well. A few pointed bone 'meat forks' and large hooks of wood and antler – interpreted as possible 'blubber hooks' – might also belong to the household sphere.

No 'fireproof' containers like pots of soapstone were found at the frozen sites, and thus two informal lamps from Qt and the soapstone fragments from the later Saqqaq layers at Qa must represent sources of light rather than sources of heat for food-making. A coarse lamp was found on the H4-surface at Qt showing that a large dome-like Dwelling A8 could have been lit not only by a fire fed with twigs and wood waste but also by a blubber oil lamp.

8.1.1.5 Disposal of refuse and craft activities

It was concluded that the spatial distribution of artefacts and refuse form patterns inside and around the Dwelling A8 dome floor, and that these patterns resulted from structured behaviour including clearing activities by the occupants. Activities directly connected to food processing and consumption described above formed a key to an understanding of the character of the occupation. But the sources also yield important information about the various crafts, work processes and the disposal of refuse.

First and foremost, repeated clearings of the dwelling floor were responsible for the patterns observed. Above, it was shown how large amounts of refuse from the fireplace inside the midpassage itself ended up in front of the dwelling, probably resulting from both thorough clearings and more continuous sweepings of the midpassage, floor and platforms, as revealed i.a. by the distribution of fire-cracked lithic tools and flakes. Incidentally dropped into the fire, these lithics provide clues as to how waste from inside the midpassage itself was swept not only out through the front entrance but also into the periphery of the platforms, i.e. into the narrow space between the platform and the side walls of the dome. Moreover, the fire-cracked lithics indicate that refuse was also swept out under the tent cover on the back side of the dwelling. This is mirrored also in the distribution of discarded materials from activities on the eastern platform: broken tools, heaps of wood shavings and bone refuse from activities on the platform accumulated and were swept aside: out of the front entrance, into the platform periphery or out under the tent wall.

Even if the occupants' clearing activities dominate the distribution patterns they do not completely obscure the evidence of the spatial organization and character of daily activities inside the dwelling. There is not much material left on top of the platforms, but nevertheless it leaps to the eye that there is a marked difference between the quantities of fragmented tools and refuse left on each platform. The eastern platform shows traces of crafts involving the processing of wood, antler and bone objects, as well as the resharpening of lithic tools. A number of simple flake knives also reveal craft activities which took place on this platform. This contrasts with the western platform, which is almost 'clean'. It was concluded that the inhabitants used the two opposite platforms in different ways: craft activities were carried out on the eastern platform, whereas the western platform probably served mainly as a resting and sleeping platform.

Next, the overall patterns show that the midpassage, in particular the front part, and the small floor area on each side of it were focal areas for various crafts. Here, the craftspersons took advantage of the heat and light radiating from the fireplace. The 'work table' in the front zone was both pleasantly close to the fire and to the dome's entrance, from where daylight could be let in except of course during the darkest winter months. The crafts included skin-working (microblades), wood-working, in particular connected to making round poles and shafts (pumice grinders, side scrapers), and working hard, organic materials like antler and bone (burins and burin spalls). Production and, not least, repair of broken or worn tools were also important in this zone, as evidenced by a concentration of broken arrow and light dart shafts, harpoon points and a number of exhausted lithic endblades for hand tools like scrapers and burins. In line with this, the inhabitants kept a small quantity of lithic raw materials stored immediately next to the midpassage.

Immediately outside the front wall of the dome a veritable 'door dump' accumulated. We have heard of the charcoal, fire-cracked rocks, animal bones and other refuse above, but large amounts of split wooden pieces and well-defined heaps of wood shavings, along with several broken arrow and dart shafts, bows, end prongs for bird darts, and harpoon heads indicate that not everything in this zone was 'refuse' from inside the dwelling. Crafts like shaft-making, repair and retooling probably took place immediately outside the dwelling as well, even if the craftsperson worked there sitting on top of waste from the household. The large quantities of wood shavings probably formed a relatively pleasant and dry surface, and during most of the year snow covered the frozen door dump and made the surface stable.

The meaningful spatial distribution of artefacts and refuse inside and outside the dome lends support to the interpretation of Dwelling A8 as representing only a single, primarily cold season, habitation episode. This conclusion is corroborated by analyses of the architecture and microstratigraphy of the midpassage presented above.

8.1.2 Technology, tool kits and designs

8.1.2.1 Raw materials and crafts

The two frozen sites provide a unique picture of Saqqaq technology. Artefacts of organic materials, and of course lithics, are preserved at almost every stage of processing from raw material blank to completely exhausted tool. Equally informative are all sorts of waste, like wood shavings and lithic flakes, from the working procedures. Through the combination of results from the technological analyses presented in chapters above, we are able to follow the techniques and gain some insight into the decisions of the craftsperson.

Processing of organic materials: Driftwood formed an essential part of Saqqaq material culture (Figs. 3.122 ff.). Wood was a component in almost every tool at the site and, as we have seen, it was an indispensable raw material in the construction of the dwelling: the complex frame of the dome and probably drying racks were built from slender poles lashed together from several short pieces. Importantly, the entire heating system and food-processing procedure was based on the burning of driftwood in huge quantities (supplemented with dwarf-shrub twigs) in built-in fireplaces in the midpassages or in oval central hearths for heating rocks. Disko Bay was the northernmost important natural driftwood trap on the west coast of Greenland, and large numbers of tree trunks, in particular spruce and larch from Siberia, had accumulated on the beach ridges since the beginning of deglaciation. Thus access to wood was almost boundless, at least during the early Saqqaq period.

The Saqqaq craftsman hammered heavy wedges of whalebone or antler into selected tree trunks in order to split them longitudinally into usable boards. Studies of work marks on wooden poles and preforms for tools, as well as analyses of split wood pieces and wood shavings, show that the killiaq adze was the preferred universal tool for sectioning the boards and for further processing throughout all the work stages. The finish, however, of wooden tool hafts and shafts was carried out with side scrapers or pumice grinders. Bent objects like wooden frames for skin boats were made by softening the wood by means of heating and subsequently bending the object stepwise on a blunt edge.

The mastering of lashing techniques was a precondition for using driftwood for long, flexible objects like stakes, poles and tools like bows, arrows and harpoon shafts. The finds show that the Saqqaq skilfully joined several pole or shaft units by means of precise scarf links lashed with threads from baleen (and probably from sinew and rawhide, as some fragments of threads suggest). Sometimes the lashings were countersunk to avoid friction and wear. Shafts for hunting weapons – like lances for stabbing game – which were exposed not only to longitudinal pushing forces but also to pulling forces, were built by means of swallow-tail links (Fig. 3.19).

Characteristic work traces from adzes and burins on hard organic raw materials – primarily whalebone and antler – show that softening in urine or water was applied. The initial processing was aimed at producing regular 'fillets' (list-shaped blanks), which in turn were the toolmakers' starting point for the production of tools like harpoon heads, flint flakers and end prongs for darts (Fig. 3.130; Fig. 3.131).

Bone, other than whalebone and ivory, was rarely used at Qt and Qa, but blanks for sewing needles made from bird bones were found, and some of the flint-flakers were probably made from the massive ulna bones of seals. Baleen from, among others, Bowhead whales was a more common raw material. It was cut into strips and used for lashing and tying. Preserved baleen thongs show that the Saqqaq knotter used at least nine different knots, including bends, hitches and loop knots (Fig. 3.120). Remarkably, they twisted strands together in an alternating, anti-spiralling fashion for use in skin-sewing (Fig. 3.117).

Working skin into clothes, tent skins, vessel covers, platform covers, etc., was obviously an important part of Saqqaq technology. The preserved fragments of seal, bird and caribou skins are few, but together with waste materials from the 'seamstress's workshop' and fragments of skin with preserved seams and thin sewing threads of sinew, they provide us with a glimpse of a craft that was indeed advanced. Thin bird-bone needles, bodkins of different kinds and microblades used for precise skin-cutting belong to this part of the Saqqaq techno-complex.

Lithic reduction: The complexity and at the same time conformity of Saqqaq material culture find expression in the lithic technology (Fig. 3.133). Saqqaq technology is characterized by 'specialization': there is a particular tool for a particular purpose. Thus no fewer than 14 different types of formal tool – functional types – were recorded in the assemblages from Qt and Qa, and several among these main types include sub-types defined by different metric, stylistic or raw material properties, which were also to a large extent interpreted as functional variables.

As seen, almost all of these formal lithic tools were originally mounted in specialized wooden, bone, or antler hafts or shafts, and the vast majority of stone tools excavated at the sites were obviously waste products in the shape of completely exhausted or broken cutting, scraping, sawing or penetrating blades, which were replaced by fresh ones during 'retooling'.

On top of this inventory of formalized lithic tools, a quantitatively important category of expedient, multifunctional, unhafted lithic tools was used, namely flakes showing a 'natural' cutting edge and a minimum of adjusting retouch to improve the user's grip.

The complete *chaîne opératoire* of Saqqaq lithic technology, except the raw material procurement at the outcrop, can be followed in the inventory of the two sites. A few standardized cores imported from the killiaq outcrops on the Nuussuaq Peninsula (see below), knapped with direct percussion from hard hammerstones are intact and demonstrate the presumably typical state of the greatly preferred lithic raw material (80–90%) as it reached the settlement sites. A number of raw material nodules of quartz crystal and micro crystalline quartz, as well as lumps of pumice, show that other lithic raw materials from Disko Bay were also collected and 'imported' to the settlements. In comparison with killiaq, these raw materials are quite rare at the sites, and they were used for a number of special purposes, e.g. quartz crystal and mcq for microblades and small end and side scrapers.

The Saqqaq knappers' reduction of the imported 'Nuussuaq cores' by means of direct soft hammer percussion resulted in the production of flakes, some of which were used immediately for the above-mentioned simple cutting tools, and some which served as blanks for a wide selection of formal implements. The cores became blanks for large bifaces like adze heads and knives.

Pressure-flaking was a predominant technique during the next stage: the production of tools from blanks. Numerous pressure flakers – short 'sticks' of whalebone and antler – found at both sites reflect this work process (Fig. 3.87 ff.). Originally these flakers were hafted, and a few candidates for these hafts, curved wooden or whalebone handles, have been identified from Qt. Grinding and polishing by means of long, narrow sandstone hones or flat whetstones belonged to the knapper's repertoire as well: typically, burin sides, saw blades and adze edges were polished, and 'plateaus' on bifacial objects which were hard to get rid of by pressure-flaking were removed by grinding.

Microblades of quartz crystal and mcq were produced by a specific pressure-flaking technique from small cores, which, according to recent experiments, were fixed mechanically (Appelt *et al.* 2012: 8). A few microblades of mcq from Qt clearly show that the Saqqaq employed heat-treatment of cores in some cases (see also Sørensen 2012a: 350–52).

All lithic tools went through a use phase, which resulted in breaks and/or wear. Whereas the bifacial projectile points are rarely resharpened and re-hafted, we can follow the often long life cycle of most hand tools. The working edges of bifacial knives, end scrapers and side scrapers were resharpened by bifacial pressure-flaking and retouch while they were still fixed in their hafts. The craftsperson pulled the blade out of the haft, discarded it and replaced it with a fresh one when several rounds of resharpening made it too short, resulted in too steep an edge or deformed it so much that it was not functional any more.

Only in a few cases were worn-down or discarded lithic tools reused, and it was extremely rare that a formal tool belonging to a certain functional category was reworked into a tool with another function. Obviously, the Saqqaq concept of lithic production and design was rigorous and consistent.

Hand tool kits: The Saqqaq possessed a remarkably wide range of specialized hand tools employed in the craft activities described above (Fig. 3.103). Archaeologically, about 16 main types of tool have been identified, and on a metric or morphological basis it is possible in many instances to divide each of these types into subtypes – probably according to different functionalities. As seen above, the tool finds from the two frozen sites are particularly informative as many were found in a complete state with the lithic component (typically a kind of endblade) in its original position in the haft.

Cutting of organic raw materials and probably meat and blubber was done by means of simple flakes (with some retouching to secure the grip), with knives with bifacial endblades, and with hafted microblades. In fact, simple flake knives – expedient tools – are the most common cutting tools at Qt. Formalized bifacial knife blades of killiaq were mounted at the end of a driftwood haft. The haft was split longitudinally in two halves, and the proximal end of the knife blade was countersunk into a shallow blade bed cut on the inside of each haft part. A lashing, judging by traces on the haft components, often covered the entire surface of the haft, securing the blade and making the grip stable even in wet or greasy conditions. Only very rarely are tool marks from bifacial knives found on organic raw materials, leading to the conclusion that bifacial knives were typically used for cutting skin, meat and blubber. Among the four morphological main types identified, some showed flat or rounded distal ends suited for flensing. Experiments where an experienced Greenland woman flensed a seal confirm that the Saqqaq knives work very well as tools for flensing and butchering (Appelt *et al.* 2012). Small, razor-sharp knives – microblades of quartz crystal and mcq for precision work like cutting skin for clothes – were also an integral part of the Saqqaq hand tool kit. The wooden haft material shows that microblades were expediently hafted at the end of a 'stick', but also more elaborate microblade hafts of wood were made. An observed division into two size classes of microblades might indicate that the tool kit contained precision cutting knives, which were used at different stages in the work processes, probably dressmaking. Additionally, it must be mentioned that sewing needles of bird bone and drill bits of killiaq for making round needle eyes were part of the hand tool kit as well.

The Saqqaq 'hand tool bag' contained a wide range of scrapers. One kind of scraping tool consisted of a flat U-shaped wooden handle with an end scraper blade made from killiaq or mcq mounted in a blade bed at each distal end. Thus, two scraper blades with different properties could be used alternately in a continuous working process. According to edge wear analyses and work traces on driftwood objects like bowls and trays, end scrapers probably served for working driftwood. It is noteworthy that no fewer than five different classes of end scraper blade were identified, reflecting the characteristic Saqqaq approach to material culture: specialization. This is reflected as well in the side scrapers, where at least two different size and raw material classes exist. Hafted in a blade bed at the end of a short handle, the side scrapers, judging by the concave edge shape and work traces on organic objects, were probably used for shaping round wooden, bone and antler shafts for hunting gear like darts and harpoons.

The overview of the Saqqaq hand tool kit is not complete without the tool that was most frequently used, according to their number and work traces on objects of antler and bone: the burin. Their formal driftwood hafts were short and characterized by the hafting principle, which differed from that of bifacial knives. Only the distal end of the burin handle was split and provided with a shallow, two-sided blade bed. In this, the proximal end of the killiaq burin was secured by a lashing, which only covered the split end of the handle. The lithic burins with ground sides were worn quite heavily from the cutting of grooves in hard materials, as described in Chapter 3.3.2. Resharpening of burins was done by means of polishing the sides followed by pressuring off a burin spall. The burins show that they were often resharpened five to ten times before they were discarded. Moreover, exhausted burins are among the most numerous lithic tools at the sites, showing that the 'turnover' of burins was fast.

Some wooden, antler and whalebone hafts and handles reveal that the Saqqaq's tool kit contained an additional number of small hand tools, of which only a few can be linked to a certain function at present. However, some of these – the bent wooden ones and a couple of short bone hafts – were probably handles for pressure flakers. These small flakers, typically made from solid seal ulnae, with their characteristic worn ends, were indispensable everyday resharpening tools in a Saqqaq life. A fortunate find, described in 3.2.4.8 above, of the remains of a skin bag holding, among other things, several flint flakers at different stages of wear, adds information to this part of the hand tool kit.

The repertoire of hand tools also includes a variety of grinding stones. Much the most common tools are pumice grinders showing either flat sides or sides with grooves of different diameters, indicating that they were used for shaping and polishing round shafts of wood, bone and antler, ranging from sewing needles to arrow and dart shafts. Less common, but still an important component in the tool bag, were slender grinding stones with a rectangular cross section. They were probably portable multi-tools used for polishing and fine resharpening of objects like killiaq drill bits, needles, burin sides and adze edges. A variety of flagstones of fine-grained stone showing patches with smooth surfaces probably served as 'stationary' grinding stones. Finally, strike-a-lights consisting of hammerstones of killiaq and a lump of pyrite belonged to the extensive tool kit of the Saqqaq.

In sum, the complexity of the hand tool kit of the Saqqaq was impressive. It consisted of several specialized and lightweight tools, and the toolmaker or craftsperson could pick and choose exactly the right instrument suited for a specific task. This highly curated repertoire was supplemented with expedient tools, like simple flakes, used 'ad-hoc'. The specialized tools were often completely worn down before they were discarded. They were never reworked into other formal types and thus their basic functionality was never changed. This consistency in the production as well as use of a remarkably complex repertoire of tools is a Saqqaq characteristic.

8.1.2.2 Hunting tool kits, living resources, and gathering

As with the hand tools, it is possible to present a quite detailed description of the complex hunting tool kit (Fig. 3.56). We are also able to pinpoint some of the hunting methods applied by the Saqqaq and to characterize their game. This is due to a combination of the archaeological results presented in this monograph and Morten Meldgaard's faunal analyses. The starting point consists of finds and faunal material from the period of the 'heyday' of Qeqertasussuk, i.e. H3 and H4 in archaeological terms and 'Faunal Component II/ Base Camp, Period II' in Meldgaard's terms (2004: 165 ff.).

The dominance of harp seal and ringed seal in this period speaks for itself: 80% (NISP) of all mammal bones in the Faunal Component II assemblage identified to species (n = 7783) are from these two species, which were cornerstones in the site's subsistence economy (Meldgaard 2004: 112). And among the seals, harp seal is predominant with 73%, whereas ringed seal amounts to 17%.

The Saqqaq hunters used various light harpoons for this intensive seal hunting. The harpoon heads comprised a toggling type (Qt-A) and three tanged or barbed types (Qt-B–D), each showing individual stylistic variations (Figs. 3.25 ff.). These variations were probably determined by a combination of functionality and signals of individual ownership.

With these small harpoon heads the Saqqaq could have hunted both ringed and harp seals, but it is likely that the toggling harpoon heads were mainly used for hunting ringed seal in their breathing holes, i.e. on fast ice during winter or along the ice edge, and that the tanged types were connected with hunting harp seals in open water, typically during their spring and autumn migrations. Foreshafts of wood and whalebone for toggling harpoon heads were found (Fig. 3.27), whereas foreshafts for tanged heads have not yet been identified in the material from the two sites. No traces of the use of inflated bladders or sealskins (valves, swivels, etc.) used as floats in connection with harpoon hunting and transportation of killed seals have yet been recognized, in spite of the quantity of organic artefacts at the sites.

A number of archaeological finds add information to the tool kit connected to Saqqaq open-water seal hunting. Several fragments of frames of slender, kayak-like vessels were found at both Qt and Qa: the most complete frame is 35 cm wide and 21 cm high and comparable to historic kayak frames, and fragments of oars or paddles with slender, elongate, almost pointed blades are part of the picture as well (Fig. 3.53). The harpoons were likely launched from sitting position in vessels by means of throwing boards made from whalebone (Fig. 3.47). The two throwing boards found at Qa were, according to the width of the longitudinal groove, made for missiles shaft diameter of only about 12 mm, confirming the character of the hunters' gear as very light and aimed at throwing the harpoons and darts at long distances, perhaps up to 30–40 metres, as ethnographical analogies from historical Alaska suggest.

The harpooned seals were dispatched with light lances (Fig. 3.19). As mentioned above, the lances were provided with foreshafts lashed to the main shaft via a swallow-tail link, which was able to resist both pushing and pulling forces, so that the animal could be stabbed several times with the same weapon. The hunter possessed different calibres of lances, probably attuned to different size-classes of seals. Metric analysis showed that the majority of lances were quite light – just like the other seal-hunting gear. They had wooden foreshafts showing diameters of 14–21 mm and were provided with tapering, stemmed bifacial endblades of killiaq with widths within the range of 14–22 mm, named Class c and d projectile heads (Fig. 3.19; Fig. 3.22; Fig. 3.23).

In conclusion: the Saqqaq possessed a very complex, lightweight tool kit for sealing both from the ice and from sea-going vessels in open water.

However, analysis of the harp seals at Qt indicates that individual hunting with harpoon was probably not responsible for the major part of animals processed at Qt: the age profile with less than 30% young-of-the-year suggests that entire *ammissut* (herds) of migrating harp seals were taken in the spring season. There are no clear material traces in the archaeological record of such large-scale communal hunting episodes, but nets of baleen strings may have been involved. Finds of knotted strings of baleen, in particular those where two string fragments are knotted perpendicular to each other, show that it was within Saqqaq technological potential to produce strong nets for large-scale communal seal hunting.

With these advanced fast ice and open-water hunting tool kits, the Saqqaq hunted larger marine game like bearded seal and hooded seal. But the faunal material also includes bones of much larger marine mammals. Faunal Component II at Qt includes teeth of sperm whales, and the early-phase bone material at the site shows bones of killer whale, narwhal, minke whale and bowhead. Only a single stray find of a large Saqqaq harpoon head indicates that the hunters possessed gear for active large whale (or walrus) hunting. Perhaps scavenger-like methods were employed to exploit marine big game, as discussed by Meldgaard (2004: 128). Heavy lances with a shaft diameter up to 27 mm and provided with Class e bifacial endblades – the largest calibre – were identified in the archaeological material from Qt (Fig. 3.21; Fig. 3.18). They could have been used for killing or at least injuring and poisoning marine big game. Thus, tons of meat, blubber, teeth and baleen from whale carcasses resulting from both natural and 'artificial' deaths were probably exploited at Qt and Qa.

The picture of the Saqqaq seal hunter is not complete without mentioning that he or she, as seen from a find from Qa, carried a skin pouch (provided with a tube-shaped antler nozzle) containing a number of small, triangular endblades for tanged harpoons (Fig. 3.39). These points were, as seen above (3.2.4), wedged into a slit in the distal end of the harpoon head and would break off when the head struck an animal. Accordingly, the hunter needed quite a lot of spare endblades.

About 47% (NISP) of the faunal material of Faunal Component II consists of bird bones, of which by far the most – 33% of all bird bones – are from Brünnich's guillemot. Some black guillemot, little auk, a lot of fulmar – 26% of the bird bones – and some large gulls like the glaucous gull, and finally some ducks, like eider and mallard, were also hunted during the warm season and, for some species, well into the autumn. The hunters used bird darts, which were provided with three long, barbed end prongs of whalebone, and they propelled the darts by means of whalebone throwing boards. Bird dart foreshafts show that the diameter of the typical bird dart shaft was a mere 14–15 mm. Moreover, the shafts were built of several scarf-linked components and reinforced by girdles of lashings (Fig. 3.13; Fig. 3.14). Thus the bird dart shafts were flexible and must have wobbled considerably during the first phases of the flight. But they were remarkably light and could, like the harpoons, be thrown considerable distances. Ethnographic descriptions from historic Alaska tell about different bird dart throwing techniques with throwing boards from sea-going vessels: one where the dart follows a high trajectory and hits the flock of swimming sea birds from an almost vertical direction, and another where the dart skips on the sea surface and hits the birds from the side before they dive (Nelson 1899: 153).

Ptarmigan from the mainland was also on the menu, probably on a whole-year basis. Ptarmigan amounts to about 14% of the birds eaten at Qt, according to a count of NISP from Faunal Component II. These birds could have been hunted with all sorts of simple devices, from stones to bolas and snares, and thus it is not possible to determine tools especially for ptarmigan hunting in the archaeological material. The same goes for the hunting of the small terrestrial game: Arctic fox and Arctic hare.

Arctic fox was hunted remarkably intensively at Qt; they account for 19% NISP of the mammal bones at Qt, whereas they were of almost no importance at Qa. The faunal analyses at Qt clearly point to the fact that people from Qt mainly exploited fox to get their high quality winter furs: young-of-the-year foxes killed from October to March completely dominate the sample. This material provides a hint concerning the hunting method: the crania were typically broken in the occipital and parietal parts. This indicates that fox traps with a head-crushing mechanism were used – or that the hunter clubbed the trapped animals while extracting the animals from a stone-built trap (Meldgaard 2004: 147–49). Arctic hare only plays a minor role among the game at the two sites. They could have been caught by means of snares.

There is no direct archaeological evidence of the importance of fox furs at Qt that is indicated by the faunal analyses. However, it takes a lot of precise cutting to process these quite brittle skins into, for example, trimmings on garments, and thus the razor-sharp microblades could be associated with fox skin dressing. It must also be mentioned that fox sinew was probably used for the extremely fine sewing threads which have been found at Qt.

Evidence of fishing at the sites is sparse. The near-absence of fish bones can be explained by a number of taphonomic processes profoundly influencing the 'survival rate' of fish bones, even at these sites with excellent preservation conditions, and based on the few bones of arctic char, capelin, cod, polar cod and sculpin identified in Faunal Component II at Qt, Meldgaard (2004: 154) speculates that they indicate that fishing had in fact been of importance to the Saqqaq. This is difficult to confirm from the archaeological material. First and foremost, there are no certain fish hook components in the finds from Qt and Qa, and nor were leister prongs identified with certainty. However, some of the barbed whalebone end prongs that were interpreted as end prongs for bird darts (based on the preserved wooden foreshafts) could have been part of fishing leisters, and likewise, some of the resharpened/reworked harpoon heads, particularly of the self-bladed Qt-A type, could have served well as fishing harpoons for large arctic char and cod, somewhat like the historically known char-fishing harpoons from inland Greenland sites (Secher *et al.* 1987: 63). Finally, if the Saqqaq, as is supposed, were capable of making nets of baleen for sealing, then they would probably have made fishing nets as well. But, in the end, the fact is that the question of fishing and fishing technology in the Saqqaq era is still open.

A small number of caribou bones (NISP: 21 or 0.6% of the total number of mammal bones) were recovered at Qt, and the same relatively low representation was seen at Qa (Møhl 1986: 84). This modest presence of caribou bones probably does not reflect the 'real' importance of this resource as part of the total diet. The analyses show that only marrow-filled bones from the most nutritious anatomical parts were transported from the hunting grounds in the interior back to the two sites, and it is reasonable to assume that bone waste from the primary butchering activities were left at killing and processing sites on the mainland. Accordingly, processed (dried, rather than fresh) caribou meat, marrow and tallow were consumed at the Qt and Qa sites. However, this statement must be balanced with a view to the results of the stable isotope analyses of the human remains at Qt. They show, as with the later Thule culture Inuit in West Greenland, that the quantitative input of terrestrial game in the diet was minimal.

There is clear evidence of caribou hunting and hunting of other terrestrial mammals at the sites: fragments of bows, arrows and arrow points are quite numerous. Arrow shaft fragments show that the 'typical' Saqqaq arrow consisted of a main shaft with a notch for the bow string, secured from splitting by a lashing, and a foreshaft with a unilateral distal blade bed fitted to hold the tapering stem of a killiaq bifacial arrowhead (Fig. 3.7 ff.). The shaft parts were lashed together via scarf joints, and the typical diameter was about 10 mm with a bit of tapering towards the nock end. Traces of lashing for feathers were identified. The total length of an arrow including the head was estimated to have been 70–90 cm. The arrowheads came in a slender (blade w: 9.5–12.5 mm) and a broad version (blade w: 12.5–15.5 mm) (Fig. 3.10).

A few certain bow limb fragments of wood were found at the sites (Fig. 3.2 ff.). The parts of the composite Saqqaq bow were connected with scarf joints. The traces of notches and lashings on the bow limbs are not unambiguous, but it is supposed that these composite bows were reinforced by sinew backing, as almost all ethnographic Arctic bows from driftwood and bone were (Birket-Smith 1914). The total length of a bow is estimated at 1.2 m or longer. Taken together with the evidence from the arrows, it is clear that Saqqaq bow and arrow technology was advanced, and accordingly that caribou hunting in the inland played an important part in a hunter's life, if not quantitatively in the total diet. Finds of foreshafts (average diameter: *c.* 15 mm) with proximal scarf joint and distal unilateral blade beds for stemmed bifacial killiaq heads indicate that light darts of different calibres propelled by throwing boards were used for caribou hunting alongside bow and arrow. These two fundamentally different technologies for land mammal hunting did not exclude each other during the Saqqaq era.

We assume that dogs accompanied the hunters during caribou-hunting trips. A few (four) dog bones have been identified in Faunal Component II at Qt and dog is also represented at Qa. The size range is within that of the modern Greenlandic sledge dog (Meldgaard 2004: 87–90; Møhl 1986: 84–88; Moray and Aaris-Sørensen 2002), but based on the observations that the representation of dog is very modest, that dog bite marks on bones are rare, and that no evidence of dog harness (bone fittings, etc.) or sledge components were found, the dogs must be considered hunting dogs (used for caribou hunting and sealing at breathing holes) and pack dogs.

There is plenty of evidence for subsistence gathering at the two sites. It is of course difficult to estimate the quantitative contribution of gathered food items to the total diet, but both the palaeo-botanical (Böcher and Fredskild 1993) and the faunal analyses (Meldgaard 2004: 156–58) identify the sorts of foods that were gathered. In sum, there is evidence for gathering of plant products like crowberry (large quantities), cranberry and/or Arctic blueberry, mountain sorrel and sheep sorrel, and seaweed. Likewise, shells of mussels (*Mytilus edulis*) and sea snails (periwinkle) were found in the refuse layers. However, gathering, processing and consumption of these mineral- and vitamin-rich products do not demand specialized gear, and accordingly traces of these important activities have not been pinpointed in the archaeological materials.

8.1.3 Catchment areas and regional perspectives

8.1.3.1 A yearly cycle in Sydostbugten

Analyses of the faunal material concluded that life at Qt during the site's Base Camp Period II (equivalent to the period of Faunal Component II and H4 and H3) was based on a complex subsistence economy of hunting/fishing/gathering activities finely in tune with the options of specific seasons. Marine game, birds and fish were harvested in the close vicinity of the base camp at Qt, but resources were also brought back to the site from hunting trips or seasonal short-term camps at some distance from the Qeqertasussuk Island.

Based on a reconstruction of the distribution and accessibility of game throughout a year and ethnographic/historic analogies, Meldgaard (2004: 166–67) reconstructs a seasonal cycle that would explain the composition of the faunal material during Qt's 'heyday' (Fig. 8.1):

During spring belugas and ringed seals were hunted from camps at the ice edge along the outer island in Sydostbugten (Zone I). The bag

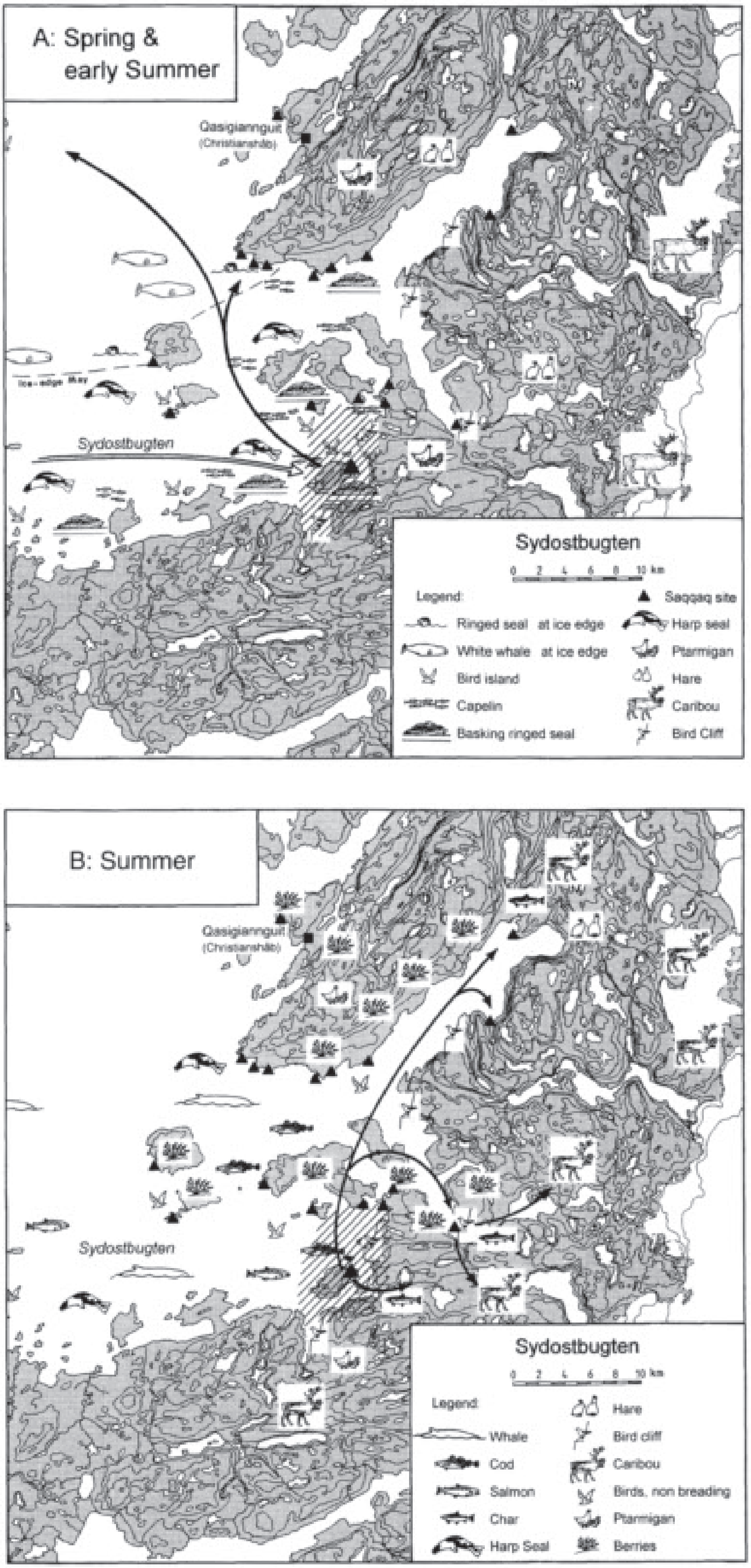
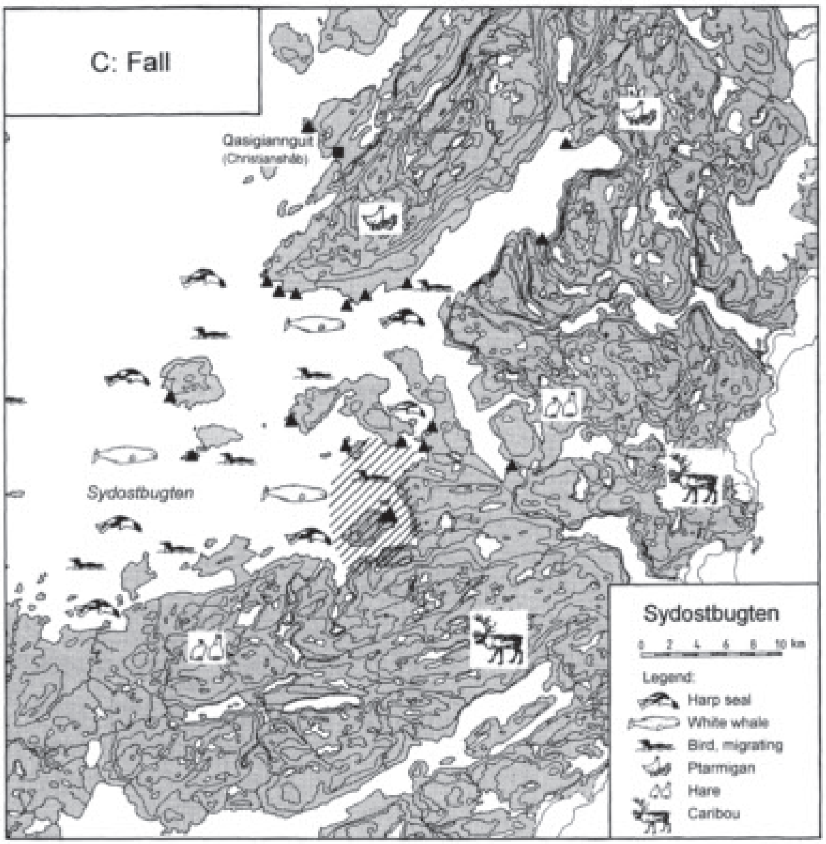
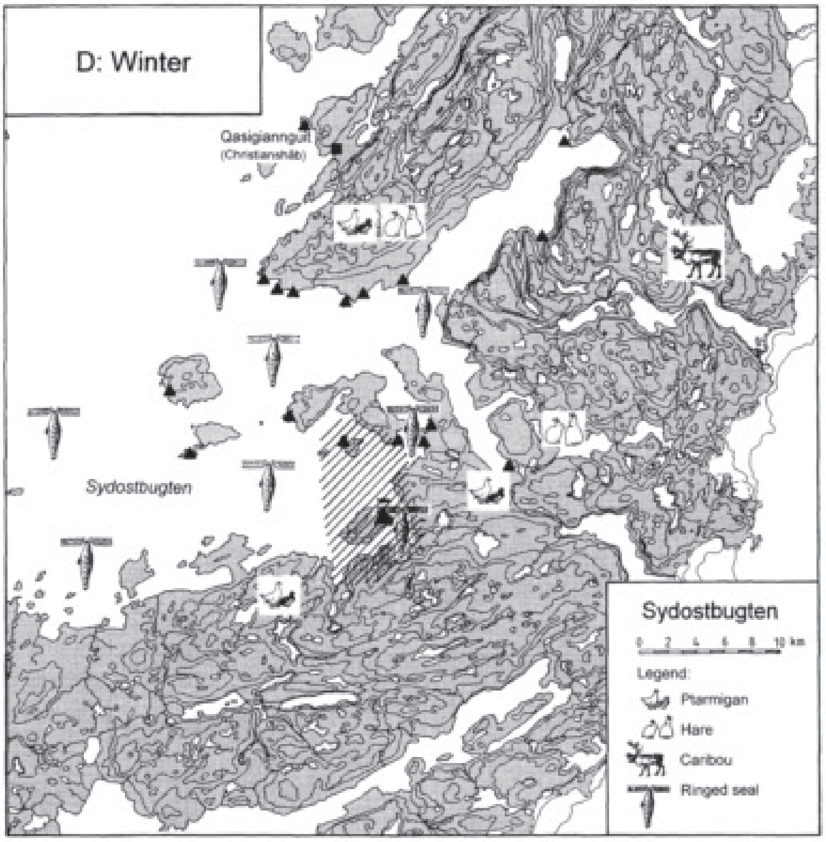


Fig. 8.1
a–d: *Maps showing in concert the 'typical' early cycle of the Saqqaq settlers in Sydostbugten during Horizons 4 and 3 as inferred from the faunal evidence at Qt. (Reproduced from Meldgaard 2004: Fig 10.5).*


C: Fall
Qasigiannguit
(Christianshåb)
Sydostbugten
Sydostbugten
0 2 4 6 8 10 km
Legend:
Harp seal
White whale
Bird, migrating
Ptarmigan
Hare
Caribou


D: Winter
Qasigiannguit
(Christianshåb)
Sydostbugten
Sydostbugten
0 2 4 6 8 10 km
Legend:
Ptarmigan
Hare
Caribou
Ringed seal

from these camps was transported back to Qt from hunting grounds at a distance of 10–50 km from the site. The sea ice retreated during late spring and early summer into the inner part of the bay, and a resource boom followed: migrating harp seals formed *ammissut* (herds of 20 to over 100 animals) and, following schools of fish (*ammassat*), filled the open water areas now closer to the base camp at Qt. These *ammissut* were hunted from sea-going vessels, probably both by the individual hunters and by large-scale communal hunting, where hunters from several base camps may have joined forces to harvest entire herds of seals. With the spring resource boom, great quantities of migratory sea birds came as well. They could be caught at bird cliffs, nesting islands and in the open water in the inner bay zone (Zone II). Summer left the island of Qeqertasussuk surrounded by open water. The living resources were scattered, but occasionally marine mammals like large whales would swim through the narrow sound between the island and the mainland. The inner bay, i.e. the close vicinity of Qt, was the primary hunting area, where gathering of berries could also be carried out on the islands and on the mainland coast. However, hunting and fishing parties from Qt also travelled to the inland, Zone III, where caribou and char runs in the rivers were exploited. Caribou meat, fat, antler and skin, and dried char and inland game like ptarmigan and hare were brought back to Qt from these inland trips, which continued into the autumn. During the autumn short hunting trips aimed at return-migrating scattered harp seals, beluga and sea birds in the open water took the inhabitants of Qt to Zone II, the inner bay, close to the base camp. With the freezing up of the sea, ringed seal breathing-hole hunting began. This world of solid ice, named Zone IV, covered the entire Sydostbugten and most of Disko Bay. Hunting trips went from the base camp in all directions as the ringed seal population was scattered. When light came back, the hunting of ringed seal basking on the ice dominated, and only with the formation of an ice edge in the outer island zone (Zone I), following the toughest winter months, did long-distance hunting trips and the establishment of satellite 'ice camps' resume.

Seen from a subsistence point of view, taking into account evidence of gathered food items like berries, seaweed and mussels, the world of the inhabitants at Qt could have been limited to Sydostbugten. They could have covered all their needs for food throughout a year by exploiting the living resources within this quite limited area, reaching at most 20–50 km, as the crow flies, from the base camp on the island of Qeqertasussuk. But, as one might expect, archaeology extends this picture of a geographically restricted perspective by adding information about the connections between the Qt site, the site catchment area and the other early Saqqaq sites. Evidence from the Qa site will be integrated in this attempt to view the two frozen sites in a perspective which encompasses the entire Disko Bay region. This is facilitated by the work of Jensen (2006), who presents an overview of the palaeo-Eskimo settlements of the region. Likewise, information from Sørensen (2012a) on lithic raw materials in Disko Bay will be included in the following.

8.1.3.2 Evidence from raw materials about external connections

The greater part of the organic raw materials could have been procured in the vicinity during a yearly cycle as described for Qt: caribou products like antler were brought back to the camp from hunting trips inland, and large quantities of whalebone and baleen were collected either from hunting at the ice edge in Sydostbugten or from beached whale carcasses. Skin for garments, tents and boats were largely a product of seal hunting, which also took place in the near catchment area. The indispensable driftwood for crafts as well as for fuel could be gathered on beaches in the archipelago, as well as on ancient high-lying coastlines in the bay, where driftwood had accumulated in great quantities since the end of the last glaciation (Grønnow 1996a).

More rare raw materials, which are only represented by a few or a single pieces at the site, like walrus ivory and sperm whale tooth, came to Qt from greater distances, probably from the outer parts of Disko Bay or from the mouth of Kangia (Meldgaard 2004: 125), and likewise narwhal tusk was probably imported from well outside the immediate catchment area. At least, the rarity of these materials and the almost total absence of waste in Qt from the working of these materials indicate that they were 'imports'. Whether these exotic raw materials reached the site via the inhabitants' travels or were procured by exchange taking place in the Sydostbugten itself, the implication is that people certainly had connections to sites in the greater Disko Bay area.

This conclusion is obviously supported by the lithic raw materials. First and foremost, killiaq reached the Qt site in the shape of cores, reduced from tabular nodules and 'initial' cores at the outcrops themselves and/or at specialized sites neighbouring the outcrops (Jensen and Petersen 1998). Killiaq was procured from only two sources in the region (Fig. 8.2): the grey, high quality killiaq from the 'Slibestensfjeldet' (Qaarsut) outcrop on the northern side of the Nuus-

Fig. 8.2
Map showing the geographical position of the two outcrops of killiaq in Disko Bay, Angissat and Qaarsut. (Based on information from Jensen 2006: 95).

suaq Peninsula, i.e. beyond Disko Bay (Jensen 2006: 44), and from Angissat, an island in the outer Sydostbugten (Zone I), which delivered a lesser quality killiaq (Sørensen 2012a: 58). The last mentioned killiaq is represented by only a small percentage of the total volume of killiaq at Qt, and thus the great majority of the raw material was imported from Slibestensfjeldet (Chapter 3.9.4). This is firm evidence that the people at Qt had long-distance contacts. Raw materials like agates and other mcq variants nicely fit this picture, as nodules of these raw materials can only be collected in the region's tertiary volcanic rock formations on Disko Island and the Nuussuaq Peninsula. This probably goes for sandstone as well, and it is likely that this raw material for grinding stones and lamps was procured from afar. In contrast, quartz crystal and the frequently used pumice could be collected in the near vicinity of the Qt site. The excavation team found crystals at Akulliit immediately north of the island of Qeqertasussuk and dark grey pumice clumps (from volcanic eruptions on Iceland) were found washed ashore on ancient and present boulder beaches on the northern side of the island.

It must be mentioned that soapstone was only found in the shape of a few 'shards' in the upper Saqqaq layers at Qa. This raw material for lamps could have been collected locally at quite small, but high quality, deposits in central Disko Bay (Olsen 2004: 18–19).

In conclusion, even if the analyses of the faunal material draw a picture self-sufficiency as regards basic subsistence, the archaeological sources speak of travels in the area and contacts with other Saqqaq societies in the Disko Bay region, confirming on archaeological grounds that these two sites were not isolated, but part of a greater Saqqaq society and integrated in an exchange system of at least regional scale. The evidence speaks of strategic moves between nodes of importance in their land- and icescapes. The maintenance of Saqqaq's remarkably complex material culture and consumption of a wide variety of unevenly distributed mineral and living resources could only have worked in practice and in the long run due to the Saqqaq's strategic mindset.

8.1.3.3 The position of Qt and Qa in the Disko Bay settlement patterns

Archaeological surveys – highly intense in some areas – have provided a basis for considerations on palaeo-Eskimo settlement patterns in Disko Bay (Møbjerg 1986; Grønnow 2004: 97 ff.; Jensen 2006: 54 ff.). According to Jensen's comprehensive analysis of about two hundred Saqqaq sites, the distribution pattern is characterized by two concentrations around the mouths of the two very productive ice fjords, Torsukattak and Kangia. Here, extremely large sites, some with accumulations of very thick midden layers from the entire Saqqaq era, are situated: Illuutsiaat, Sermermiut, Eqi and Qajaa. Thus our frozen site of Qa in Kangia is among the sites that Jensen interprets as large central sites (focal sites) inhabited by groups 'monopolizing' rich resources at the mouths of the fjords. These focal sites were inhabited all year round but had several satellite camps in their catchment area, so that a full yearly settlement cycle could be maintained and all subsistence needs covered within the catchment area. A number of likewise central sites, but of a lesser size than the focal sites at the ice fjords, and a number of supposed winter sites (judged from their substantial architectural remains) fill the gaps between the large focal sites. Qt is interpreted by Jensen as such a central site – a 'base camp' during the H4/Faunal Component II phase. Together with its network of about 18 specialized camps, including small warm-season occupations (Meldgaard 2004: 56–67), Qt defines a catchment area (Jensen 2006: 54).

According to Jensen's analysis, Disko Bay shows at least eleven such catchment areas, each containing a focal or a central site and/or a winter site surrounded by smaller satellite sites of different functions. Based on geographical criteria, the catchment areas are tentatively grouped into four 'territories' covering the entire bay (Fig. 8.3).

Following Jensen's line of thought, contacts between the territories were driven by: 1) a com-

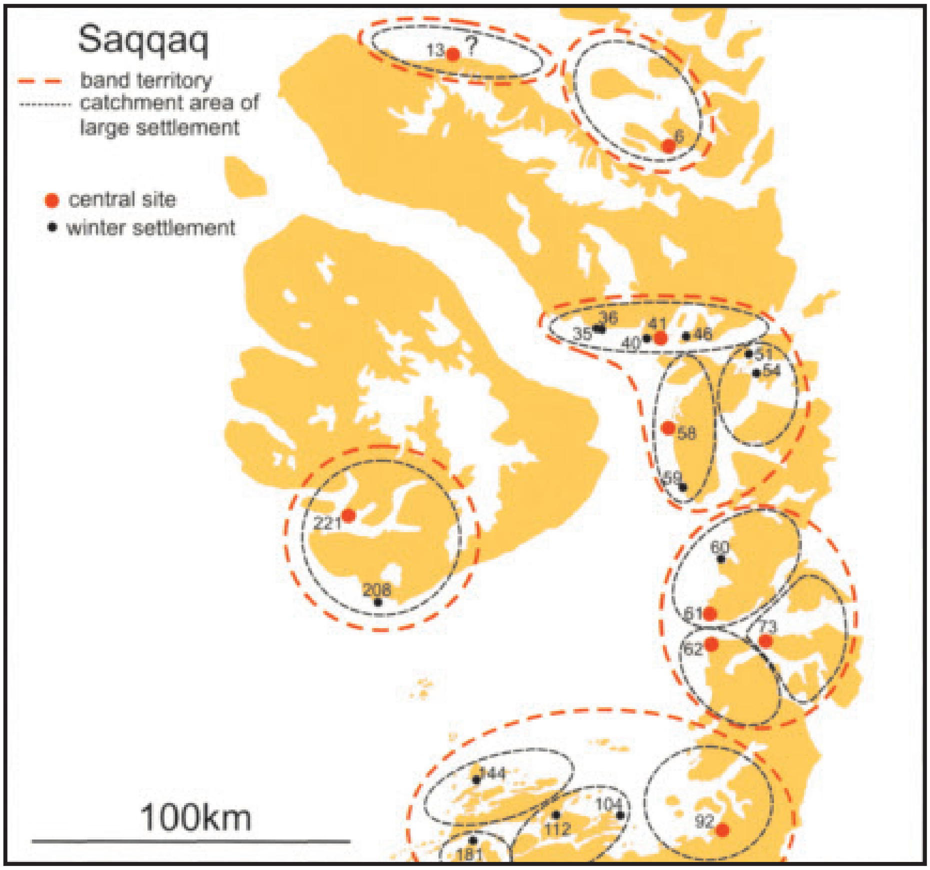


Fig. 8.3 *Maps showing the 'territories' in Disko Bay. (Reproduced from Jensen 2006: 54).*

mon demand for the 'marker raw material' of the Saqqaq culture, killiaq, and 2) a cultural tradition and a social need for regular large aggregations. Concerning 1): Trade and exchange 'down the line' of killiaq cores in Disko Bay from the (perhaps monopolized) outcrops and processing sites at Nuussuaq have been demonstrated from technological studies (Jensen and Petersen 1998; Sørensen 2012a: 311 ff.). Thus there is solid archaeological evidence that the otherwise self-sufficient catchment areas/territories maintained regular contacts with each other. Concerning 2): Qa could have been intensively occupied by a more or less permanent group of 'fjord-dwellers' and at the same time frequently have served as an aggregation camp of inter-territorial and regional importance, in the same manner as the historical aggregation camps in West Greenland (Grønnow *et al.* 1983). With the present modest level of excavations at Qa it is difficult to estimate the number of dwellings and inhabitants at this site when the large aggregations of Saqqaq people from the entire Disko Bay took place, but the mere volume of the Saqqaq culture layers – over two metres deep and covering a considerable area – is enough to indicate that something very unusual took place here. Even if we take into consideration the fact that Qa was settled for several centuries, and furthermore theoretically remove the organic component from the frozen layers and estimate the volume of the site only from concentrations of fire-cracked rocks, lithic artefacts and refuse, Qa would appear to be a huge site. There are of course a lot of open questions about this characterization of Qa as an aggregation camp, and we are lacking substantial data for describing its relationship to the other sites in the class of extremely large, focal sites in the region.

8.2 The frozen sites in their Eastern Arctic context

8.2.1 Technology and intercultural contacts

Through comparative studies it was documented that the three Eastern Arctic Early ASTt cultures – as defined by minor differences in their lithic technology – share a significant number of archaeological traits. Interestingly, the close relations between Pre-Dorset, Independence I and Saqqaq find their clearest expressions in the artefacts made of organic raw materials. Preservation of organic matter is not good concerning the first two cultures mentioned, but nevertheless it was argued that important components of Saqqaq material culture – the morphology of bird darts, harpoon heads, throwing boards, pressure flakers, ladles, needles, needle cases and components of ornamentation – have close parallels in Pre-Dorset and Independence I. The 'typologically sensitive' harpoon heads are notably similar across the three cultures. The same goes for the steps of the working processes concerning hard organic materials.

The symbolic representations, even if they are few, confirm that Pre-Dorset, Independence I and Saqqaq must have been closely related. It was shown that the 'cloven foot' motif, the line ornamentation, triangles/diamond-shaped ornamentation, and 'swallow-tails' were shared between Saqqaq and Pre-Dorset, that small containers interpreted as amulet boxes with carved (spirit) holes were shared by all three cultures, and that the spectacular 'zig-zag' pattern on needle cases was a characteristic ornamentation shared by Pre-Dorset and Independence I. The finds show that the drum/tambourine was used in Saqqaq as well as in Pre-Dorset cultures.

This homogeneity over vast areas and long time periods can be understood as resulting from the sharing of very strong mental templates determining the production of material culture – norms that were shared from the very beginning of Early ASTt in the Western Arctic and were confirmed and reinforced through much tighter communication between the cultures throughout the entire Early ASTt era than we might expect, taking the vast geographical ranges of the cultures into consideration.

Some traits in the lithic inventories supplement this notion of intercultural contacts. It is argued in Grønnow et al. 2014 that the blubber lamp of soapstone and sandstone was a Saqqaq invention, which in a late phase of Saqqaq was supplemented with formal, round lamps. The informal and in particular the low-walled stone lamps or 'plates' have counterparts in late Pre-Dorset, and due to the fact that lamps are present in Saqqaq well before late Pre-Dorset, it was argued that the idea of making blubber lamps spread from West Greenland to Canada via the High Arctic 'Gateway' through exchange between the two cultures, even if the suggested 'contact zone' seems only to have been sporadically settled.

It must be underlined that the lithics, in contrast to the organic inventory, show regional and inter-cultural differences between the Early ASTt cultures: cultural 'marker' raw materials like the killiaq of the Saqqaq in West Greenland, the Mugford chert of the Pre-Dorset in Labrador, and the dark green chert of the Independence I were all distributed in regional exchange networks which did not seem to overlap, and the three cultures showed subtle differences both in their lithic *châines opératoires* and in design details. Burin production, design and resharpening, and microblade production are examples of such differences between the Early ASTt cultures. Moreover, the significant change in burin design and technology which took place in Low Arctic Pre-Dorset through time is not paralleled in Independence I and Saqqaq.

8.2.2 Architecture

The wide range of dwelling features of the Early ASTt cultures were compared, and it was shown that practically all types of dwelling are shared by the three cultures. Identical 'building components' in different combinations formed the basis for the architecture, which consisted of substantial dwellings with midpassages or central box hearths, simple tent ring constructions and paved areas. Even subtle traces of snow-lined tents or snow houses have been documented in both Saqqaq and Pre-Dorset contexts. On the other hand, it is difficult to find parallels to the Saqqaq's remarkably extensive use of fire-cracked rocks and complex arrangement of the midpassage structures inside the dwellings. It might be due to the character of the subsistence economy of the Saqqaq in West Greenland, and in Disko Bay in particular, which was based on 'bulk resources' (like migrating harp seals), that such substantial features developed there. Likewise, the Pre-Dorset probably constructed 'long-houses' or communal structures that are not found in Independence I and Saqqaq.

A comparison of floor areas of substantial dwellings (i.e. excluding simple tent rings) from the three cultures produced interesting results. The histogram of size classes for all three cultures showed skewed normal distributions with a long 'tail' towards the high end of floor area values. With an average of 20 m^2, the Saqqaq dwellings were the largest (variation: 16–26 m^2). Pre-Dorset dwellings measured on average 16.5 m^2 (variation 7.1–28.3 m^2), and the cluster of significantly smallest dwellings was formed by Independence I dwellings, with an average of 11.6 m^2 (variation: 4.4–23.8 m^2). As seen, the variations are remarkable. Among other things, this indicates that all three cultures, no matter their average floor size, constructed very large (multi-family) dwellings in the size range of 24–28 m^2.

It is interesting to observe that Independence I dwellings generally are the smallest, thus demanding less fuel for heating during the cold seasons. This is in accordance with the very limited access to firewood and use of 'expensive' fuels like blubber, tallow and bones in the High Arctic.

8.2.3 Spatial organization, camps and settlement patterns

The overall spatial distribution of artefacts, artefact fragments, and refuse from crafts and food processing inside the dwellings of the three ASTt cultures resembled each other. The bipartition documented for the Saqqaq dwelling floors into an activity side on one side of the midpassage and a 'sleeping platform' on the opposite side, and in addition an activity area immediately around and on top of the midpassage construction, proved to be valid for Pre-Dorset and Independence I as well. The division into an activity side and a resting side was documented even in dwellings without a midpassage, which contained only traces of a central fireplace or hearth. This general trend was interpreted as reflecting uniform social structures and perceptions of space by the pioneer cultures all over the Eastern Arctic.

A comparison of camp types also showed shared principles. All three cultures established local networks of camps. A few base camps consisting of 3–10 dwellings were important nodes in these networks, which also contained a much larger number of 'specialized camps' showing only one or two dwellings. Obviously, the duration and season of stays, and the topographical position of the different camps differed considerably, depending on specific natural and cultural preconditions. However, there is an additional aspect of camp organization which links the three cultures together: large aggregation camps. It was argued that that Saqqaq aggregation camps were huge – at Qa they produced midden layers two or three metres deep – even if we are not able at present to estimate the number of dwellings at these few focal sites. It was further shown that Independence I established a few aggregation camps containing 10–35 dwellings and that Pre-Dorset's aggregation camps consisted of 10–25 probably contemporary occupations. These camps indicate that regular (yearly) gatherings of the entire population of a region of the size of Peary Land, Disko Bay or Foxe Basin were an integral part of the settlement pattern of the Early ASTt societies. The temporary activities in these aggregation camps maintained cultural coherence and consistency among, and perhaps between, the regional populations of the three cultures.

8.2.4 Saqqaq's place among the pioneer cultures

In Chapter 7 the Saqqaq culture was put into a wider Eastern Arctic perspective by thorough analyses of evidence from radiocarbon dates. Based on a screening designed to extract the most reliable dates of the beginnings and ends of the three cultures, and on analyses of the radiocarbon calibration curve in order to define important plateaus and wiggles, the following was concluded:

The initial migration into the Eastern Arctic of Pre-Dorset societies took place some time within 3360–2920 cal BC (within the defined Plateaus A and B on the calibration curve). The western Canadian Arctic, at least from Victoria Island to Boothia Peninsula, was populated by this demographic expansion, which took a maximum of 440 years, probably less. The further spread east seems to have stalled for some centuries until some time within 2470–2290 cal BC (within Plateau D on the calibration curve), when the vast areas from Foxe Basin in the central Canadian Arctic to Labrador in south-east, the High Arctic islands in the north-east, and ultimately Greenland in the far east, were populated within a time span of less than 180 years or less than seven generations. It is suggested that Independence I and Saqqaq cultures formed in High Arctic Canada and West Greenland, respectively, as regional developments of societies belonging to this second phase of the Pre-Dorset expansion eastwards.

To substantiate this interpretation we must identify Pre-Dorset sites which pre-date the Independence I sites at the High Arctic 'Gateway to Greenland' and the Saqqaq sites in West Greenland, respectively.

The potential for finding such early Pre-Dorset sites in the High Arctic is substantial. As shown above, Pre-Dorset structures are frequent on the Canadian side of the gateway and have been identified in increasing numbers on the Greenlandic side. There is now a starting point for future thorough archaeological investigations in this area, which must include stratigraphic, typologic and dynamic technological analyses, as radiocarbon dates can hardly throw light on this issue due to Plateau D.

However, the problem about the formation of the Saqqaq culture in West Greenland is hard to solve. Sites of Pre-Dorset groups have not yet been identified in this area. Assuming that the discovery of the killiaq source on Nuussuaq was made and exploitation began as soon as the hypothetical Pre-Dorset pioneers migrated into West Greenland, the number of 'pure Pre-Dorset' sites must be very low. However, future investigation in the archaeologically quite 'unknown' regions north of the killiaq source – from the Uummannaq area to Melville Bay – may bring such Pre-Dorset sites to light.

While Pre-Dorset continued in central parts of the Canadian Arctic and Saqqaq in Low Arctic Greenland, the High Arctic was more or less depopulated following the disappearance of the Independence I before 1860 cal BC. There are traces, however, of sporadic Saqqaq and Pre-Dorset presence around the Nares Strait during the following centuries.

The last traces of the Saqqaq in West Greenland are contemporary with a major transition in the Eastern Arctic: the Early to Late ASTt-transition dated to around 800 cal BC, which is immediately before the significant Plateau E on the calibration curve (*c.* 790–400 cal BC). Only a single date of terminal Saqqaq from the Sisimiut area falls within this plateau, suggesting a contraction of at least the West Greenland geographical range of this culture in its terminal phase. There seems to be only a short temporal overlap, if any at all, between the Greenlandic Dorset groups spreading into West Greenland and the last Saqqaq there.

8.3 Alaskan and Siberian connections

8.3.1 Introduction

The assemblages from Qt and Qa and the material culture of the Saqqaq in general point towards the Western Arctic in three quite different ways: 1) similarities in material culture in relation to the fourth member of the Early ASTt, the Denbigh Flint Complex in Alaska, 2) common ancestors as indicated by the aDNA analyses, and 3) analogies with the historically known Inupiat and Yupiit groups concerning hunting technologies. A brief discussion of these topics completes the placing of the Saqqaq culture and the frozen sites in a large-scale perspective.

8.3.2 Saqqaq and Denbigh Flint Complex material culture and chronology

Based on a study of Independence I architecture and assemblages, Knuth (1967: 211) pointed to different shared aspects of this culture and the Denbigh Flint Complex (DFC), the range of which stretches along the coasts from Norton Sound in the west to the MacKenzie Delta in the east. Also parts of the interior of this vast range are included (Tremayne and Rasic in prep.). From an architectural point of view some similarities can be demonstrated: a few oval tent rings and a single DFC dwelling floor with a probable midpassage structure, thus resembling the dwellings of Saqqaq and the other Early ASTt groups, have been documented (Odess 2003). However, DFC also constructed veritable semi-subterranean (winter) houses, some even with a pit, a cold trap, in front and with a hearth situated in the centre of a circular floor (Anderson 1988; Tremayne and Rasic in prep.). Such dwelling types are, as documented above, not present in the Early ASTt cultures of the Eastern Arctic.

Judging from the lithic artefacts, DFC shares stylistic and technological traits with all three Eastern Arctic Early ASTt cultures, in particular concerning projectile points, burin production and resharpening techniques (Sørensen 2012a: 329–30). Some of the DFC burins are almost identical to their Saqqaq counterparts (Tremayne 2010: 77). However, DFC's production of precisely made end- and side-blades, often finished with an intricate series of parallel pressure-flaking (Giddings 1964: Pl. 71-b; Tremayne and Rasic in prep.), have no counterparts in Independence I and Saqqaq, and the Pre-Dorset side blades show different morphologies.

Until future systematic *chaîne opératoire*-based analyses have been carried out, the conclusion based on lithics can only be of a general character, stating that both Saqqaq and DFC were closely related members of the Early ASTt and that many more traits connected Saqqaq lithic technology with DFC than separated them.

Regrettably, only in very rare cases are organic materials preserved at DFC sites. Comparisons between the complete Saqqaq inventory and DFC are thus quite limited. However, a single DFC locality provides some information in this respect: the Macharak Lake Site, a caribou-hunting site in the northern interior of Alaska (Tremayne 2011). Here, about forty fragments of artefacts and worked bone and antler pieces were uncovered in the refuse layers. The DFC pressure flakers do not seem to have been systematically produced in standard types, as we have seen for the Saqqaq. The slender, antler arrow points of DFC, some with bilateral slots, do not find counterparts in the Eastern Arctic either. The antler wedges are closer to the Saqqaq ones, but they are quite uncharacteristic and they do not support further conclusions. A single find from Macharak Site – a long, narrow list of caribou bone – is decorated with four parallel longitudinal grooves and a group of five shallow notches on one edge. The parallel line component is, as we have seen, found in Pre-Dorset and Saqqaq as well. However, the piece from Macharak is broken at the edge along the fourth groove, and it is suggested by the present author that it might have served as a blank for producing thin lists for production of bone sewing needles. Blanks like this, admittedly with fewer than four parallel grooves, are known from Pre-Dorset as well as Saqqaq.

In order to elaborate on the possible relations between DFC and Saqqaq, evidence from radiocarbon dates must briefly be touched upon. According to the latest evaluation of the dates (Tremayne and Rasic in prep.), the presence of DFC in Alaska can only be documented with certainty within the quite narrow time span of 2450–1450 cal BC. Thus the initial phase of DFC lies within Plateau D on the calibration curve, and in this respect the timing of the DFC migration into Northern Alaska is parallel to the 'second wave' of the Pre-Dorset expansion that we saw in the Eastern Arctic. However, there are dates, even if at present they may be considered outliers, which must be taken into consideration (c.f. Harrit 1998; Dumond 2005, Slaughter 2005, Davis and Knecht 2005) and which, in the opinion of the present author, are quite strong indicators of a much earlier presence of initial DFC in Alaska. The dates on charcoal from Kuzitrin Lake lie well before Plateau A on the calibration curve (before 3360 cal BC).

In any case, the radiocarbon dates show that DFC is contemporary with and possibly several centuries earlier than Pre-Dorset, Independence I and Saqqaq in the Eastern Arctic, and thus that DFC, which shares so many technological traits with these cultures, must have played an important role in the cultural development of the Eastern Arctic. On the basis of these sparse data on DFC we must point to the conventional, but also simple, model of the relations between the Early ASTt cultures as the most likely (McGhee 1996: 73–105):

The DFC represents the earliest society of the ASTt that developed from Siberian Neolithic. They migrated across the Bering Strait into Alaska probably a few centuries before 3400 cal BC and spread, partly far inland along the rivers, and partly along the Northern Slope. The migrating groups, which crossed the Mackenzie Delta some time within the period 3360–2920 cal BC and thus entered into the western Canadian Arctic, developed their material culture into what we designate Pre-Dorset. About five centuries later the next step in the initial population of the Arctic was taken, when Pre-Dorset groups expanded further east. One way to illustrate these chronological and chorological considerations is with diagram Fig. 8.4.

Following this model, the relations between Saqqaq and DFC are in fact quite simple: Saqqaq's cultural roots go back via early Pre-Dorset to DFC. A millennium separates the beginnings of the two cultures, with DFC the earlier of them, and vast stretches of sea ice and tundra – a distance of 5,000–8,000 km along the Artic coasts – lie between the easternmost DFC societies and the Saqqaq's rich larder in West Greenland.

8.3.3 The aDNA trail back to Alaska and Siberia

As we saw in Chapter 6.1 on the human remains from Qt, the admittedly sparse evidence from aDNA supports the general 'simple' model of the Saqqaq's relationship to Western Arctic/Siberia – a model which was originally deduced from archaeological evidence and radiocarbon dating. There is no human material from Alaska and Siberia which is contemporary with the bones and hair from Qt. However, comparisons of mtDNA and core DNA from the ancient Saqqaq remains with the genomes of the present populations of Eastern Siberia and the Bering Strait support the interpretation that, genetically-speaking, the Saqqaq came from Siberian roots. The aDNA evidence excludes the exchange of genes with other populations, e.g. with Amerindians, during the millennium or more that the expansion from west to east lasted (Raghavan *et al.* 2014).

As shown earlier, estimates based on mtDNA mutation rates suggest that the separation from the Siberian roots of the initial ASTt population took place more than 5,500 years ago. This fits nicely with the archaeologically-based conclusions, but it also encourages further inquiry in the future.

8.3.4 Analogies to hunting technologies in the historic Western Arctic

Just a glance at ethnographic assemblages from the Western Arctic of historic Inupiat or Yupiit origin reveals many technological analogies to Saqqaq culture. In particular, with respect to the reconstruction of the Saqqaq's hunting tool kit, references to Bering Strait ethnography served as an inspiration and an 'eye-opener' that made often very fragmented archaeological objects meaningful. The analogies from Alaska are striking even at the most detailed level: recent studies by the author of Inupiat and Yupiit darts and harpoons in the ethnographic collections of the Anchorage Museum have confirmed that a remarkably high number of practical technological solutions are shared between the Saqqaq and the historic Yupiit/Inupiat (Fig. 8.5).

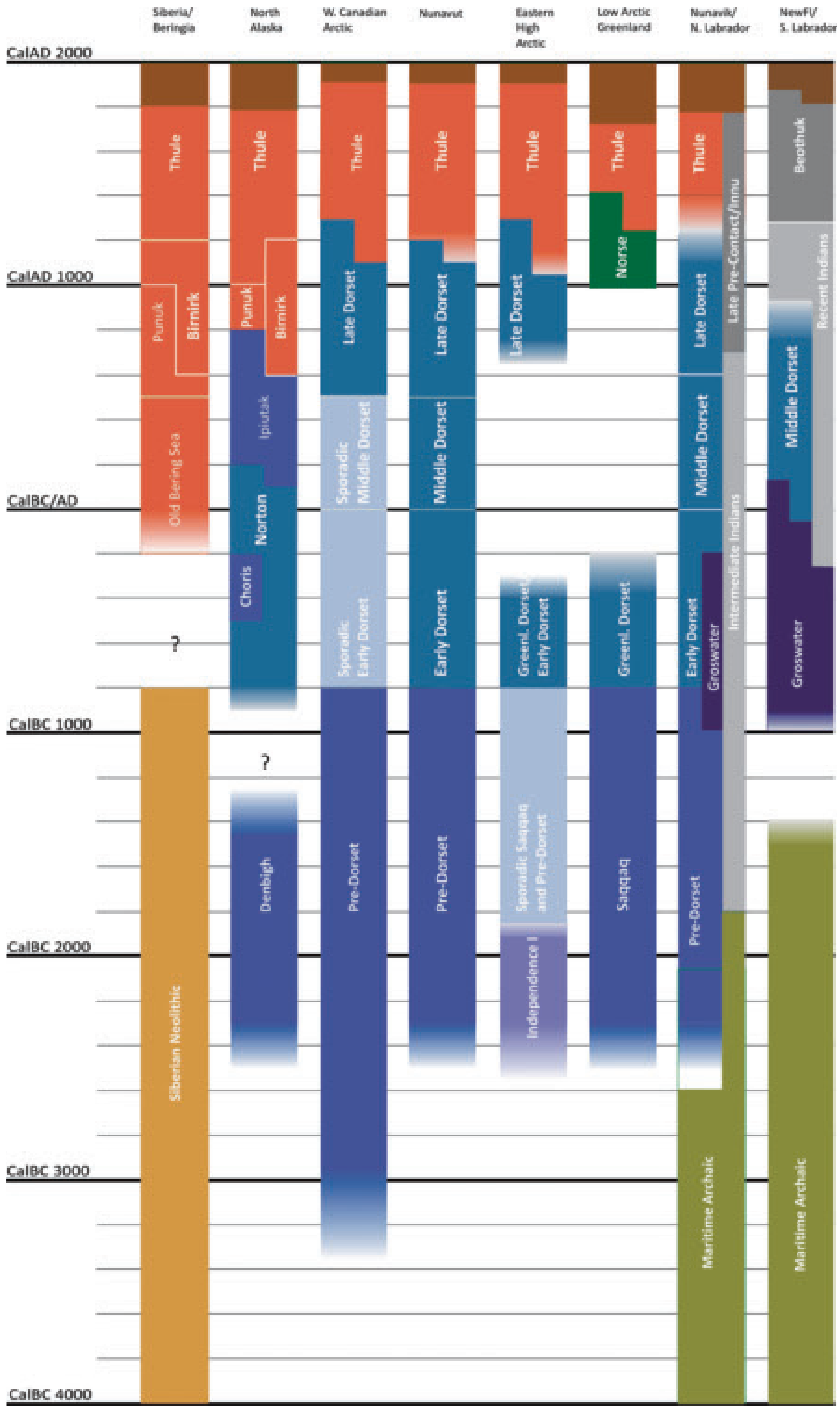


Fig. 8.4

Overview of the chronology of the prehistory of the New World Arctic. Modified from Raghavan et al. 2013: Fig. 1 (Based on Appelt, Friesen and Grønnow's contribution).

a.

b.

Fig. 8.5
Examples across time and space of parallel technologies – the 'lightweight solution' – used by Saqqaq as well as historic/recent Yupiit/Inupiat. (Photos by BG, Anchorage Museum, December 2013).
a: *Tanged harpoon head with rawhide line (object no.: 1998.025.141).*
b: *Arrow with tanged harpoon head (object no.: 95.59.66).*
c: *Distal end of bird dart shaft with grooves for three end pongs (object no.: 88.48.2).*
d: *Detail of 1d. The front end of the distal dart end.*
e: *Detail of the distal end lashing of a bird dart with three end prongs (object no.: 83.153.72).*

c.

d.

e.

It is not possible at the present stage of knowledge to explain the similarities across a gap of more than 4,000 years and thousands of kilometres of coastline, but obviously one can turn to the more functional aspects of this shared technology: the preference for extremely 'lightweight' equipment for the hunting of seals, birds and, probably, small whales. This light and, in more than one sense, flexible technology was a precondition for Saqqaq, as well as Yupiit/Inupiat, hunting strategies, which were characterized by killing at long range. The light harpoons or darts were launched by means of throwing boards with high precision and velocity at long distances – up to 40 metres. The impact of the missiles of this light gear comes with high velocity. Moreover, the lightweight gear could easily be transported. The light gear is, at least in historic times, closely associated with open-water hunting of small marine game and birds from sea-going vessels (Nelson 1899: 135 ff.). As shown by the archaeological and faunal analyses above (chapters 3.2.3, 3.2.4, 3.2.7 and 5.1.2.6), this kind of hunting to a large extent characterized the Saqqaq's subsistence as well.

The hunting tool kits of the Eastern Arctic Thule culture/historic Inuit are rooted in a somewhat different technological tradition of the hunting of marine game and birds: here harpoons, lances and bird darts are considerably heavier (e.g. Jensen 1975; Hansen 2008: 112 ff.) and the missiles are used within ranges of only 10–15 metres. By this 'heavyweight strategy' the impact first and foremost comes from the weight of the missiles rather than their velocity. It is interesting to observe how the preference for using heavy gear followed the Inuit of the Eastern Arctic even when they settled in open water areas like central and south-western Greenland (e.g. Nansen 1891), where lightweight technology could probably have served the purpose as well. This underlines that the choice between 'light-' or 'heavyweight' hunting strategies was determined by tradition as well as function.

8.4 Implications of the study – and future research

8.4.1 Frozen sites as important 'stepping stones' and indicators of site dynamics

The Qt and Qa sites are still, more than thirty years after their discovery, the only Early ASTt sites known from the Eastern Arctic where excellent organic preservation is combined with a deep sequence of stratified culture layers. This study has demonstrated how interdisciplinary collaboration in the field as well as in the laboratories has opened a new window on the life and the world of the first people in Greenland. It is clear that the two sites have the qualities to serve as firm archaeological 'stepping stones' in our exploration of the true pioneer societies of the Arctic.

The analyses have thrown light on important questions about tool kits, working processes, and the formation and functional history of the 'iconic' midpassage structures, and this knowledge is extremely useful as a guide in interpreting the vast majority of sites, where only lithic inventories are preserved. Imagine that all organic material, including the turf layers separating the different layers and microstratigraphies at Qt had decayed and disappeared. The 'collapsed' version of the site would appear as a quite ordinary Saqqaq site with diffuse concentrations of lithic artefacts and heaps of fire-cracked rocks situated in and around a mixture of stone-built structures and large amounts of 'loose rocks'. This is in fact the state in which we find almost all Saqqaq sites, and other Early ASTt sites in the Eastern Arctic, for that matter.

Moreover, this study has demonstrated the value of a long-term, interdisciplinary research effort targeted at a single or a few key sites within a limited geographical area. In certain respects, the nature of the fieldwork, the methodological approaches and the amount of analytical effort that has been devoted to the frozen sites in Disko Bay are comparable to the long-term campaign run by Renouf and collaborators at the Newfoundland Port au Choix and neighbouring sites (e.g. Renouf 2011). This kind of persistent work must have a high priority in the future.

However, at the same time it is clear that the 'key sites' cannot stand alone if we wish to explore topics such as settlement patterns, demography and the spread of the pioneer cultures into the Eastern Arctic. Thus in this work the two frozen sites were seen firstly as a model for Saqqaq settlement in Disko Bay (primarily based on Jensen's investigations (2006)), secondly in the context of Early ASTt settlement in Greenland, and thirdly as part of the settling of the entire Eastern Arctic. These wide-range comparative analyses were facilitated by results of long-term, systematic regional surveys like Savelle and Dyke's studies in the Canadian High Arctic (e.g. Savelle and Dyke 2014). Taking the preservation conditions and visibility of archaeological sources into consideration, Arctic archaeology holds unique potentials for realizing and elaborating such multi-scalar studies.

Detailed studies of the stratigraphy in particular at Qt resulted in a meaningful division of the site into five horizons, which in turn provided a basis for establishing five chronological phases at this particular site. Considerable changes in the importance and use of the site through time could be described, as these factors were reflected clearly in the faunal remains, in the architecture, and in the character of the waste heaps encapsulated in the different layers. Remarkably, these marked changes hardly made an imprint in the tool inventory, as the types, designs and relative frequencies proved to be quite stable through time. Thus it must be kept in mind that important information on site dynamics has been lost on sites with 'normal' preservation conditions.

8.4.2 Learnings from dynamic technological studies

The present study has gone into minute detail by applying a dynamic technological approach to the interpretation of the material remains at the frozen sites. This was inspired by the remarkable results of the *chaîne opératoire*-related analyses of, in particular, lithic inventories during the last couple of decades. New insights into prehistoric decision-making, raw material preferences and learning processes have been achieved through this approach (e.g. Sørensen and Desrosiers 2008). We have emphasized that the starting point for any meaningful artefact typology, metric or quantitative analysis of artefact assemblages, and interpretation of features at a site must be based on a mapping and profound understanding of the 'life cycle' that any piece of material culture has gone through before its incorporation in the archaeological record.

The present study has viewed not only the lithics but also the entire spectrum of artefacts made from organic materials – wood, bone, antler, skin, etc. – as well as the stone-built structures as steps in dynamic technological processes rather than static 'morphological types'. Thus a wealth of hitherto unknown aspects of Saqqaq material culture was discovered and documented. We have been able, at least on a theoretical level, to reconstruct what seem to have been complete tool kits which were designed, made, used, maintained and discarded by the Saqqaq people. Such a high complexity in connection with raw material procurement and selection, as well as the application of diverse work processes leading to composite tools, speak of the targeted logistical organization of Saqqaq society.

As has been seen, Saqqaq technology differs considerably from historically-known inventories from the Eastern Arctic. It is not meaningful to apply a direct historical approach to the interpretation of the Saqqaq remains. However, one way to bridge this 'discontinuity' between ethnographic present and the deep past is through experiments. Hitherto, only a few pilot projects aimed at exploring Saqqaq toolmaking and tool-use through practical experiments have been undertaken (e.g. Appelt *et al.* 2012), but the outcome is more than promising. It was demonstrated that archaeological experiments based on collaboration between experienced experimental researchers and contemporary Greenlanders with hunting, butchering and sewing skills opened up new perspectives on the assemblages from Qt and Qa. We need much more work along the same lines.

8.4.3 Features and spatial analyses

The excavation and registration methods applied at Qt to uncover the H4-surface provided high-resolution data sets. The documentation of turf- and stone-built features as well as artefacts allowed detailed descriptions of Saqqaq architecture and insight into the spatial structuring of activities like food processing, work processes and the disposal of waste inside and around the dwelling.

The added value that objects and refuse of organic matter could provide to spatial analysis is obvious, but it is also important to emphasize that the well-preserved architectural structures inside the frozen layers, in particular Feature A8 at Qt, made it possible to paint a completely new picture of the 'life cycle' of a midpassage. Studies of i.a. microstratigraphy inside this structure revealed a minimum of six different use and construction phases and, interestingly enough, they reflect activities from probably only a single (cold season) occupation. Likewise, for the first time ever, solid archaeological evidence for the use of boiling bags of seal and caribou skin inside the midpassage was found due to favourable preservation conditions and careful excavation.

Thus these results remind us again that the seemingly quite simple dwellings, midpassages, hearths, etc., which we normally find at Early ASTt sites might result from originally complex sequences of use and reuse.

8.4.4 The Early ASTt peopling of the Eastern Arctic

The present study has contributed to a new understanding of the earliest peopling of the Eastern Arctic. We have seen that the Saqqaq possessed an impressive variety of specialized tools for hunting, transporting and crafts, as well as a wide range of household utensils. They made use of a variety of raw materials, which they worked with high precision and finished into composite tools of such an advanced technological level that it surpasses most if not all later archaeological or ethnographic assemblages. They lived in spatially firmly structured lightweight dwellings with advanced heating and cooking technologies. They were highly mobile and utilized an impressively broad spectrum of biotic resources, as reflected in the fauna lists, which show considerably more diversity than those from later times.

Only a fraction of the organic inventory made and used by Early ASTt societies is preserved on sites beyond the frozen ones in Disko Bay, but nevertheless the comparative studies reaching across the entire Eastern Arctic proved that these bits and pieces hold valuable information in a wider context. The incorporation of the 'organic aspect' supplemented the evidence traditionally derived through analysis of lithic artefacts and architecture and made it possible to draw new conclusions on the relations between the Pre-Dorset, Independence I and Saqqaq cultures. Hopefully, in a not so distant future, it will be possible to locate and allocate resources to excavate sites with optimal preservation conditions from all three cultures.

Finally, this study has shown that a balanced application of screened and calibrated radiocarbon datings from the Early ASTt in the Eastern Arctic throws new light on the character and timing of the pioneer expansion from present-day Canada that led to the initial peopling of Greenland. It was argued that, on a grand scale, the process was divided into two phases, including a 'stand-still' in the western/central Canadian Arctic lasting for about five centuries before the spread into Greenland *c.* 2500 cal BC. It is almost superfluous to say that we need additional series of reliable high-precision AMS datings in order to explore the expansion phases further. There is a long and exciting path in front of us towards a better understanding of the timing as well as the drivers of the enigmatic peopling of the Eastern Arctic.

Tables

Table 1.5.1 Artefacts from Qt and Qa

Components of hunting tool kits		Qt	Qa
Bows	Bow limb fragments	19	4
	Toy bows	2	0
Arrows	Main shafts, complete	2	0
	Main shafts, fragments with nock end	4	1
	Foreshafts, complete	9	1
	Shaft fragments	63	28
	Arrowheads (lithic)	56	19
Darts and lances	Foreshaft fragments,'three winged'	17	3
	Bird dart prongs, whalebone	27	1
	Leister prong (?)	1	0
	Foreshaft fragments with blade bed (Type 1 foreshaft)	18	6
	Foreshafts, light lances (Type 2 foreshaft)	20	6
	Foreshafts, heavy lances, distal end fragments	4	1
	Symm. endblades for darts/lances (lithic)	42	81
	Detachable heads (ivory)	0	1
Harpoons	Harpoon heads, Qt-A (whalebone, antler, ivory)	16	5
	Harpoon heads, Qt-B (whalebone, antler, ivory, wood)	24	8
	Harpoon heads, Qt-C (whalebone, antler)	7	2
	Harpoon heads, Qt-D (antler)	7	1
	Harpoon heads, undetermined	1	1
	Harpoon foreshafts for Qt-A	8	10
	Harpoon endblades (lithic)	93	19
	Eyelets for harpoon lines (?)	1	0
	Tubes for spare harpoon end blades (antler, ivory)	4	3
Missile shafts	Fragments of darts, harpoons, lances	91	29
Throwing boards	Throwing board fragm., whalebone	2	3
	Throwing board fragm., wood	1	0
Skin boats	Frame fragments	20	9
	Paddle/oar fragments	14	0
Snares/nets	Snare- and net fragments (?), baleen	2	0
Knives	Hafted knives	11	5
	Knife hafts	12	8
	Knife blades (lithic)	75	24

Components of hand tools and household utensils		Qt	Qa
Burins	Hafted burins	5	1
	Burin hafts	8	4
	Burins (lithic)	402	87
	Burin spalls (lithic)	81	26
End scrapers	Hafted end scrapers	1	0
	End scraper hafts	1	0
	End scrapers (lithic)	82	25
Side scrapers	Hafted side scrapers	1	0
	Side scrapers (lithic)	113	27
Saws	Saws (lithic)	10	2
Drills	Drill points, fully ground/bodkin like (lithic)	5	1
	Flake drills (lithic)	7	0
	Drill shafts (?) (wood)	4	0
Microblades	Hafted microblades	3	0
	Microblade hafts	4	0
	Microblades (lithic)	156	6
	Microblade cores (lithic)	93	1
Expedient hand tools	Flakes and blades with retouch/serration (lithic)	490	35
Wedges and chisels	Wedges of antler and whalebone	17	4
	Chisel of ivory	1	1
Adzes and mattocks	Adze heads (lithic)	17	4
	Mattock head (whalebone)	1	0
Flakers	Pressure flakers	51	52
	Hammerheads for flint flaking (?)	2	0
Grinding and polishing tools	Pumice grinders	187	17
	Whetstones	6	13
	Flagstones with polished patches	5	0
Hammerstones	Hammerstones	22	0
Needles, needle cases, bodkins	Sewing needles	7	31
	Needle cases	3	0
	Bodkins	21	11
Toggles and hooks	Toggles	4	0
	Hooks	3	0
Fire-making tools	Pyrite nodules	4	0
	'Strike a lights' (killiaq hammer stones)	7	3

Components of hand tools and household utensils		Qt	Qa
Lamps	Informal lamps	2	0
	Formal, circular lamps	0	1
Spoons and ladles, bowls and trays	Spoons and ladles (wood, antler, ivory)	13	1
	Bowls and trays (wood)	10	0
	Fragments of containers (wood)	42	6
Various hand tools	Various hafts	7	5
	Various tools (lithic)	8	8
Amulets and drums			
Amulets	Amulet containers (?)	5	0
	Inserted bird bones	3	5
Drums	Drum frame fragments (wood)	5	5
Stakes, poles and pegs	Stakes and poles	147	91
	Pegs (pointed)	18	5
Worked skin etc.	Skin stocking	1	0
	Skin fragments with sewings and/or work traces	14	0
	Baleen strings with knots	20	8
	Sinew threads	2	0
	Seal skin straps	4	0
Waste products	Flakes (lithic)	11348	3016
	Split pieces (drift wood)	10798	41
	Shavings from chopping/coarse work (drift wood)	9600	70
	Shavings from cutting/detailed work (drift wood)	700	
	Worked antler pieces/scraps	78	16
	Worked whalebone pieces/scraps	41	8
	Worked bone (other than whalebone)	12	7
	Worked ivory pieces	6	5
Total		35381	3928

Table 2.2.4-1 Raw materials, harpoon heads

Horizon	Ivory	Antler	Wood	Total
2		6		6
3		3		3
4	3	12	1	16
5		2		2
1/5		1		1
2/3		2		2
3/5	1	10		11
4/5		12	2	14
Total	4	48	3	55

Table 4.1.5-1 Radiocarbon dates from Qt. Area C.
Seal bone dates are corrected for marine reservoir effect: 410 radiocarbon years.

Lab. no.	Layer	Material	BP	+/-	Delta 13C	Calib. (1 std. div.)
K4820	11N	Herbal turf	3150	80	-27.9	1510BC (68.2%) 1310BC
K4816	15U	Herbal turf	3310	80	-26.2	1690BC (68.2%) 1500BC
K4822	16L	Twigs (empetrum)	3640	75	-26.7	2140BC (68.2%) 1910BC
K4818	16M	Twigs (empetrum)	3650	85	-27.3	2140BC (68.2%) 1900BC
K4817	15L	Herbal turf	3680	85	-26.6	2200BC (7.7%) 2160BC 2150BC (60.5%) 1940BC
K4821	16U	Twigs (empetrum)	3760	80	-27.3	2300BC (68.2%) 2030BC
K4819	15AU	Herbal turf	3780	85	-25.6	2350BC (57.2%) 2120BC 2100BC (11.0%) 2040BC
K4823	18L	Herbal turf	3980	85	-25.0	2620BC (68.2%) 2340BC
OxA18746	14	Caribou bone	3505	29	-19.4	1890BC (12.7%) 1860BC 1850BC (55.5%) 1770BC
OxA18749	15	Caribou bone	3628	28	-18.0	2030BC (68.2%) 1950BC
K5128	14AU	Seal bone	3400	80	-14.9	1880BC (7.0%) 1840BC 1820BC (3.0%) 1800BC 1780BC (58.3%) 1600BC
K5126	14AU	Seal bone	3500	80	-14.1	1930BC (65.1%) 1730BC 1710BC (3.1%) 1690BC
K5127	14AL	Seal bone	3570	80	-14.0	2030BC (51.5%) 1860BC 1850BC (16.7%) 1770BC

Table 4.1.5-2 Radiocarbon dates from Qt. Area B.
Seal bone dates are corrected for marine reservoir effect: 410 radiocarbon years.

Lab. no.	Layer	Material	BP	+/-	Delta 13C	Calib. (1 std. div.)
K4560	2L	Herbal turf	1730	70	-24.2	230AD (68.2%) 410AD
K4561	5U	Herbal turf	3390	80	-24.8	1870BC (3.7%) 1840BC 1780BC (56.3%) 1600BC 1580BC (8.2%) 1530BC
K4562	5L	Herbal turf	3690	80	-22.5	2200BC (68.2%) 1960BC
K4563	6L	Herbal turf	3720	80	-22.5	2280BC (4.4%) 2250BC 2210BC (60.4%) 2010BC 2000BC (3.5%) 1970BC
K4564	5U	Herbal turf	3730	80	-22.3	2280BC (7.1%) 2240BC 2230BC (60.3%) 2020BC 1990BC (0.8%) 1980BC
K4565	5L	Herbal turf	3750	80	-22.4	2290BC (68.2%) 2030BC
K4566	6L	Herbal turf	3880	85	-22.5	2470BC (58.6%) 2270BC 2260BC (9.6%) 2200BC
Ox18747	6	Caribou bone	3713	28	-17.6	2190BC (5.3%) 2180BC 2140BC (16.7%) 2110BC 2100BC (46.2%) 2030BC
OxA18748	6	Caribou bone	3664	28	-17.6	2130BC (29.7%) 2080BC 2050BC (25.1%) 2010BC 2000BC (13.5%) 1970BC
K5124	5f	Seal bone	3460	80	-14.4	1890BC (68.2%) 1680BC
K5125	6L	Seal bone	3820	60	-14.6	2430BC (0.8%) 2420BC 2410BC (5.0%) 2380BC 2350BC (55.6%) 2190BC 2170BC (6.8%) 2140BC

Table 4.2.2 Radiocarbon dates, Qa.

Lab. no.	Site name	Material	BP	+/-	Delta 13C	Calib. (1 std. div.)
K-3904	Qajaa, Area C, Saqqaq layer, 0–5 cm above sterile gravel	twigs	3550	85	-26.7	2020–1990, 1980–1740 3732–3960
K-3899	Qajaa, Area E. Lowermost 5 cm of the Saqqaq layer, directly above sterile gravel. 120 cm below the surface	twigs	3550	80	-25.6	2020-1990, 1980-1750
K-4104,	Qajaa, Area C	twig	3540	80	-23.6	2010–2000, 1960–1740
K-3906	Qajaa, Area F	twig, modified	3490	140	-26.7	2020–1990, 1980–1620
K-3900	Qajaa, Area E, Sarqaq layer, 90–100 cm	twigs	3440	80	-25.9	1880–1680, 1670–1630
K-3648	Qajaa, Area A, 5–10 cm		3430	85	-25,8	
K-3650	Qajaa, Area B, 0–10 cm		3290	80	-27,3	
K-3645	Qajaa, Area A, Layer B 20–35 cm. From the lower part of Saqqaq layer (17–85 cm), with sterile turf below and above	Turf and twigs of locally grown schrubs	3150	80	-25,1	
KIA45309	42 cm above local local zero	Montia and Empetrum	3024	26	-26,61	
KIA45310	79 cm above local zero.	Montia and Empetrum	3014	28	-30,07	
K-3651	Qajaa, Area B, 25–35 cm		3100	75		
K-3905	Uppermost horizon with Saqqaq Culture, humified turf 15–20 cm below the surface. Late phase of the Saqqaq Culture.	peat	2910	75	-25.6	1260–1230, 1220–990
K-3646	Qajaa, Area A, Layer B, 65–80 cm	Turf and twigs of locally grown schrubs	2890	65	-26,3	
K-3647	Qajaa, Area A, Layer B, 70 cm	Wood and twigs of locally grown schrubs	2850	80	-26,2	
K-3901	Qajaa, Area E. Uppermost 5 cm of Saqqaq layer. Dates the end of the Saqqaq Culture at the site	peat	2830	80	-24.2	1130–890
KIA 453011	Height above local zero: 109 cm	Sphagnum	2803	40	-25,19	

Lab. no.	Site name	Material	BP	+/-	Delta 13C	Calib. (1 std. div.)
K-3649	Qajaa, Area A. Layer C, 90-95 cm	peat	2720	80	-25,1	
K-3894	Qajaa, Area A. Section A. Uppermost 5 cm of Saqqaq layer with sterile peat immediately above	peat	2700	75	-25.5	920–790
K-3895	Qajaa, Area A, Section A. Lowermost 5 cm of sterile peat. Dates the beginning of the sphagnum peat immediately above the Saqqaq layer	peat	2640	75	-25.4	910–760, 680–660, 610–590
K-3896	Qajaa, Area A, Section A. Uppermost 5 cm of the sterile peat	peat	2280	75	-25.5	410–340, 330–200
K-3902	Qajaa, Area E	peat	2210	70	-24.4	380–190,
K-3897	Qajaa, Area A, Section A. Dark humified peat, immediately above K-3896. Dates the climate change before the Dorset settlement period	peat	2200	75	-24.7	380–170
KIA45312	116 cm above local zero	Empetrum	2195	65	-27,54	
K-3898	Qajaa, Area A, SectionA. Dark humified turf with Dorset traces. Immediately above K-3897. Dates the Dorset settlement at Qajaa	peat	2150	75	-25.1	360–290, 260–250, 240–90, 80-60
K-3903	Qajaa, Area E	peat	1860	70	-24.7	AD: 70–240
K-3652	Qajaa, Area D, 40-50 cm.	peat	1650	70	-24,3	
K-3653	Qajaa, Area D, 50-55 cm.	peat	750	70	-24,3	
K-4102	Qajaa, Area D	twig	420	65	-20.6	AD: 1420–1530, 1590-1630
K-4103	Qajaa, Area D	twigs	280	65	-26.1	AD: 1490–1670, 1780-1800

Table 4.3.1-1 Lithic raw material frequencies, Qt.

Total lithic material, Area C	Killiaq	Agate (mcq)	Quartz crystal	Misc.	Sum
H1	4193	127	54	17	4391
H2	3202	48	44	15	3309
H3	1470	38	26	9	1543
H4	1290	198	295	10	1793
H5	771	71	25	13	880
Sum	10926	482	444	64	11916

Table 4.3.1-2

Lithic tools, Area C	Killiaq	Agate (mcq)	Quartz crystal	Misc.	Sum
H1	419	35	15	2	471
H2	225	11	4	3	243
H3	136	12	11	0	159
H4	198	66	14	4	282
H5	67	23	5	0	95
Sum	1045	147	49	9	1250

Table 4.3.1-3 Raw material frequencies, microblades, Qt.

Micro Blades, Area C	Killiaq	Agate (mcq)	Quartz crystal	Sum
H1	1	5	15	21
H2	1	4	4	9
H3	0	6	9	15
H4	0	29	12	41
H5	0	16	2	18
Sum	2	60	42	104

Table 4.3.1-4 Burin base width, Qt.

	H1	H2	H3	H4	H5	**Total**
Number	57	26	16	35	12	146
Average width (mm)	11	12	12	14	14	12
Std. dev.	1.8	1.7	1.5	2.1	2.1	2.2

Table 5.3.3 Dwelling floor sizes, Saqqaq Culture.
Across: the estimated width between the inner side of the tent ring along the longitudinal axis of the midpassage or from entrance through center of box hearth; Length: the estimated width at right angles to the 'across' measurement between the inner side of the tent ring or outer edge of platform.

	Across (m)	**Length (m)**	**Est. total floor area (sq. m)**	**Remarks**
Dwelling A8, Qeqertasussuk	3.5	6.0	16–18	Oval floor
Structure III, Tupersuai	4.0	4.8	15–17	Oval floor
Structure A, Nunnguaq	5.0	5.6	23–25	Oval floor
Structure B1, Nunnguaq	4.5	6.5	24–26	Oval floor
Akia	4.0	7.0	24–26	Oval floor. Measures estimated by excavator
Structure II, Niivertussannguaq	4.5	4.5	16–18	Probably circular floor. Measures estimated by excavator
Structure V, Tupersuai	4.5	4.5	16–18	Probably circular floor. Measures estimated by excavator

Table 5.4.1-1 Frequencies of lithic artifacts, Area C and Area B, H1-H5.

All lithic artifacts (number)

	Area C						**Area B**					**Area C and B**
Horizon	1	2	3	4	5	**Total**	1	1/3	2/3	4/5	**Total**	**Total**
Type 1	14	5	9	20	6	54	1		1	5	7	61
2 (flakes)	4182	3045	1365	1478	777	10847	1	41	131	328	501	11348
2 (microblades)	21	9	15	41	18	104		1	1	19	21	125
3	121	77	42	65	27	332	1	3	13	28	45	377
5	8	5	2	2	1	18				1	1	19
6	102	45	24	52	22	245			1	31	32	277
7	1		1	2		4					0	4
8	15	15	6	10	2	48		1	4	3	8	56
9	27	12	2	16	8	65	1		2	10	13	78
10	5	3	1			9					0	9
11		1	1	1		3				2	2	5
12	1	2	4	3		10				3	3	13
13	83	68	56	85	16	308		1	4	23	28	336
14			1		1	2					0	2
15			2			2			1	4	5	7
16	26	32	21	27	10	116			2	5	7	123
17	4	5	2	2		13			1	1	2	15
19		1				1					0	1
20				1		1					0	1
21	6		1	1	1	9					0	9
22	5	8	2	2		17		1			1	18
23	9	3	4	7	1	24			1	2	3	27
24	4	4	6	2		16			1	5	6	22
25				3		3			1		1	4
998											0	0
999	11					11			3	7	10	21
Total	4645	3340	1567	1820	890	12262	4	48	167	477	696	12958

1: Flake core; 2: Flake or microblade; 3: Bifacial end blade; 5: Unifacial blade; 6: Burin; 7: Burin with more than two polished facets; 8: End scraper; 9: Side scraper; 10: Drill/bodkin; 11: Saw; 12: Adze/Chisel; 13: Flake with retouched or serrated edge; 14: Multifunctional tool; 15: Fire-making tool; 16: Grinding and polishing tool; 17: Hammerstone; 19: 'Bola-stone'(?); 20: Lamp; 21: Various tools; 22: Blank; 23: Raw material; 24, 25, 998, 999: Various worked stones.

Table 5.4.1-2 Frequencies of lithic tools (incl. microblades), Area C and Area B, H1-H5.

All lithic tools (number)

	Area C						**Area B**					**Area C and B**
Horizon	1	2	3	4	5	**Total**	1	1/3	2/3	4/5	**Total**	**Total**
Type 2 (microblades)	21	9	15	41	18	104		1	1	19	21	125
3	121	77	42	65	27	332	1	3	13	28	45	377
5	8	5	2	2	1	18				1	1	19
6	102	45	24	52	22	245			1	31	32	277
7	1		1	2		4					0	4
8	15	15	6	10	2	48		1	4	3	8	56
9	27	12	2	16	8	65	1		2	10	13	78
10	5	3	1			9					0	9
11		1	1	1		3				2	2	5
12	1	2	4	3		10				3	3	13
13	83	68	56	85	16	308		1	4	23	28	336
14			1		1	2					0	2
15			2			2			1	4	5	7
16	26	32	21	27	10	116			2	5	7	123
17	4	5	2	2		13			1	1	2	15
Total	414	274	180	306	105	1279	2	6	29	130	167	1446

Lithic tools. Percent within each horizon, Area C

Horizon	1	2	3	4	5
Type 2 (microblades)	5	3	8	13	17
3	29	28	23	21	26
5	2	2	1	1	1
6	25	16	13	17	21
7	0	0	1	1	0
8	4	5	3	3	2
9	7	4	1	5	8
10	1	1	1	0	0
11	0	0	1	0	0
12	0	1	2	1	0
13	20	25	31	28	15
14	0	0	1	0	1
15	0	0	1	0	0
16	6	12	12	9	10
17	1	2	1	1	0
Total	100	100	100	100	100

Table 5.4.1-3 Frequencies of selected bifacial end blades, Area C, H1-H5.

Bifacial end blades, Area C (number)

Horizon		1	2	3	4	5	**Total**	
Type	003 0100–0499	12	4	3	14	5	38	Bif. knives
	003 0500–0999	8	3	5	2	3	21	Large symm. endbl.
	003 1000–1199	14	8	2	3	2	29	Arrow heads
	003 1200–1399	15	10	6	18	3	52	Harpoon points
	Total	49	25	16	37	13	140	

Bifacial end blades, Area C (percent within each horizon)

Horizon		1	2	3	4	5	
Type	003 0100–0499	24	16	19	38	38	Bif. knives
	003 0500–0999	16	12	31	5	23	Large symm. endbl.
	003 1000–1199	29	32	13	8	15	Arrow heads
	003 1200–1399	31	40	38	49	23	Harpoon points
	Total	100	100	100	100	100	

Table 7.4.2

Definitions of plateaus and wiggles important to the analyses of the timing of events during the Early ASTt period. Deduced from the high precision calibration curve presented by OxCal v. 3.10 (Reimer et al. 2004).

	Period BP	**Time span (rad. carb. years)**	**Period BC**	**Time span (cal. years)**
Plateau A	4560–4440	120	3360–3100	260
Plateau B	4440–4350	90	3100–2920	180
Plateau C	4200–4060	140	2880–2580	300
Wiggle I	4060–3980	80	2580–2470	110
Plateau D	3980–3840	140	2470–2290	180
Plateau E	2550–2400	150	790–400	390
Wiggle II	2260–2150	110	370–190	180

Table 7.4.3-1 Saqqaq culture dates earlier than 3.800 BP. Screened radiocarbon dates.

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
Ua-2166	Qivittup nuua, Sisimiut, W. Greenland	charcoal (Betula nana)	4010	90		Kramer 1996a
K-6090	Ikerasak, Disko Bay, W. Greenland	charcoal (Salix sp. / Bet. nana)	3980	70	-25.4	Jensen 2006
KIA-30916	Narsatsiaq, Nuuk, W. Greenland	charcoal (twigs of Empetrum)	3890	23		Appelt (unpubl.)
K-4566	Qeqertasussuk, Disko B. W. Greenland	turf and twigs	3880	85	-22.5	Meldgaard 2004 This volume
TO -1556	Bight Site, F2, Ellesmere Isl.	Bone (Ovibus moschatus)	3840	70		Schledermann 1990

Table 7.4.3-2 Independence I culture dates earlier than 3800 BP. Screened radiocarbon dates.

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
S-2214	West Wind, Ellesmere Isl.	charcoal (Salix sp.)	4055	80		Sutherland 1996, Can. Arch. Rad. Carb.
AAR-1184	Røde Hytte, Scoresby Sund	charcoal (Salix arctica)	4030	90		Sandell & Sandell 1996, Tuborg & Sandell 1999
AAR-1182	Røde Hytte, Scoresby Sund	charcoal (Salix arctica)	4000	75		Sandell & Sandell 1996, Tuborg & Sandell 1999
TO-994	Camp View, F. 2, Ellesmere Isl.	charcoal (Salix sp.)	3990	70		Schledermann 1990
K-938	Pearylandville, 24, Pearyland	charcoal (Salix sp.)	3950	120		Grønnow & Jensen 2003, Knuth 1984
AAR-18512	Silja Ø, LB 21, C, NE Greenland	Charcoal (twigs from Salix arctica)	3946	25	-26.6	Jensen (unpubl.)
TO-993	Lakeview, F. 30, Ellesmere Isl.	charcoal (Salix sp.)	3940	70		Schledermann 1990
K-1260	Kettle Lake S, M-3, Ellesmere Isl.	charcoal (Salix arctica)	3930	130		Grønnow & Jensen 2003, Knuth 1984
K-5075	Kettle Lake N, 4, Ellesmere Isl.	bone (Ovibus moschatus)	3920	85	-18.9	Grønnow & Jensen 2003
K-928	Portfjeldet 1, Pearyland	charcoal (Salix sp.)	3890	120		Grønnow & Jensen 2003, Knuth 1984
K-3366	Solbakken 2 B, Hall Land	bone (Ovibus moschatus)	3870	85	-18.8	Grønnow & Jensen 2003, Sørensen 2012a
K-929	Portfjeldet 2, Pearyland	charcoal (Salix sp.)	3860	120		Grønnow & Jensen 2003, Knuth 1984
K-4497	Deltaterrasserne 14, Pearyland	bone (Ovibus moschatus)	3850	90	-18.6	Grønnow & Jensen 2003
K-939	Pearylandville, 10a, Pearyland	charcoal (Salix sp.)	3840	120		Grønnow & Jensen 2003, Knuth 1984
K-4498	Detaterrasserne 12, Pearyland	bone (Ovibus moschatus)	3840	85	-19.6	Grønnow & Jensen 2003
K-3364	Midternæs, 6, Pearyland	bone (Ovibus moschatus)	3830	85	-19.3	Grønnow & Jensen 2003, Knuth 1984
I-11757	West Wind, Ellesmere Isl.	charcoal (Salix sp.)	3830	95		Sutherland 1996, Can. Arch. Rad.Carb.
K-1261	Kettle Lake S, T-3, Ellesmere Isl.	charcoal (Salix arctica)	3810	130		Grønnow & Jensen 2003, Knuth 1984

Table 7.4.3-3 Pre-Dorset culture dates earlier than 3.800 BP. Screened radiocarbon dates.

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
AA-40591	DCA-188b, Victoria Island	charcoal (Salix sp.)	4557	45		Savelle & Dyke 2002
AA-61958	OcLb-6-F6, Western Boothia Peninsula	bone (caribou or musk ox)	4486	62	-16.32 (high!)	Savelle & Dyke 2009
UCI-AMS-30358	NfNg-9 –F4, Kent Peninsula	charcoal (Salix sp.)	4415	20		Dyke & Savelle 2009
AA-40576	DCA-26, Victoria Island	charcoal (Salix sp.)	4247	51		Savelle & Dyke 2002
AA-40577	DCA-35a, Victoria Island	charcoal (Salix sp.)	4237	43	-26.2	Savelle & Dyke 2002
UCI-AMS-43960	OfJo-24-F3, Gulf of Boothia	charcoal (Salix sp.)	4230	15	-24.5	Dyke et al. 2011
AA-40587	DCA-151a, Victoria Island	charcoal (Salix sp.)	4216	51		Savelle & Dyke 2002
AA-40863	DCA-175a, Victoria Island	charcoal (Salix sp.)	4197	41	-25.8	Savelle & Dyke 2002
UCI-AMS-30371	NjLg-25-F2, King William Island	charcoal (Salix sp.)	4195	15		Dyke & Savelle 2009
AA-41518	NhPl-2, Victoria Island	charcoal (Salix sp.)	4172	58	-25	Can. Arch. Radiocarb. Database
AA-61366	OcLb-1-F1, Western Boothia Peninsula	bone (caribou)	4164	58	-15.62 (high!)	Savelle & Dyke 2009
AA-40584	OdPc-26, Victoria Island	charcoal (Salix sp.)	4163	45	-25.2	Can. Arch. Rad. Carb. Database
AA-40585	DCA-146a, Victoria Island	charcoal (Salix sp.)	4154	45	-26.3	Savelle & Dyke 2002
AA-40586	DCA-150, Victoria Island	charcoal (Salix sp.)	4133	42	-26	Savelle & Dyke 2002
UCI-AMS-30372	NjLg-33-F6, King William Island	charcoal (Salix sp.)	4110	15		Dyke & Savelle 2009
UCI-AMS-30367	NhLa-14-F1, King William Island	charcoal (burnt bark from Salix sp.)	4100	15		Dyke & Savelle 2009
UCI-AMS-30359	NfNg-17, Kent Peninsula	charcoal (Salix sp.)	4070	15		Dyke & Savelle 2009
Beta-171162	NiHf-57, Igloolik Island	bone (Goose)	4020	40		Can. Arch. Rad.Carb. Database
AA-40850	DCA-30b, Victoria Island	charcoal (Salix sp.)	3973	42		Savelle & Dyke 2002
AA-41515	DCA-186a, Victoria Island	charcoal (Salix sp.)	3971	46		Savelle & Dyke 2002
AA-40861	DCA-146c, Victoria Island	charcoal (Salix sp.)	3970	42		Savelle & Dyke 2002

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
UCI-AMS-30356	NfNg-6-F1, Kent Peninsula	charcoal (Salix sp.)	3960	15		Dyke & Savelle 2009
S-2484	QkHn-13, Devon Island	bone (caribou or musk ox)	3930	95	-20	Helmer 1991
UCI-AMS-30363	NfNf-10-F1, Kent Peninsula	charcoal (Salix sp.)	3925	15		Dyke & Savelle 2009
AA-40578	DCA-92a, Victoria Island	charcoal (Salix sp.)	3911	42	-26.2	Savelle & Dyke 2002
UCI-AMS-30365	NfNh-3-F2, Kent Peninsula	charcoal (Salix sp.)	3910	15		Dyke & Savelle 2009
AA-41498	DCA-30a-1, Victoria Island	charcoal (Salix sp.)	3859	45		Savelle & Dyke 2002
UCI-AMS-71591	OaHt-7-F3, Gulf of Boothia	charcoal (Salix sp.)	3835	20		Dyke et al. 2011
UCI-AMS-53269	OaHu1-F3, Gulf of Boothia	bone (caribou or musk ox)	3810	20	-18.5	Dyke et al. 2011
UCI-AMS-42206	OfJc-24-F4, Gulf of Boothia	bone (caribou or musk ox)	3805	15	-18.1	Dyke et al. 2011
AA-40854	DCA-36, Victoria Island	charcoal (Salix sp.)	3804	41		Savelle & Dyke 2002

Table 7.4.4-1 Saqqaq culture dates from sites in West Greenland, later than 3200 BP. Screened radiocarbon dates.

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
	Disko Bay					
T-12917	Niivertussannguaq, F II, Disko B.	charcoal (Salix sp. and ericales)	3160	85	-26.1	Jensen 2006
K-518	Niaqornaarsuk, Disko Bay	charcoal (Betula nana)	2760	100		Jensen 2006
K-3894	Qajaa, Disko Bay	Herbal peat	2700	75		Jensen, this volume
	Sisimiut Area					
K-5193	Angujaartorfik, Sisimiut	Bone (caribou)	3190	75	-17.6	Kapel 1996
K-6198	Nipisat, Sisimiut	charcoal (Salix sp. and Betula nana)	3180	125		Gotfredsen & Møbjerg 2004
AAR-3570	Nipisat, Sisimiut	Bone (caribou)	3085	45		Gotfredsen & Møbjerg 2004

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
AAR-3572	Nipisat, Sisimiut	Bone (caribou)	3065	40		Gotfredsen & Møbjerg 2004
AAR-4158	Nipisat, Sisimiut	Bone (caribou)	3060	45		Gotfredsen & Møbjerg 2004
AAR-3571	Nipisat, Sisimiut	Bone (caribou)	3040	50		Gotfredsen & Møbjerg 2004
AAR-4160	Nipisat, Sisimiut	Bone (caribou)	3025	40		Gotfredsen & Møbjerg 2004
K-6459	Nipisat, Sisimiut	Bone (caribou)	3010	95		Gotfredsen & Møbjerg 2004
AAR-6987	Nipisat, Sisimiut	Bone (caribou)	2975	45		Gotfredsen & Møbjerg 2004
AAR-3573	Nipisat, Sisimiut	Bone (caribou)	2950	50		Gotfredsen & Møbjerg 2004
K-5584	Nipisat, Sisimiut	Bone (caribou)	2940	80		Gotfredsen & Møbjerg 2004
K-6193	Nipisat, Sisimiut	Bone (caribou)	2920	85		Gotfredsen & Møbjerg 2004
K-6460	Nipisat, Sisimiut	Bone (caribou)	2910	60		Gotfredsen & Møbjerg 2004
K-5864	Nipisat, Sisimiut	Bone (caribou)	2860	80		Gotfredsen & Møbjerg 2004
AAR-4159	Nipisat, Sisimiut	Bone (caribou)	2835	40		Gotfredsen & Møbjerg 2004
AAR-3575	Nipisat, Sisimiut	Bone (caribou)	2815	45		Gotfredsen & Møbjerg 2004
K-6194	Nipisat, Sisimiut	Bone (caribou)	2670	85		Gotfredsen & Møbjerg 2004
AAR-3574	Nipisat, Sisimiut	Bone (caribou)	2455	50		Gotfredsen & Møbjerg 2004
	Nuuk Area					
K-1193	Itinnera, Nuuk	charcoal (Salix sp. and Betula nana)	3140	120		Jensen 2006
K-588	Itinnera, Nuuk	charcoal (Junipe-rus sp.)	2960	110		Jensen 2006

Table 7.4.4-2 Dates from Greenlandic Dorset sites in West and South Greenland. Screened radiocarbon dates.

Lab. No.	Site name	Material	BP	+/-	Delta 13C	Ref.
Ka-6992	Kangerlussorissunnguup Kangia C, Disko Bay	charcoal (Salix sp.)	2680	40	-25.4	Jensen 2006
AAR-8408	Kangerlussorissunnguup Kangia, Disko Bay	charcoal (Betula nana)	2535	30	-24.5	Jensen 2006
AAR-2351	Annertusuaqqap Nuua, Disko Bay	charcoal (Betula nana, Salix sp.)	2530	75	-23.4	Jensen 2006
Ka-6991	Innartalik, Disko Bay	charcoal (Salix sp.)	2490	45	-25.8	Jensen et al. 1999
KIA-25371	Itilleq (Layer 5), Cape Farewell area	charcoal (Betula nana)	2475	25	-26.0	Raahauge et al. 2005
AAR-2343	Annertusuaqqap Nuua, Disko Bay	bone (caribou)	2460	70	-18.7	Jensen 2006
K-3055	Saattorsuaq, Sq. B, Sisimiut	charcoal (Betula nana, Salix sp.)	2420	75	-23.7	Kramer 1996a
K-3770	Sermermiut, Disko Bay	herbal peat	2370	70	-24.1	Møbjerg 1986
AAR-8410	Nerukinnera 52/205: 2 Disko Bay	charcoal (Betula nana)	2310	30	-25.7	Jensen 2006
Ua-2165	Tasilik, Sisimiut	charcoal (Salix sp.)	2310	90		Kramer 1996a
K-3769	Sermermiut, Disko Bay	herbal peat	2260	70	-25	Møbjerg 1986
AAR-8411	Nerukinnera 50/200: 3 Disko Bay	charcoal (Betula nana)	2230	45	-26.9	Jensen 2006
AAR-2350	Orpissoq, West, Disko Bay	bone (caribou)	2200	65	-18.0	Jensen 2006
AAR-2709	Orpissoq East, Disko Bay	bone (caribou)	2175	55	-17.8	Rasch & Jensen 1997
AAR-8409	Umiartorfik 99/91: 3, Disko Bay	charcoal (Betula nana)	2170	30	-26.8	Jensen 2006
K-3771	Saqqaq East	herbal peat	2160	70	-23.8	Møbjerg 1986
K-3152	Aasivissuit, Sisimiut	bone (caribou)	2150	75	-18.7	Grønnow et al. 1983
K-3898	Qajaa, Disko Bay	herbal peat	2150	75	-25.1	Jensen, this volume
KIA-25372	Itilleq (Layer 6), Cape Farewell area	charcoal (Betula nana)	2131	39	-27.4	Raahauge et al. 2005

Appendices

Appendix A

Catalogue of Worked Skin Fragments from Qeqertasussuk

by Anne Lisbeth Schmidt

Introduction

The skin finds

Fragile skin fragments with and without pelage were found in the permanent frozen midden at Qeqertasussuk (Qt) during the excavations from 1984 to 1987. Skins with remaining pelage were easily identified by eye as seal, caribou and other species, including birds. Some fragments had clearly cut edges, and on some of these fragments relatively coarse sewing with two parallel Z-twisted threads of sinew remained. The type of sewing indicated that these fragments did not originate from items of clothing. Also a small heap of skin scraps, possibly leftovers from production of clothing or equipment, was found. Among the small items were sealskin straps with knots, a caribou skin fragment with sewing, bird and Arctic hare skin fragments, as well a loose thread of sinew.

However, the most remarkable find was the fragment of a piece of footwear, with remains of the sole and part of the upper, and with holes from sewing still present, as well as the twisted sinew thread mentioned above. The skin had the flesh side turned outwards, which suggested that the footwear was probably the foot of a stocking,[1] since it was obviously worn with the hair side turned inwards.

Prior conservation treatment and analyses

In 1987 the skin fragments were sent to the Danish National Museum's conservation department for treatment, where conservator Gerda Møller (1920–2003) took care of the finds. The skin materials, which were often permeated by grass turf from the excavation site, were thoroughly cleaned using tweezers, brush and distilled water (Møller 1991: 145). Some especially fragile fragments were also excavated at the conservation laboratory. Samples for further analyses[2] were taken from the fragment and stored in acetone (Møller 1987). After cleaning, the skin materials were stabilized and freeze-dried (Møller 1991: 146). The stabilization method consisted in soaking the specimens in a 10% solution of polyethylene glycol (PEG 400) in water, followed by freeze-drying in four to five hours (Møller 1987). This conservation method prevented shrinking and drying of the skin, and made it possible to handle and examine the fragments.

After conservation, macroscopic identification of sealskin, caribou skin, bird skin, etc., was conducted by studying the hair or feather still attached to the skin material. Furthermore, identification of individual seal species was attempted by analyses of various amino acids. However, these analyses failed because of the degradation of the skin (Møller 1991: 146). The skin fragments were documented by means of black-and-white photography and in some cases tracing to transparent plastic sheets. Along with the other finds from the site, the foot of the stocking was transferred to Qasigiannguit Museum, where they are stored and exhibited.

Recent analyses

Prior to the final return of the remaining skin fragments to Greenland, the fragments were reanalysed in 2013 at the National Museum of Denmark by means of a systematic documentation method, which had recently been devel-

1 In previous literature it was named 'kamik' (Møller 1991). 'Kamik' seems misleading here, since the Inuit word is often connected with boot or outer footwear.

2 Samples were sent to the Botanical Laboratory (identification of plant material) and to Rigshospitalet in Copenhagen (amino acid analysis).

oped and used for the identification of prehistoric Danish bog skin from the Iron Age as well as for historic Arctic skin clothing (Jensen *et al.* 2013; Schmidt *et al.* 2011).

The new documentation methods were adapted to the Qt skin fragments. This included tracing of outline, identification of species, sewing and thread, and traces of tool marks, as well as high definition digital photography (photos by Roberto Fortuna) and X-ray photography:

- The outline of each skin fragment was traced to a plastic sheet, for identification purposes. The tracing served as documentation for sewing, traces from tools, etc. Sampling spots were marked with red for hair samples, green for thread samples. It was noted from which side the tracing was made (hair side or flesh side of skin).
- Mammal skins were identified macroscopically to species level by studying the present pelage on hairy skins. On skin without pelage (where epidermis or dermis was revealed), where remaining marks from hair follicles showed distinct species-specific grain patterns, the grain surface was studied. If the skin's upper layer, the epidermis, was destroyed, identification by the naked eye was difficult.
- The macroscopic recognition of skin with pelage was verified by means of microscopy of hair, if possible with intact skin connection. Mounted[3] hair strays were studied by means of optical microscopy, 100x–400x magnification, and digitally photographed. The structure of the hair was described according to Wildman (1954) and compared to various reference atlases as well as photo material of hair collected for the research project 'Skin Clothing from the North 2009–2013'. Attempts were made to determine a limited number of skin fragments to species level by means of aDNA analyses. Thickness of skin was measured with a gauge measurer.
- Sewing techniques were identified by observation with the naked eye, e.g. overcast sewing and running stitch. The number of stitches per 10 cm was counted.

  The thread was macroscopically identified with regards to material (sinew, skin, hair, etc.). Determinations were verified by means of microscopy. Minute amounts of thread material were sampled from thread ends. An attempt to identify a number of threads to the level of species by means of aDNA analyses was made.[4] It was determined whether the sewing was primary or secondary (from later repair). Also thread thickness, the existence of twisting or plaiting, as well as knots and thread ends, etc., were documented. Mounted[5] thread material was studied by means of optical microscopy, 100x–400 × magnification, and digitally photographed.
- Tool marks were searched for and identified, 1) on the grain and flesh side of the skin (i.e. scraping marks from blunt or sharp tools used during the skin processing), 2) at the edges of the skin pieces (i.e. cut with sharp tool), and 3) in sewing holes (i.e. holes punched with pointed tools). Digital photography and X-ray photography was also used for identification of tool marks.
- The condition of the fragments was estimated with regards to skin's cohesiveness and loss of hair and surface.

3 Mounting media Pertex.
4 These analyses failed.
5 Mounting media Pertex.

Catalogue

Skin fragments with sewing and traces from production. Inventory number 20/19: 46, Fragments A–G.

Previous analysis

Møller (1991: 147) describes the fragments as originally one large skin piece, apparently deriving from a tent, a sleeping platform cover or a bag. Measurement c. 150 × 50 cm, obviously of sealskin with some pelage left. Showing a 30 cm long sewing with coarse thread of twisted sinew. The sewing was performed with regular stitching. Edges of skin were cut with a sharp tool. Flesh side of skin shows marks from scraping, possibly in connection with initial skin processing. Due to the fragile condition of the skin, this piece was fragmented during excavation.

Summary of recent analyses

Seven skin fragments (A–G), of which the majority is from seal, have remaining pelage. Two fragments (A, F) (Fig. 1, Fig. 2, Fig. 3, Fig. 6) contain meticulous and accurate sewing in overcast stitch, which is sewn from the flesh side of the skin, forming a rolled seam. The thread consists of two parallel Z-twisted threads of sinew, varying from 1.4 to 1.6 mm in diameter, and the number of stitches per 10 cm varies from 13 to 18. One fragment (B) contains sewing holes without thread (Fig. 4).

The skin thickness varies from 0.7 to 1.8 mm, and the variation is due to the depilating and splitting epidermal layer. There are traces from tools, 1) used for skin processing on the flesh side (Fragments A, B, C, E, F) (Fig. 5), 2) from the cutting of edges (Fragment A), and 3) possibly from a sharp-pointed tool used for punching or cutting holes in the skin in order to facilitate a regular stitching (Fragment A).

The obviously originally thick sealskin, with its coarse sewing, indicates that the skin was not used for clothing, but could have been used as a cover, e.g. a tent, a platform skin or perhaps a bag. The sewing is clearly not watertight, indicating that the skin was not used as a vessel.

App. A, Fig. 1 *Sealskin fragment (20/19: 46, Fragment A), perhaps from a tent or bag. Hair side has partly preserved pelage and loss of epidermal layer. Sewing is hardly visible from hair side.*

App. A, Fig. 2
Flesh side of 20/19: 46, Fragment A, showing faint, parallel marks from a tool which was used for scraping off blubber and meat. One edge is cut with a sharp tool. Sewing with two parallel Z-twisted threads of sinew c. 1.4 mm thick, with accurate overcast stitches 13 per 10 cm. Sewing holes perhaps pre-punched with pointed tool.

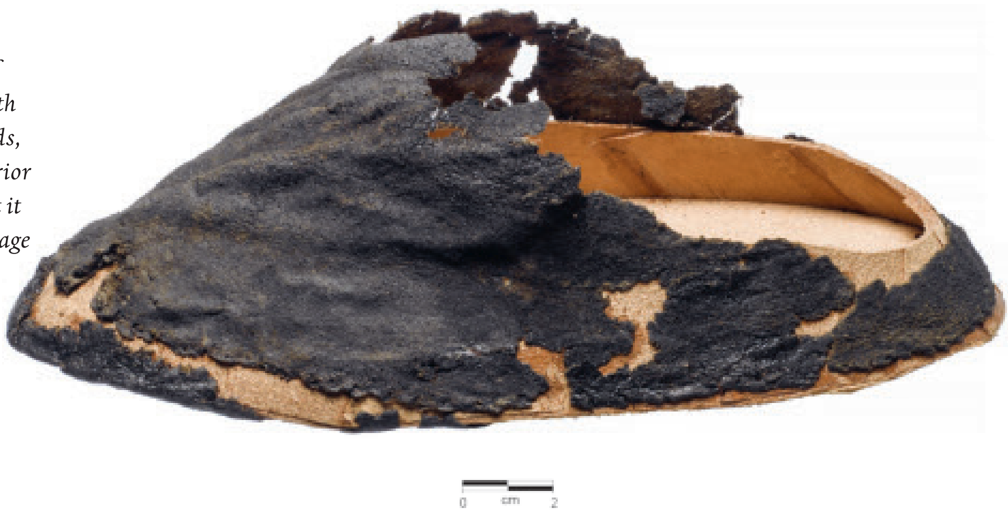
App. A, Fig. 3
Detail of sewing on the specimen 20/19: 46, Fragment A.

App. A, Fig.4
Sealskin fragment (20/19: 46, Fragment B), perhaps from a tent or bag. Hair side with pelage loosened from skin and flaking epidermal layer. Holes left from sewing, 16 stitches per 10 cm.

App. A, Fig. 5
Detail of sealskin fragment (20/19: 46, Fragment C), perhaps from a tent or bag. Flesh side shows parallel marks, probably from a tool which was used for scraping off blubber and meat. Network of collagen fibres is visible.

App. A, Fig. 6
Seal and caribou skin scraps (20/19: 46, Fragments F), perhaps from a tent or bag. Hair side shows some intact pelage and flaking epidermal layer. Two scraps have sewing with two parallel Z-twisted threads of sinew c. 1.6 mm thick, with overcast stitches 18 per 10 cm.

App. A, Fig. 7
Sealskin fragment (19/20: 72). Hair side with some pelage and intact epidermal layer. Sewing with two parallel Z-twisted threads of sinew 1.1–1.6 mm thick, with overcast stitches 18 per 10 cm. Sewing holes possibly punched with pointed tool. Sewn edges cut with sharp tool. Inventory number Qt 87, Fragment with sewing.



App. A, Fig. 8
Fragmented stocking of sealskin (20/19: 92) with hair side turned inwards, from the side. Due to prior conservation treatment it is not clear whether pelage is preserved. The sole is sewn to the vamp with tucked overcast stitches with twisted sinew thread c. 1.3 mm thick.

App. A, Fig. 9
Fragmented stocking of sealskin (20/19: 92), with hair side turned inwards, from the sole.

Summary of analyses performed

20/19: 46 Fragments A, B, C, D, E, F and G.	**Description**	**X-ray of fragment**	**Hair micro-scopy, id. no.**	**Thread micro-scopy, id. no.**	**Cross section of hair, id. no.**
Fragment A	Skin, 29 cm long sewing. Trace from tool	X	X	X	
Fragments B	Skin, with sewing holes. Trace from tool		X		X
Fragment C	Skin without sewing. Trace from tool		X		
Fragment D	Skin without sewing. Trace from tool		X		
Fragment E	Skin without sewing. Trace from tool		X		
Fragments F	Skin scraps, two with sewing. Trace from tool		X	X	
Fragment G	Skin without sewing. Trace from tool		X		

20/19: 46, Fragment A. Skin, 29 cm long sewing. Traces from processing.
Height 16 cm × length 35 cm.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	Sinew, Z-twisted
Species identification, microscope	Seal (Phocidae) Id. no. A and B	Material identification, microscope	Collagen
Skin thickness (mm)	1.30, 1.45, 1.70, 0.69	Thread diameter (mm)	1.44, 1.35, 1.46
Hair length (cm). Colour	A and B: 1.0–1.5 (guard hair). Black	Sewing. Number of stitches	Overcast, sewn from flesh side. 13 stitches per 10 cm. 29 intact stitches
Trace from tool		**General condition**	
Description	Sewing holes punched with stylus? Regular sewing holes with 8.27, 8.00, 8.27 mm between each sewing hole	Description	Some intact pelage as well as de-haired areas and loss of epidermis. Cohesive condition

20/19: 46, Fragments B. Skin, without sewing. Traces from processing.
Height 15 cm × length 17 cm.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	Seal (Phocidae) Id. no. A (cross section of hair incl.)	Material identification, microscope	—
Skin thickness (mm)	0.66, 0.70, 0.80	Thread diameter (mm)	—
Hair length (cm). Colour	A: 1.2–1.5 (guard hair) Black	Sewing. Number of stitches	Holes from sewing, without thread. 16 stitches per 10 cm
Trace from tool		**General condition**	
Description	Cut made with sharp tool. Scraping marks from skin preparation on flesh side?	Description	Pelage loosened from skin, flaking epidermis. Visible collagen fibre network

20/19: 46, Fragment C. Skin, without sewing. Traces from processing.
Height 18 cm × length 18 cm.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	Seal (Phocidae) Id. no. A	Material identification, microscope	—
Skin thickness (mm)	1.26, 1.30, 1.29	Thread diameter (mm)	—
Hair length (cm). Colour	A: 1.5 (guard hair). Black	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Scraping marks from skin preparation on flesh side?	Description	Loosened pelage, flaking epidermis. Visible collagen fibre network. Vegetable fibres at surface. Salt deposits(?) on surface

20/19: 46, Fragment D. Skin without sewing. Traces from processing.
Height 20 cm × length 22 cm.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	Seal (Phocidae) Id. no. A	Material identification, microscope	—
Skin thickness (mm)	1.75, 1.65, 0.89	Thread diameter (mm)	—
Hair length (cm). Colour	A: 1.0 (guard hair) Brown	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Cut marks in skin	Description	Loosened pelage, epidermal layer partly damaged and dermis layer exposed. Obvious seal grain pattern from hair follicles. Visible collagen fibre network. Low cohesive condition

20/19: 46, Fragment E. Skin, without sewing. Traces from processing.
Height 34 cm × length 45 cm.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	Seal (Phocidae) Id. no. A	Material identification, microscope	—
Skin thickness (mm)	0.70, 0.70, 1.82	Thread diameter (mm)	—
Hair length (cm). Colour	A: 1.5–1.8 (guard hair) Black, brown. Wool hair?	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	On flesh side several lines close together. Is it scraping marks, from skin preparation?	Description	Some intact pelage. Depilating and flaking epidermis. Visible collagen fibre network

20/19: 46, Fragments F. Skin scraps, some with sewing. Traces from processing.
Not measurable.

Skin		**Thread**	
Species identification, macro	?	Material identification, macro	Id. no. A and B: Sinew, *Z*-twisted
Species identification, microscope	Id. no. A: Seal (Phocidae) Id. no. B and C: Caribou (*Rangifer tarandus*)	Material identification, microscope	Id. no. A and B: Collagen
Skin thickness (mm)	1.39, 1.43, 1.40, 1.60	Thread diameter (mm)	Id. no. A: 1.45–1.60 Id. no. B: 1.69–1.70
Hair length (cm). Colour	Id. no. A: 1.5. Black Id. no. B: 1.5. Light Id. no. C: 1.0–1.2. Light	Sewing. Number of stitches	Overcast, sewn from flesh side. Id. no. A and B: 18 per 10 cm. Number of intact stitches: 21 / 10 / 5
Trace from tool		**General condition**	
Description	Traces from sharp tool in sewing where thread A was sampled. Scraping tool marks on flesh side, from skin preparation?	Description	Depilation of epidermis. Some intact pelage. Fragments are not cohesive

20/19: 46, Fragment G. Skin without sewing.
Height 30 cm × length 46 cm.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	Id. no. A: Seal (Phocidae)	Material identification, microscope	—
Skin thickness (mm)	0.77, 1.00, 0.86	Thread diameter (mm)	—
Hair length (cm). Colour	1.5–2.0 (guard hair) and 1.5 (wool hair). Brown	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Cut marks from sharp tool.	Description	Some intact pelage and epidermis. Some exposed dermis

Head skin of seal, inventory number 19/20: 72

Previous analysis

The sealskin fragment was found near the fragmented large skin (20/19: 46 Fragments A–G), according to Møller (1991: 147). One side was cut, and on two sides were found traces of sewing with twisted sinew thread. An ellipsoid hole was assumed to be the seal's eyehole. The flesh side has many traces from scraping tools in different directions. Probably this fragment was sewn to an item of clothing.

Summary of new analyses

The above-described sealskin fragment was not identified. A sealskin fragment contained in the same find number showing a 29 cm long sewing with 24 intact overcast stitches was analysed (Fig. 7). The sewing was made with two parallel Z-twisted threads of sinew 1.1–1.6 mm thick. Perhaps a pointed tool had been used to prepunch holes for sewing. The sewing edges were cut with a sharp tool.

Qt 87 19/20: 72	Description	X-ray of fragment	Hair micro-scopy, id. no.	Thread micro-scopy, id. no.	Cross section of hair, id. no.
	Skin, 29 cm long sewing. Trace from tool	X	X	X	

19/20: 72, Fragment with sewing.
Height 7 cm × length 17 cm.

Skin		Thread	
Species identification, macro	Seal	Material identification, macro	Sinew, Z-twisted
Species identification, microscope	Id. no. A: Seal (*Phocidae*)	Material identification, microscope	Collagen Id. no. A
Skin thickness (mm)	1.30, 1.40, 1.40	Thread diameter (mm)	1.60, 1.10, 1.30
Hair length (cm). Colour	Id. no. A: 1.5–2.0 Black	Sewing. Number of stitches	Overcast, sewn from flesh side. 18 p 10 cm. 24 intact stitches
Trace from tool		**General condition**	
Description	Sewing holes punched with stylus?	Description	Some intact pelage and epidermis. Good cohesive condition. One small separate fragment

Collection of miscellaneous scraps, inventory number 20/19: 46

Previous analysis

Møller (1991: 147–48) describes how the small bundle of skins was excavated in the conservation laboratory. The small fragments from various animals as well as thread material looked largely like a small pile of waste or remains from sewing.

Summary of recent analyses

A number of skin scraps, some with sewing. The scraps were species identified by means of microscopy of hair to come from caribou, seal and Arctic hare. Most of the thin-scraped scraps had clear edges, cut with a sharp tool. It points to the assumption that this is waste from clothing sewing.

Below is a survey of the fragments, documented as 20/19: 46 (skin scraps). Numbers refer to the drawing in the main text (Fig. 3.119; Fig. 3.121).

20/19: 46 (skin)	Description	X-ray of fragment	Hair sampled	Thread sampled	Cross-section of hair, id. no.
Fragments 1	Skin straps, some with knots				
Fragments 2	Skin, without sewing. Trace from tool				
Fragment 3	Skin without sewing. Trace from tool		X		
Fragment 4	Skin without sewing. Trace from tool		X		X
Fragment 5	Skin with loose thread	X		X	
Fragments 6	Skin scraps, two with sewing	X			
Fragments 7	Skin with sewing	X			

20/19: 46, Fragment 1. Skin straps, some with knots.

Skin		Thread	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	—	Material identification, microscope	—
Skin thickness (mm)	—	Thread diameter (mm)	—
Hair length (cm). Colour	—	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Edges are cut	Description	Cohesive condition

20/19: 46, Fragment 2. Skin without sewing. Traces from processing.

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	—
Species identification, microscope	—	Material identification, microscope	—
Skin thickness (mm)	—	Thread diameter (mm)	—
Hair length (cm). Colour	—	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Edges are cut	Description	Cohesive condition

20/19: 46, Fragment 3. Skin without sewing. Traces from processing.

Skin		**Thread**	
Species identification, macro	Caribou	Material identification, macro	— ±
Species identification, microscope	B: Caribou (*Rangifer tarandus*)	Material identification, microscope	—
Skin thickness (mm)	0.65, 0.59, 0.60	Thread diameter (mm)	—
Hair length (cm). Colour	1.5. Light	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Edges are cut	Description	Cohesive condition

20/19: 46, Fragment 4. Skin without sewing. Traces from processing.

Skin		**Thread**	
Species identification, macro	Arctic hare	Material identification, macro	—
Species identification, microscope	A: Arctic hare? (*Lepus arcticus*)	Material identification, microscope	—
Skin thickness (mm)	0.77, 0.59, 0.60	Thread diameter (mm)	—
Hair length (cm). Colour	1.5. Light	Sewing. Number of stitches	—
Trace from tool		**General condition**	
Description	Edges are cut	Description	Cohesive condition

20/19: 46, Fragment 5. Skin with loose thread.

Skin		**Thread**	
Species identification, macro	Bird	Material identification, macro	Sinew, Z-twisted
Species identification, microscope	?	Material identification, microscope	Collagen
Skin thickness (mm)	—	Thread diameter (mm)	0.41, 0.37
Hair length (cm). Colour	—	Sewing. Number of stitches	Loose thread
Trace from tool		**General condition**	
Description		Description	Fragile condition

20/19: 46, Fragment 6. Skin with sewing

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	Sinew, Z-twisted
Species identification, microscope	—	Material identification, microscope	—
Skin thickness (mm)	—	Thread diameter (mm)	1.70, 2.21, 1.53
Hair length (cm). Colour	—	Sewing. Number of stitches	Overcast stitch sewn from hair side. Sewing holes without thread, 20 per 10 cm
Trace from tool		**General condition**	
Description		Description	Fragile condition. Depilated epidermis

20/19:46, Fragment 7. Skin with sewing

Skin		**Thread**	
Species identification, macro	Seal	Material identification, macro	Sinew, Z-twisted
Species identification, microscope	—	Material identification, microscope	—
Skin thickness (mm)	—	Thread diameter (mm)	1.35, 1.34
Hair length (cm). Colour	—	Sewing. Number of stitches	Overcast stitch. 3 per 2 cm
Trace from tool		**General condition**	
Description	—	Description	Fragile condition. Depilated epidermis

Stocking fragment, inventory number 20/19: 92

Previous analysis

Møller (1991: 51) compared the stocking foot to traditional historical footwear from Greenland. It has a bended sole, tucked and sewn to the upper with accurate stitches by means of a thin sinew thread. At the heel a small back piece is joined to the sides together. The skin is repaired at the vamp with thin sinew thread. The vamp has the hair side turned inwards. Inside the sole was what might have been an insulating lining of grass. Following conservation the stocking fragment was mounted on a leather support.

Summary of new analyses

The sewing is made with tucked overcast stitch, 3 per 2 cm, with Z-twisted thread of sinew c. 1.3 mm thick. The fragile condition of the stocking foot made further analysis problematic (Fig. 8; Fig. 9; Fig. 3.116). A digital surround-photo was made.

Qt 87 20/19: 92 stocking fragment	**Description**	**X-ray of fragment**	**Hair sampled**	**Thread sampled**	**Cross section of hair, id. no.**
		X	—	—	—

Skin	
Species identification, macro	Seal, hair side turned inwards
Species identification, microscope	—
Skin thickness (mm)	—
Hair length (cm). Colour	—

Thread	
Material identification, macro	Sinew, Z-twisted
Material identification, microscope	—
Thread diameter (mm)	1.35, 1.34
Sewing. Number of stitches	Overcast stitch. 3 per 2 cm

Trace from tool	
Description	—

General condition	
Description	Fragile condition. Depilated epidermis

Sample of hairs, inventory number Qt 87, Anlæg A8

Not analysed previously

Summary of recent analyses

The bundle of hair consists of thick hair from caribou. The diameter of the hair shows that the hair sample originates from an adult animal which was hunted in the autumn when the layer of hair is thickest.

Qt 87 Anlæg A8 Hair	Description	X-ray of fragment	Hair sampled	Thread sampled	Cross section of hair, id. no.
		-	X	-	X

Appendix B

Analyses of Faunal Materials from Qeqertasussuk, Area C, Horizon 4

by Anne Birgitte Gotfredsen

Methods

The bone material was analysed using the comparative collection at the Zoological Museum, National History Museum of Denmark (NHMD), University of Copenhagen. Except for tools and preforms the bone material is kept and stored at NHMD.

Each fragment was identified as regards taxon, bone element, side and part of the bone. All identifiable bone fragments were recorded without a lower size limit. For each bone a code for fragment type was applied, e.g. for long bones with proximal and distal ends, proximal and distal ends including more that 50% of the diaphysis, diaphyses lacking articular ends, fragments, and finally loose epiphyses. The fusion state of the proximal and distal ends of mammalian long bones was recorded. Within each quarter-square-metre unit all loose epiphyses which could be matched with their respective diaphysis were not counted, i.e., one long bone with loose epiphyses counted as one specimen.

Identification of taxon

Birds are, in comparison to mammals, very homogeneous, and comprise a large number of species which make some taxa difficult to distinguish at the species or even the generic level. Measurements of the avian bones can often facilitate species identification. However, due to time pressure no measurements were taken during identification of the bone material, which made it necessary to lump and classify some species to a higher taxonomic level. With respect to the procellarids, several reliable distinguishing features exist to separate them at the generic level (*Fulmarus* from *Puffinus*) (e.g. Lepiksar 1958). Although size may be taken as a general guideline for separation of common eider (*Somateria mollissima*) and king eider (*Somateria spectabilis*), they were classed together in the present study. The gull bones could to some extent be separated, based on size, between the larger glaucous gull (*Larus hyperboreus*) and the smaller Iceland gull (*Larus glaucoides*). However, fragments and bones of intermediate size had to be lumped together. The medium-sized alcids also pose some identification problems; although razorbill (*Alca torda*) and guillemots (*Uria* sp.) can fairly easily be separated, the two guillemots are almost inseparable (Gotfredsen 1999; Gotfredsen and Møbjerg 2004). Positive identification to Brünnich's guillemot (*Uria lomvia*) was made only on the maxillary and mandibula, whereas the postcranial material was identified no further than to genus.

Regarding the seal species differentiation between the bearded seal (*Erignathus barbatus*) and the hooded seal (*Cystophora cristata*) is possible by means of elements of the entire skeleton. Postcranial skeletal elements of the small seals (*Phoca* sp.), however, are difficult to identify due to overlap in size and a large degree of intra- and inter-specific variability. Therefore species-level identification of the phocid species was made on selected bone elements (auditory bulla, mandibula, humerus, ulna and femur) which exhibit diagnostic features. Fortunately auditory bullae, mandibles, and e.g. distal humeri are some of the densest and best preserved elements of the phocid skeleton (Lyman 1996) and are therefore often the elements used for MNI (Minimum Number of Individuals) calculations for seals.

Quantification

Most scholars agree on using NISP (Number of Identified Specimens) for the quantification of zooarchaeological assemblages and for the estimation of taxonomical abundance (Grayson 1984; Lyman 1996). MNI (Minimum Number of Individuals), although a derived measure, has been calculated in order to make the present analysis comparable with previous analyses of the animal bone material of the Qeqertasussuk site (see Meldgaard 2004). Likewise, nomenclature and taxonomic sequence of the species list is comparable to lists in Meldgaard 2004. The MNI was calculated by using the most frequently occurring bone element, taking side and part of the particular bone but not ontogenetic age into consideration. All recorded bird bones were from adults, whereas the majority of the seal bones derived from immature and subadult seals. For the majority of bird species the humerus was used, but for *Puffinus gravis* and *Somateria* sp. the ulna, and for *Gavia immer* the tarsometatarsus were used. For the mammal species the mandibula was used for *Lepus arcticus* and *Phoca hispida*, auditory bullae for *Phoca groenlandica*, scapula for *Erignathus barbatus*, metatarsus for *Rangifer tarandus* and finally humerus for *Alopex lagopus*.

Appendix B

Table 1 Frequencies of species, Area C, Horizon 4, at Qt.

Scientific name	Common name	NISP	%NISP	MNI	%MNI
PISCES	FISH				
Gadus morhua	Atlantic cod	14			
Pisces sp.	Fish, unspecified	3			
AVES	BIRDS				
Gavia immer	Great northern diver	7	0.3	2	0.6
Fulmarus glacialis	Fulmar	797	30.4	82	25.2
Puffinus gravis	Great shearwater	13	0.5	2	0.6
Anas platyrhynchos	Mallard	3	0.1	1	0.3
Somateria mollisima/spectabilis	Common/king eider	52	2.0	7	2.1
Anser/Branta sp.	Goose, unspecified	1	0.0	1	0.3
Lagopus mutus	Rock ptarmigan	95	3.6	21	6.4
Larus glaucoides	Iceland gull	40	0.0		0.0
Larus hyperboreus	Glaucous gull	129	0.0		0.0
Larus hyperboreus/glaucoides	Iceland/glaucous gull	157	0.0		0.0
Larus hyperboreus/glaucoides, total	Gulls, total	326	12.4	28	8.6
Alle alle	Little auk	96	3.7	24	7.4
Uria lomvia	Brünnich's guillemot	17	0.6		0.0
Uria lomvia/aalge	Brünnich's/Altantic guillemot	1139	43.4	146	44.8
Cepphus grylle	Black guillemot	56	2.1	9	2.8
Corvus corax	Common raven	23	0.9	3	0.9
Aves sp.	Bird, unspecified	1801			
MAMMALIA	MAMMALS				
Lepus arcticus	Arctic hare	22	0.3	2	2.0
Alopex lagopus	Arctic fox	513	6.7	24	24.5
Rangifer tarandus	Caribou	13	0.2	2	2.0
Phoca hispida	Ringed seal	240	3.2	32	32.7
Phoca groenlandica	Harp seal	229	3.0	34	34.7
Phoca sp.	Seal, unspecified	6575	86.5		0.0
Erignathus barbatus	Bearded seal	6	0.1	2	2.0
Cystophora cristatus	Hooded seal	1	0.0	1	1.0
Orcinus orca	Killer whale	1	0.0	1	1.0
Cetacea	Whale, unspecified	4	0.1		
Mammalia sp.	Mammal, unspecified	5128			
	Totals (identified)				
	Total mammals	7604	74.2		
	Total bird	2625	25.6		
	Total fish	14	0.2		
		10243	100		

Appendix C

Human Skeletal Remains From Qeqertasussuk: The Anthropology

by Bruno Frøhlich and Niels Lynnerup

Introduction

The identification of the Saqqaq site at Qeqertasussuk opens up the possibility of a major renewal of research into Palaeo-Eskimo cultures, not only in Greenland but in the entire Arctic area. The approximately 800-year time span (1900. to 1100 BC) during which the site was occupied (Grønnow 1994) covers all but a few hundred years of the Saqqaq culture (c. 2400 to 900 BC).

The four well-preserved human long bones from the midden at Qeqertasussuk are the first identified human remains in Greenland from the early Palaeo-Eskimo period. The biology of the Palaeo-Eskimos is practically unknown. The only known Palaeo-Eskimo remains are from the late Dorset period (Laughlin and Taylor 1960; Oschinsky 1960; Meldgaard 1960; Harp and Hughes 1968; Anderson and Tuck 1974; Lynnerup *et al.* 2003) and from a Pre-Dorset site on North Devon Island (Helmer and Kennedy 1986). In all, these finds have yielded the remains of approximately 26 individuals from ten different sites (Table 1). Physical anthropological analyses of these finds (of reasonably complete adult skeletal remains) have all indicated a clear Eskimoid morphology (Laughlin and Taylor 1960; Harp and Hughes 1958).

We present the results of the physical anthropological analyses of the human bones from Qeqertasussuk, along with a discussion of the possible mortuary practices of the Saqqaq people. Finally, since the bones were found in a midden, the absence of actual burials at the site is also addressed by presenting some tentative palaeodemograhic figures on the expected number of deceased.

The skeletal material

The skeletal material comprises fragments of four human long bones identified as: (1) an incomplete humerus; (2) two incomplete fibulae, and (3) one incomplete tibia (App. C, Figs. 1, 2 and 3). The bones were found in the thickest part of a midden deposit covering various archaeological levels (Grønnow 1994). The tibia and the two fibulae fragments were found close to each other in a layer dated to 1900–1700 BC, while the humerus fragment was found in a secondary deposit adjacent to the midden area (Grønnow 1994). The culture layers containing organic material of this deposit span the period 2400–*c.* 1600 BC.

Samples from the bones were submitted to the accelerator mass spectrophotometry (AMS) method, which showed good accordance with the midden layers (Table 2) (Rud and Heinemeier, pers. comm.). When corrected for the reservoir effect by 450 years, the average age for all three samples is approximately 2300 BC, indicating that the bones are more than 4,000 years old.

Morphological/anatomical description

The humerus

The humerus fragment was identified as the proximal part of the left humerus from an adult person (App. C, Fig. 1). The bone appeared significantly smaller when compared to other Eskimo humeri and the compact bone was relatively thin. The post-mortem fractures at the distal end may have occurred during the excavations, since the colour of the fracture line appears to be lighter than the surrounding bone. All exposed surfaces were dark coloured, i.e. medium to dark

App. C, Fig. 1
Fragment of humerus from Qt. Found on the beach close to the eroded northern front of Area B. (Photo by R. Fortuna).

brown colour, mixed with lighter areas, especially where the post-mortem damage has been more recent.

The tibia

The fragment consists of an almost complete diaphysis of a left tibia (App. C, Fig. 2). The distal and proximal ends were missing and the tuberosity of tibia had been damaged post-mortem. The soleal line was well developed. Medial interosseous and anterior borders were well pronounced with an edge 'sharper' than normally observed on Eskimo tibia.

The colour is medium to dark brown with approximately 5% to 10% of the surface covered by isolated groups of darker coloured pigments. The proximal medial surface appears slightly lighter in colour, while the posterior surfaces from the estimated midline toward the distal end are significantly darker.

Two circular areas, measuring 2 mm and 1 mm in diameter respectively and of a reddish colour, were observed 8 mm medial from the soleal

App. C, Fig. 2
Diaphysis of a left tibia from Qt, Area B. (Photo by R. Fortuna).

line and 26 mm proximal from the nutrient foramen's most distal distribution. The distance between the two spots was approximately 2 mm. The reddish colouring is typical of an iron-containing mineral, haematite, also known as 'red ochre'. SEM confirmed the compound being haematite (Hansen, pers. comm.). The origin of these areas on the bone is unknown. The other bones did not show any signs of haematite.

Fibulae I and II

The two fragments were identified as a fragmentary left (I) and a right (II) fibula. The two fibulae were similar in size and shape. The fibulae include diaphyses and distal lateral malleoli. The proximal ends were missing (App. C, Fig. 3).

The distal ends (lateral malleolus) were distinctively smaller when compared to similar anatomical areas from other Eskimo fibulae. The three borders (anterior, posterior and interosseous borders) were all extremely well marked and 'pointed', while the surfaces (especially the posterior surfaces) were deep and inversely curved. In general, the diaphyses were smaller than other Eskimo fibulae but yielded more and better (visually) developed borders and surfaces.

A significant curvature of the distal end of the fibulae started approximately 120 mm from the most distal point of the lateral malleolus.

App. C, Fig. 3
The two fibulae from Qt, Area B. (Photo by R. Fortuna).

Metric and non-metric observations

Only a few standard metric measurements could be recorded accurately. The locations of some landmarks were estimated (Table 3).

Microscopic observations

Cross sections with a thickness of between 100 microns and 150 microns were produced from one fibula and the tibia in order to compare the relative biological ages of the bones using age-related microscopic features. A complete cross section was produced of the fibula while only a small lateral section was produced of the tibia. A Buehler Isomet Low Speed Saw was used to make the thin sections.

X-ray examination

X-ray examination of the humerus showed a thin cortex with whitish spots indicating unspecific loss of calcium.

X-ray examination of the tibia showed normal cortical bone development including fine transverse lines, Harris lines, in the distal part of the bone. Similar Harris lines were found in the distal end of the fibulae.

Results

Racial affiliation

No accurate racial affiliation could be determined based on the morphological size and shape of the available skeletal material. The establishment of criteria for racial determination has focused on Caucasian and Negroid material, while little has been concluded on Eskimo and Aleut material. Walensky (1965) reported some trends in the curvature of the femur in Caucasians, Negroids and Mongoloid (North-American Indians and Eskimos), e.g. some curvature seems to be predominant in the Eskimos. However, since this curvature may have a genetic origin and changes with age, the use of curvature in racial affiliation may be somewhat inaccurate (Walensky 1965; Gilbert 1976). Because of the poor quantity of the Qeqertasussuk material and the lack of a relevant reference collection, it has not been possible to establish the racial affiliation.

Sex

The humerus fragment yielded one variable suitable for sexual classification, namely the circumference of the diaphysis midpoint (Table 3). Singh and Singh (1972) reported demarcating point for males as > 60.5 mm and females as < 44.1 mm. The recorded circumference of 61 mm may thus suggest a male. The maximum and minimum diameters of the Qeqertasussuk humerus, 21 mm and 17 mm (Table 3) are smaller than the two described Dorset humeri, both male, which measured 24 mm and 19 mm (Gargamelle Cove) and 26 mm and 20 mm (Imaha), respectively (Harp and Hughes 1968; Laughlin and Taylor 1958).

Numerous studies have been concluded on the sexual dimorphism in the tibia (Krogman and Iscan 1986), but little about the fibula. Iscan and Miller-Shaivits (1984) determined sex by using discriminant scores obtained from a series of tibial variables. Only the circumference at the nutrient foramen was applicable in this case. Any circumference less than 91 mm (white) and less than 95 mm (black) are classified as females (84.8% accuracy). With a circumference of 83 mm it may be suggested that the tibia is likely to derive from a female. Since the Qeqertasussuk tibia has a projected maximum length of 308 mm, and has a maximum and minimum midshaft diameter of 27 mm and 17 mm (Table 3), the female sex diagnosis may well be in accordance with the figures reported by Laughlin and Taylor (1958) concerning the male skeleton from the Imaha site: the left tibia had a maximum length of 360 mm, with maximum and minimum midshaft diameters of 29 mm and 22 mm respectively.

Singh and Singh (1976) reported a strong sexual dimorphism in Asiatics when using the maximum length of the fibula, whereby any maximum length less than 314 mm suggests a female while any maximum length above 388 mm suggests a male. The estimated maximum lengths of Fibulae I and II are approximately 317 mm, thus suggesting a female. A maximum length of 321 mm was reported for a fibula from the Port-aux-Choix (Gargamelle) finds, but no sex diagnosis was given (Harp and Hughes 1968).

Age (macroscopical techniques)

All the bones could be assigned to an adult age cohort. The two epiphysial fragments could only, by their general size, be determined as belonging to an adult age group. Epiphysial ends were present in only the fibulae, and did not show any signs of incomplete epiphysial union, thus suggesting an age of at least 20 years.

The external bone surfaces of the tibia were smooth and less rough than would be expected from an older person, indicating that the person may have been between 25 and 40 years of age at the time of death.

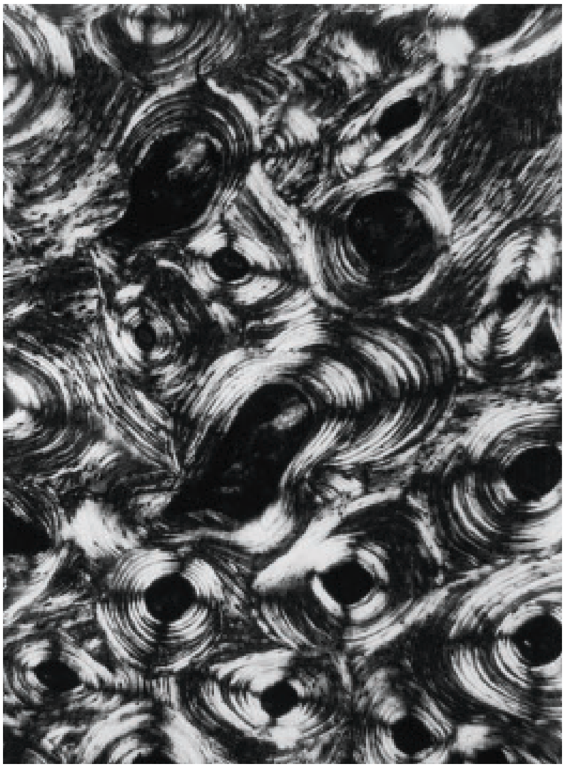
The humerus yielded no epiphyses. Only the proximal part of the diaphysis was present. The extremely thin cortex may suggest an older adult, possibly between 40 and 60 years.

Age (microscopical techniques)

Counts of secondary osteons as seen in microscopical preparations of the cortical bone (App. C, Fig. 4) were used to establish relative age differences between the bones, following the methodology outlined by Kerley (1965) and Ubelaker (1978). The anatomical locations specified by Kerley (1965) and Ubelaker (1978) were not used because of the fragmentary stage of the samples, e.g. only part of the lateral section was used from the tibia. The readings yielded some tentative age estimates, based on the regression equations developed by Kerley (1965). These indicated an age of approximately 40 years (± 10 years) for the tibia, and approximately 30 years (± 8 years) for the fibula.

Estimated living stature

Estimates of living stature were based on the approximate maximum length estimates of the long bones (Table 4). Equations specifically developed for Mongoloid material and with no sex separation were applied (Trotter and Gleser 1952, 1958).



App. C, Fig. 4
Secondary osteons in the cross section of the tibia (App. C, Fig.2) as they appear under microscope. (Photo by R. Fortuna).

Number of individuals

Based on the anatomical features and observation, there is little doubt that Fibula I and Fibula II belong to the same individual. Also, it is likely that the two fibulae and the single tibia belong to the same individual. While the microscopical age estimates indicated a slight age difference between the fibulae and the tibia, the resultant age estimates overlap, and inherent difficulties in the method may well account for the difference. Also, even though the estimated maximum lengths of the fibulae exceed the estimated maximum length of the tibia (Table 3), there is some uncertainty due to the fragmentary nature of the material.

Thus the minimum number of individuals represented by the four bones, based on a parsimonious view and on the available information, is two individuals: 1) an adult male, approximately 40–60 years old (the humerus); and 2) an adult female, approximately 30–40 years old (the tibia and fibulae).

Discussion

Skeletal material

In general, human skeletal remains are poorly represented when in proportion to the great amount of archaeological material retrieved from excavations of Palaeo-Eskimo sites. Indeed, until the Qeqertasussuk find, the remains of only 26 Palaeo-Eskimo individuals had been found, of which only one is Pre-Dorset (Table 1). The Qeqertasussuk bones comprise the oldest known human material found in the Arctic. However, beside the fragmentary nature of the find, this also means that there is no material available for comparative analysis, as the other Pre-Dorset find only concerns a prematurely born child. Therefore, it is difficult to judge to what extent the Qeqertasussuk bones are truly representative of the once-living population. The physical anthropological analyses of the earlier Dorset finds mostly centred on determining whether the Dorset people were of Eskimo or North American Indian origin (Laughlin and Taylor 1958; Harp and Hughes 1968; Anderson and Tuck 1974). It was concluded that the skeletal remains presented clear Eskimo characteristics. The Qeqertasusssuk remains were compared to the scarce Dorset skeletal remains when applicable. However, it is not possible to determine if the Palaeo-Eskimo were biologically different from the later Dorset and Thule Eskimos. This does have some implications when applying regression formulae for stature and age estimation, since most Greenland Eskimo anthropological research is based on Thule culture material (Jørgensen 1953; Laughlin and Jørgensen 1956; Frøhlich and Pedersen 1992). Although the racial affiliation is, by default, classified as Eskimo, most cut points, discriminatory analyses and demarcating points used in the analyses of age, sex and stature, are based on either American Caucasians, North American Negroids, American Indians or Asiatics. For this reason, the estimation of sex, age and stature must be considered as a guide. For example, the age estimates are derived from equations based on Caucasian characteristics, thus the resultant ages may be significantly off. Nonetheless, the application of several standard regression formulae may serve to determine whether the bones could be from the same individuals. For example, living stature has been successfully estimated from midshaft diameters, but that was based on Caucasian and Negroid skeletal populations (Steele 1970). The same estimates would be erroneous if applied to the Saqqaq material to obtain an accurate estimate of the living stature. However, as a comparative tool within the same population group, such estimates may help in establishing the number of individuals represented by the available samples. It is of interest to note that the estimated living statures in Table 3 conform with figures published by Balslev-Jørgensen suggesting 150 cm as the estimated living stature of a Thule population group (Jørgensen 1953).

The mineral loss observed for the humerus could be due to a wide range of specific and nonspecific factors including diagenetic factors, hormonal disturbances and common dietary calcium deficit. It was not possible to determine the cause of this loss, but it has been established that Thule Eskimos often suffered from osteoporosis, probably due to their high-protein diet (Mazess and Mather 1974, 1975; Thompson and Gunness-Hey 1981; Gotfredsen *et al.* 1989). Indeed, the ∂^{13C} values (0/00 PDB), cf. Table 2, indicate an almost exclusive reliance on marine food.

The Harris lines identified by X-ray in the tibia and the fibulae have been proposed as indicators of periods of growth stress: bone growth is dependent on a number of factors and in periods of disease and starvation growth is reduced while calcium is still deposited in the slowly growing bones (van der Merve 1992). To what degree the Harris lines of the tibia indicate especially harsh health conditions cannot be judged at this time because of the lack of comparative material.

Mortuary practices

The variety of mortuary practices within the Arctic population systems have been discussed in detail by numerous scientists and it is unfortunate how much we still do not know about this topic. Indeed, only few Palaeo-Eskimo graves have been identified, and all in Canada (Laughlin and Taylor 1958; Harp and Hughes 1968; Anderson and Tuck 1974; Helmer and Kennedy 1986; Oschinsky 1960; Meldgaard 1960). The first probable Dorset burial was identified by Taylor in 1957 at the Imaha site. This grave, which contained a cranium and postcranial skeletal remains of an adult male, consisted of an oval of stone slabs and boulders with horizontal slabs covering the vault (Laughlin and Taylor 1958). Several artefacts were found in the grave. The artefacts suggested that the Imaha site represented the Dorset culture (Laughlin and Taylor 1958), although the grave architecture as such also could represent the Thule culture (Helmer and Kennedy 1986).

The Imaha burial was found in the vicinity of a settlement site. This is also the case for the Dorset period Lanes Cove burial (Anderson and Tuck 1974) and especially for the large number of Dorset period graves found by Meldgaard (1960) in the Igloolik area. On the other hand, the Crow Head and Pumpley Cove graves (Anderson and Tuck 1974) and the Gargamelle Cove grave, all Dorset period, were located in caves or crevices and at some distance from known habitation structures. The Pre-Dorset burial was found within a settlement structure (Helmer and Kennedy 1986), similar to the Port-aux-Choix 5 Dorset burial (Harp and Hughes 1968). Both of these latter burials include sub-adult material only: a premature baby and a 21-month-old infant, although the latter also included an adult mandible. Unfortunately, Oschinsky (1960) does not include a description of the architecture and the cultural finds associated with the skeletal remains found on Mansel and Sugluk islands. However, Maxwell (1985) states that these remains were found in middens. It is noteworthy that the finds from Mansel Island include the remains of a fibula shaft (Oschinsky 1960). All of the above described burials, except those on Mansel Island and Sugluk Island, included artefacts. Also, all the graves seem to have had a covering of stone slabs.

The burials in caves include multiple individuals (Harp and Hughes 1968; Anderson and Tuck 1974), which was also the case for the Port-aux-Choix 5 burial, a pit burial, which, as mentioned, also included the remains of an adult mandible (Harp and Hughes 1968). Based on the burial circumstances of this mandible, associated with Dorset artefacts and in the pit with the infant skeleton, Harp and Hughes (1968) suggested that this could represent a secondary burial.

Probably the most extensive investigation of Dorset graves was carried out by Meldgaard (1960, 1962) at the Igloolik site in 1954. Meldgaard (1960) identified three types of Dorset grave: (1) the oldest type identified by a gravel mound covering a complex burial structure, including a deep pit with the remains of at least two individuals (an infant and an adult); (2) a more recent type consisting of a rectangular or rounded pit, edged by a few stones; and (3) the most recent type consisting of massive stone cists erected on the surface, indicative of contact with Thule culture. Only one grave was found of the first type. All the burials were found close to dwelling units.

Based on all the known data, it seems that two types of burials are associated with the Dorset culture:

1) Single burials, which may be primary and/or secondary, located in or nearby settlements. The grave is usually a pit, lined and covered by stones. The burial may be covered by a mound, or it may be erected on the surface. Probably the latter type reflects contacts with the later Thule culture or it may be a direct prototype for the Thule culture graves.
2) Multiple burials in caves or crevices. The graves may include a stone cover. The burials are usually found at some distance from the dwelling places. It has not been possible to verify whether the multiple burials of this type represent one single burial event only, or are the result of several burial events.

There remains, though, the problem of interpreting the finds of skeletal elements in the middens: the case of the Qeqertasussuk bones, and the finds from Mansel and Sugluk islands. Assuming not too diverse mortuary practices between Pre-Dorset and Dorset culture, this could represent a mortuary practice of first laying the dead out for skeletonization, and then at a later time some bones would be chosen to be placed in a pit grave, along with grave goods (seal meat, small bone figurines) (Grønnow and Meldgaard 1991), the remaining bones simply being discarded in a midden. Since ochre has been reported in or by some of the pit graves (Meldgaard 1960; Grønnow 1987b), this may indicate that the Qeqertasussuk tibia with ochre deposits was involved in a mortuary ritual. The Qeqertasussuk bones were found in a midden, and hence it could be speculated that these bones were the bones not selected to be placed in the grave proper. The midden find at Mansel Island also included the shafts of some long bones, among others a fibula.

Paleodemography

No actual graves have been identified at the Qeqertasussuk site. This partly reflects the difficulties in locating subterranean burials exposed to up to 4,500 years of uninterrupted environmental changes, and also the difficulties in facing a mortuary practice which does not include the interment of the deceased bodies in a man-made construction such as a stone chamber.

Independent of the mortuary practice or practices used by the Saqqaq people, simple demographic calculations may suggest an average number of deceased people that should be accounted for. Such models are based on means and averages and do make assumptions on population growths, migrations and immigrations, sex and age distribution, which in practice cannot be applied to a living population. However, with the lack of any usable data, such models may be helpful in identifying trends and patterns (Frøhlich 1986; Lynnerup n.d.).

The Qeqertasussuk settlement was inhabited in varying degrees of intensity for about 800 years (Grønnow 1994). The faunal analysis of the settlement finds suggests a permanent settlement pattern during the first part of the occupation. This seems to be replaced by a more seasonal use of the site in the later part of the occupation, suggesting the use of the site as a 'summer camp' (Grønnow and Meldgaard 1991). The human activity, i.e. the number of people occupying the site, seems to have been significantly larger during the periods from 1900 to 1700 BC, suggesting that for roughly one quarter of the site's life span the activities seem to have been 'high' (Grønnow and Meldgaard 1991). The following analysis will pertain only to this period, since it is not possible to determine the degree of activity in the later periods, which may very well have had an irregular, discontinuous pattern.

How many people could the site carry during the first period of 'high' activity? A rough estimate suggests that there were 'several houses' at the site (Grønnow and Meldgaard 1991). Ethnographical records register either total population size or number of persons per family (McCartney 1977: 215). Based on data derived from Boas (1888: 17–18; 1901: 7; 1907: 377–78), Jennes (1922: 37), Mathiassen (1928: 15–20) and Kroeber (1899: 269), McCartney (1977: 215–17) estimates the average number of persons per house to be four. Let us assume that the Qeqertasussuk site contains a total of five functional houses at any given time, a population estimate can be calculated based on the sedentary use of the site described above. The maximum potential for a full occupancy for five houses would be 20 persons. Based on demographical models (Ubelaker 1978; Hassan 1981), the tentative and average number of deceased persons during the 200-year occupancy can be calculated at between 100 and 120 individuals. Half of the deceased persons would be expected to be sub-adults because of traditionally high infant and sub-adult mortality rates. This leaves tentatively 50 to 60 adult deceased persons covering the period in question. While this number attests to a small population, the number may seem large in the sense that at least some graves should be present within or adjacent to the site.

Hypothesizing that the actual burial ground would change location over time as a result of possible changes in the burial customs, the estimated number of deceased individuals may be distributed over a relatively large area. This does not include cases where the applied burial customs may have resulted in a significant decay of the bodies, leaving few or no traces either as an architectural structure or as biological evidence. On the other hand, assuming some similarity to the later Dorset cultural complex, it could be hypothesized that the deceased were grouped together in less accessible caves or crevices and at some distance from the settlement. Furthermore, several may have died while hunting or at sea, precluding 'proper' burial.

Conclusion

Based upon morphological, microscopical and X-ray examination it was concluded that the four bones found in a midden at the Saqqaq site represent the fragments of a humerus, a tibia and two fibulae. The bones may be the remains of at least two individuals. The humerus probably represents a 40- to 60-year-old male, displaying signs of osteoporosis. The tibia and the two fibulae may represent a female, approximately 30 to 40 years old. Living stature was estimated, and found to be in accordance with later Thule culture Eskimos. However, it must be kept in mind that the use of regression equations and observations gained from Thule culture Eskimos (or other Mongoloids) may not be directly applicable.

The bones represent the only human material from the Saqqaq period in Greenland. Indeed, in the entire arctic region, Palaeo-Eskimo human remains have only been sparingly identified. Analyses of the graves point to a mortuary practice where only some bones were included in the burial, presumably after skeletonization of the dead. Since the Saqqaq bones were found in a midden and not in actual graves, it may be speculated that the bones were discarded, and that somewhere actual graves do exist incorporating the rest of the missing skeletal remains.

Since the bones represent too small a sample to establish any adequate paleo-demographical picture of the site, calculations were carried on the basis of archaeological and cultural historical data from the Saqqaq site and other sites. This included the number of dwellings, the number of individuals in each, and the period of occupation, in order to estimate a hypothetical population size. These calculations yielded an estimate of about 20 individuals occupying the site during a 200 year time span. This would equal an expected cumulative amount of deceased adults of between 50 and 60.

Table 1 Dorset and Pre-Dorset skeletal finds.

Culture	Site name	Skeletal remains	Reference
Dorset (?)	Imaha	1 adult male	Laughlin and Taylor 1960
Dorset	Mansel Island	1 adult male	Oschinsky 1960
Dorset	Sugluk Island	1 adult female	Oschinsky 1960
Dorset	Alarnerk, Igloolik	4 adults 1 infant	Meldgaard 1960
Dorset	Gargamelle Cove	4 adults 1–2 juveniles 3 infants	Harp and Hughes 1968
Dorset	Port-aux-Choix 2	1 adult 1 infant	Harp and Hughes 1968
Dorset	Lanes Cove	1 infant	Anderson and Tuck 1974
Dorset	Crow Head Cave	1 adult 3 infants	Anderson and Tuck 1974
Dorset	Pumbley Cove	1 adult	Anderson and Tuck 1974
Pre-Dorset	North Devon Island	1 prematurely born infant	Helmer and Kennedy 1986
Pre-Dorset	Qeqertasussuk	2 adults	Frølich and Lynnerup, n.d.

Table 2 Results of radiocarbon analyses.
Radiocarbon dates of human remains from Qt.

Lab. no.	Sample no.	Horizon Layer	Material	BP	+/-	Res. corr. BP	+/-	Delta ^{13}C	Delta ^{15}N	Refs.
AAR-797	Qt84 FB, 10-15/25	**H4-H5** 5-6	humerus	4120	250	3700 (res.age: 0.928)	250	-13.1	-	4; 5
AAR-798	Qt85 FB, 13/24:37	**H5** 6	tibia	4190	230	3750 (res.age: 0.974)	230	-12.7	-	4; 5
AAR-799	Qt84 FB, 12-13/25	**H5**	fibula	4310	230	3880 (res.age: 0.954)	230	-12.9	-	4; 5
OxA 20656	85/261:12	**H3** 15	Hair	4044	21	-	-	-13.9	19.3	1; 2
UCIAMS 86238	Qt 1.1	-	Hair	4010	15	-	-	-14.0	-	3
UCIAMS 86239	Qt 2.1	-	Hair	3970	15	-	-	-14.0	18.8	3

1) Gilbert et al. 2008
2) Rasmussen et al. 2010
3) Raghavan et al. 2014
4) Koch et al. 1996
5) Lynnerup et al., this volume

Table 3 Dimensions (in mm) and weight (in grams) of the bone fragments.

	Tibia	Fibula I	Fibula II	Humerus
Max. length I (a)	280	299	302	124
Max. length II (b)	308	317	317	
Max. diam. midshaft	27	14	14	21
Min. diam. midshaft	17	10	9	17
Circumference midline	72	42	43	61
Circumference minimum	68			
Circumference at nutrient foramen	83			
Saggital diam. at nutrient foramen	32			
Transversal diam. at nutrient foramen	23			
Weight (d)	84.8	23.3	22.3	15.6

NOTES:
(a) The max. l (I) is the maximum length in millimetres of the present bone, e.g. not including one or two epiphyses.
(b) The max. l (II) is the estimated maximum length of the reconstructed and complete long bone.
(c) The estimated midline of the humerus was located 25 mm from the most distal end of the present bone (App. C, Fig. 1, Table 2).
(d) Weight has been determined by using a Mettler PM3000 electronic scale (in grams).

Table 4 Estimated living stature (in cm) employing estimated maximal lengths.

	Tibia	Fibula
Est. max. length	30.8	31.7
Living stature (a)	155.1 ± 3.3	156.6 ± 3.2
Living stature (b)	150.9 ± 3.7	152.5 ± 3.6

(a) Sexes combined, Ref.: Trotter and Gleser (1952, 1958) and Bass (1971).
(b) Females, Ref.: Trotter and Gleser (1952) and Bass (1971).

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Dansk resumé

Qeqertasussuk og Qajaa er de eneste kendte arkæologiske lokaliteter fra den tidlige fase af Arctic Small Tool tradition (tidlig ASTt) i det østlige Arktis, hvor hele spektret af organiske materialer – træ, knogler, barde, skind osv. – er bevaret i permafrosne kulturlag. Grundlaget for denne afhandling er beskrivelser og analyser af et omfattende fundmateriale med tilhørende kontekstuelle data tilvejebragt gennem flere års tværfaglige undersøgelser og arkæologiske udgravninger på bopladsen Qeqertasussuk i den sydlige Disko Bugt. Materialet bliver suppleret med analyser af fund fra bopladsen Qajaa i Kangia (Jakobshavn Isfjord), hvor op til tre meter tykke, permafrosne kulturlag med fuldstændig organisk bevaring blev undersøgt af Nationalmuseet i 1982. De to lokaliteter ligger nær hinanden og overlapper kronologisk. De dækker tilsammen hele Saqqaq-kulturens periode i Grønland (ca. 2400 – 900 BC).

Analyser af fundgenstandene giver helt ny indsigt i Saqqaq-kulturens teknologi. For første gang kan komplette sæt af fangstvåben bestående af buer, pile, kastespyd, lanser, harpuner og tilbehør som kastetræ og kajaklignede fartøjer beskrives. Ligeledes giver de unikke bevaringsforhold, hvor flere sammensatte redskaber er fundet i komplet stand, indsigt i den teknologi, der er tilknyttet hushold, daglige aktiviteter og håndværk, f.eks. skæftede knive, skrabere og stikler samt sygrej, træfade, skeer og spæklamper. Fragmenter af barde- og skindremme med en række knob og skindstykker med syninger, bl.a. en fod af en kamikstrømpe, viser helt nye sider af Saqqaq-kulturens teknologi.

Saqqaq-kulturens udnyttelse af råstoffer og de komplekse bearbejdningsteknikker, der førte fra råstof frem til færdige redskaber, bliver beskrevet gennem dynamiske teknologiske analyser af det store materiale af affaldsprodukter og råemner af træ og andre organiske materialer. Det konkluderes, at Saqqaq-samfundets materielle kultur bestod af et for en 'pionérkultur' bemærkelsesværdigt bredt udvalg af højt specialiserede, men samtidigt meget lette og transportable, redskabssæt. Råstofvalg og design var determineret af faste normer gennem hele Saqqaq-perioden i Grønland.

Bosætningen på Qeqertasussuk kan ud fra detaljerede stratigrafiske studier i kombination med serier af kulstof 14-dateringer deles i fem kronologiske horisonter, H1–H5, med H5 som den ældste. Hver af de tidlige horisonter, H2–H5, udviser bevaring af organiske materialer, og de repræsenterer en række ret kortvarige bosættelsesepisoder fordelt i tidsrummet ca. 2350–1750 f.Kr. (kalibrerede dateringer). Den seneste fase, H1, er repræsenteret af tusinder af stenredskaber fra flere bosætninger på lokaliteten efter ca. 1500 f.Kr. Dateringer fra den store Qajaa-boplads viser tilstedeværelse af Saqqaq-kulturen i Disko Bugt indtil den sidste fase o. 900 f.Kr.

De rumlige analyser lægger særlig vægt på H4 på Qeqertasussuk. Dette 'øjebliksbillede' af en bopladsoverflade blev frempræpareret omhyggeligt inden for et 8 × 5,5 meter stort areal, der viste uforstyrrede anlæg og meget velbevarede redskaber og affaldsprodukter i en meningsfyldt kontekst. Analyser af anlægsspor på denne flade – heriblandt midtergangsstrukturer, ildsteder, tørveplatforme og teltstænger af træ – i kombination med rumlige analyser af redskaber, restprodukter og mængder af måltidsrester (dyreknogler) resulterede i identifikationen af en midtergangsbolig, Anlæg A8, med spor af en lang række aktivitetsområder i og omkring boligen. Det konkluderes, at A8 formentligt repræsenterer en kuppelformet teltbolig, anvendt af et par familier gennem blot et enkelt års kolde måneder.

Morfologiske beskrivelser af fem menneskeknogler og 'ancient DNA'-analyser af menneskehår fra Qeqertasussuk bringer os helt tæt på Saqqaq-mennesket og dets genetiske rødder i Sibirien. Studier af bestemte redskabsgrupper og symbolske elementer giver, sammen med frag-

menter af trommerammer, glimt af de tidlige palæo-eskimoers sociale organisation og kosmologi.

Komparative analyser, der inddrager Saqqaq-inventarer fra hele Grønland, fra Independence I kulturen i Højarktis og fra præ-Dorset kulturen i arktisk Canada, placerer de to permafrosne bopladser i Disko Bugt i et bredt østarktisk perspektiv. Sammenligninger mellem især de organiske dele af redskabsinventarer og teknologier fra disse tre tidligste ASTt-grupper viser tætte relationer imellem dem. Forbindelserne over store afstande og tidsrum understreges af analyser af arkitektur, rumlig fordeling af aktiviteter inden for boligerne, bopladstyper samt bosættelsesmønstre.

De tidligste faser på Qeqertassusuk (og til dels på Qajaa) tolkes som hørende til pionérfasen i det østlige Arktis. Analyser af serier af kritisk vurderede og kalibrerede kulstof-14-dateringer fra Canada og Grønland leder frem til den konklusion, at den første menneskelige bosætning i Grønland var resultatet af en bemærkelsesværdigt hurtig og geografisk vidtrækkende migration ind i det østlige canadiske Arktis omkring 2400 f.Kr. Inden denne markante hændelse ses dog en pause i den initiale vest-østgående 'kolonisering' af Arktis, hvor præ-Dorset-kulturen forblev i det centrale canadiske Arktis i fem århundreder.

Afslutningsvis tegner afhandlingen et helhedsbillede af Saqqaq-menneskenes bosætning og liv i Disko Bugt for over fire årtusinder siden. Dette holistiske billede er baseret på en kombination af de arkæologiske resultater med de omfattende analyser af dyreknogler, pollen, insektrester og makrofossiler – undersøgelser, der er udført af en lang række forskere tilknyttet forskerholdet omkring Qeqertassusuk.

Monographs on Greenland | Meddelelser om Grønland

Manuscripts should be sent to:

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Dantes Plads 1, 1556 Copenhagen V
DENMARK
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Tel. +45 32 34 14 14
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Qeqertasussuk and Qajaa are the only known sites of the Early Arctic Small Tool tradition in the Eastern Arctic, where all kinds of organic materials – wood, bone, baleen, hair, skin – are preserved in permafrozen culture layers. Together, the sites cover the entire Saqqaq era in Greenland (c. 2400–900 BC). Technological and contextual analyses of the excellently preserved archaeological materials from the frozen layers form the core of this publication.

Bjarne Grønnow draws a new picture of a true Arctic pioneer society with a remarkably complex technology. The Saqqaq hunting tool kit, consisting of bows, darts, lances, harpoons, and throwing boards, as well as kayak-like sea-going vessels, is described for the first time. A wide variety of hand tools and household utensils as well as lithic and organic refuse and animal bones were found on the intact floor of a midpassage dwelling at Qeqertasussuk. These materials provide entirely new information on the daily life and subsistence of the earliest hunting groups in Greenland. Comparative studies put the Saqqaq Culture into a broad cultural-historical perspective as one of the pioneer societies of the Eastern Arctic.

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ISBN 978 87 635 4561 7

9 788763 545617

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